Analysis and Creation of Skill Rating System in 5v5 First Person Shooter Games

Christopher Boyce
SUPERVISOR: JAMES BANTON
ASSESSOR: BEN WILLIAMS

Contents

Abstract

This research investigates the current Skill Rating system used in 5v5 competitive shooters and analysis and breakdown of Elo, Glicko, Glicko-2, TrueSkill, and TrueSkill-2. Later in the project, an artifact has been produced that is used to collect data on Elo and TrueSkill and a 3rd Skill Rating system using the research to see if the current solution is a viable option in competitive shooters or if a proprietary option for each game is better. The research concludes that the tested algorithms all perform well but there is a clear advantage to performance-based Skill Rating systems that take into account kills and discussion into other performance stats and how this could benefit future Skill Rating Systems.

Introduction

Competitive shooter games have been around for over two decades and have become one of the biggest genres in gaming, during this time titles such as Counter-Strike, Rainbow Six Siege and newer titles such as Valorant have cultured a large player base which and drawn in by their competitive nature. Each game queued utilizes Skill Rating systems to match you against similarly skilled opponents to create a competitive environment for each player to show their skills. This incentivizes players to carry on playing and improve their skill and eventually master the game (Ebtekar & Liu, 2021). The research project is going to explore and discuss current systems floors and benefits with the outcome to create a fair and robust system. These systems need to work due to thousands of players want to play a fair game as well as prove their abilities and climb the ladders of the rating system. The ranking system also has a major impact on retention due to people wanting to become better. At this current point, there are many methods to do this that will be discussed but not a definitive best solution, this research topic is going to see if there is a best or if each version is viable to implement into a game.

Due to the large scope of this topic, this investigation research will be focused on First Person Shooter due to the similar mechanics throughout each game, therefore, making systems easier to compare between games, but this research can be used in other game modes such as Multiplayer Online Battle Arenas. As well as this the project and artifact will be looking at 5v5 games due to the current climate of competitive shooters majority of competitive shooters use small to medium size teams to compete at ranked play. 5v5 shooters come in many forms such as tactical shooters where a team has an objective normally attacking or defending an objective, they must then duel using teamwork strategy and tools supplied to complete the task. Normally this format of game has a set round timer to complete the objective and when it is completed the round resets and the players start again. The game ends once a set score has been reached. Counter-Strike is the most basic example of this with the objective being to plant a bomb from the Terrorist side and the CT trying to defend two bomb sites (Dyer, 2015).

Aims and Objectives

The first aim of the project is going to look into current solutions that have been used in real-world and video game scenarios. It is going to look at the positives and negatives of each one as well as show real-world data when they have been used. The systems when possible are going to be broken down and the math behind the algorithm is going to be analyzed and explained to show how each system works. Once the research into each system is done. Elo and TrueSkill are going to be implemented into an artifact and data from the system are going to be collected and compared to see the benefits of the system using personally collected data. Finally using all the research, a new skill rating system is going to be developed and used to compare against the Elo and TrueSkill systems to see if a novel solution can perform better or worse. The data collected and analyzed and made into digestible graphs to be able to compare the data easily and form an outcome of this research.

Literature Review

One of the most important concept that is needed when looking into Skill Rating systems is the Bell Curve or Normal Distribution. The curve is a symmetrical curve that represents a bell shape(Appendix C). This curve represents the majority of data points being close together, with fewer data points being extremely high or lower performers. This bell curve has been shown to represent similar skill distributions in competitive video games as well as in other games such as Chess using this as the bases of their rating system. This happens because of the learning curve of some games and over time a smaller and smaller population will gain these skills due to serval factors such as natural ability and time that must be spent learning these skills to progress.

One of the most famous rating systems currently used is ELO (Elo, 1986). This system uses the principles of a numerical representation of a player's skill. This numerical system then breaks up into classes of players. These in chess are represented by letters, E being the lowest at around one thousand Elo score to A being the highest, after two thousand Elo score. Pass two thousand the system starts to name classes from “National Candidate Master” to “Grandmaster” (Chess.com, 2020) (Elo, 1986). The system works on finding the probability of the players winning by using the player's existing Elo score and using the formula below to calculate the points gained or lost after the match. The elo system also uses a K value, this value is based on the weighting of the event and game the higher the K score the more points for the players to gain or lose. The K score is between 10 and 32 when used in Chess (Elo, 1986).

$$E_A = 1/(1 + 10^{(R_B - R_A)/400)})$$

$$E_B = 1/(1 + 10^{(R_B - R_A)/400)})$$

This formula takes the 2 skill ratings (Ra and Rb) which are the current Elo scores of the players. It then plugs them into the formula to work out the percentage chance of them winning. Which is represented by Ea and Eb. These percentages are then either added or taken away depending on a win or loss and multiplied by the K score. The Ra and Rb score is then amended by these amounts to giving the new skill rating. An example of this formula is displayed in Appendix A where Player A with 1500 Elo plays against Player B with 1600 Elo. In the example Player B wins and the formula is used resulting in Player B gaining Elo Score.

The advantages of Elo include that it is easy to interpret a player's skill. Higher the numbers the better the player which is an important part when building a skill rating system (Izquierdo, 2019). The system also is robust and works proven by its longevity and its use of it in international laws and economic laws (Edelkamp, 2021) (Elo, 1986). Elo splitting the player base into classes also allows for fair and more even matching because it will be placed with people with similar skill ratings as each other, meaning matches should be fair and competitive. The simplicity of the system is one of its greatest advantages, because of the easy-to-use algorithm everyone understands how it works therefore making it feel fair and making the player not feel cheated (Izquierdo, 2019).

Elo also has some disadvantages such as the scaling of the K factor. High-level tournaments in chess have predefined K factors decided and calculated by the US Chess Federation (US Chess Federation, 2013) but using the system outside of chess doesn't have a set algorithm or value that the player can use. Therefore, new rules and systems must be implemented to use Elo in a new sport that could be unbalanced. The other issue is the progression time of the player, the mobility of the system is very slow compared to newer systems (Izquierdo, 2019) which means players take longer to get to their true skill level when starting, this means that there will be a large number of games before the player gets a fair opponent. Finally, Elo is very limited by the games that it can be used with because the calculation can only be used by 1v1, this means any game that has a third player or team-based game cannot use this system (Guo, 2012). Elo also doesn’t incorporate any variation or randomness into the system that happens in games with an element of chance or luck (Edelkamp, 2021) meaning the Elo system cannot be used in these circumstances. Decay of the player's scores doesn’t exist in Elo and doesn’t even have an effect when the user plays again which causes unfair or uneven games, this is where the Glicko System tries to improve upon the Elo System.

Glicko is the improvement and adaptation of the Elo system, Glicko adds a factor of reliability to the outcomes of the game. The reliability of the player's current skill level is based on how recently they have played and the amount they played. For example, someone who has played recently has a higher chance their true skill level is represented by their skill rating score. Where someone who hasn’t played in a while could have improved or deteriorated over this time meaning their score may not reflect their true skill level (Glickman, 1998). This is represented in formulas by the notation RD for “Rating Deviation”. The higher the RD indicates the player's score is less reliable and more likely for random outcomes. The rating deviation always decreases when a game is played no matter the outcome, this is because more information and a more accurate score is gained after every game even after a loss. When calculating the Rating Deviation, a predefined rating period has to be set. This is the period of time that the player must play a certain number of games before their RD is increased, the Glicko system works optimally when an average of five to ten games are played in this time period (Glickman, 1998). This would have to be worked out by the administrator of the system.

The “Rating Deviation” is set to 350 when first playing the game. This is due to the game not knowing the base skill of a new player meaning it is at its widest possible range. When the player plays for the first time after a new rating period, they must use this formula to work out their new RD.

$$\mathrm{RD} = \min(\sqrt{\mathrm{RD}_{old}^2 + c^2 t},\ 350)$$

The T in the formula is how many rating periods the player has missed if the player hasn’t missed any T = 1. C is the constant decided by the administrator of the system. C is calculated by working out how long it would take for a player’s skill to reset. Glickman assumed this to be around five years (Glickman, 1998) which in his system means 30 rating periods each period being two months to reset the RD to 350. Glickman also assumes an average player to have an RD of 50. In Glickman’s case C = 63.2 but this can change depending on the factors listed.

$$q = \frac{\ln 10}{400} = 0.0057565 \qquad 350 = \sqrt{50^2 + c^2(30)}. \qquad g(\mathrm{RD}) = \frac{1}{\sqrt{1 + 3q^2(\mathrm{RD}^2)/\pi^2}}$$

Q represents Log (10)/400 and is used in the function to work out g(RD). Once g(RD) is calculated we can use these values to calculate E or in some formulas, it is represented as E(s|r,rj,RDj). This then can be used to find d^2 which must include every player competing in the current rating period.

$$E(s|r_0, r_i, RD_i) = \frac{1}{1 + 10^{\left(\frac{g(RD_i)(r_0 - r_i)}{-400}\right)}} \qquad d^2 = \left(q^2 \sum_{j=1}^{m} (g(\mathrm{RD}_j))^2 \mathrm{E}(s|r, r_j, \mathrm{RD}_j)(1 - \mathrm{E}(s|r, r_j, \mathrm{RD}_j))\right)^{-1}.$$

$$r' = r + \frac{q}{1/\mathrm{RD}^2 + 1/d^2} \sum_{j=1}^{m} g(\mathrm{RD}_j)(s_j - \mathrm{E}(s|r, r_j, \mathrm{RD}_j))$$

After all of the calculations for g(RD), Q , C , E and D have been worked out it is possible to calculate the actual rating of the player after the match. S in the formula represents a win as 1 a draw as 0.5 and a loss as a 0 and M represents a match against a player. Multiple matches against the same player are treated as a new match and have no difference from a different player. Now knowing all the variables and inputting them into the formula it will output a rating similar to the Elo system.

There is also a separate calculation that must be done to get the player's new Rating Deviation this takes the input of the player's current RD and the d values and works out the player's post-game RD from these values. This value will always decrease due to the player rating always being more accurate after a game.

$$\mathrm{RD}' = \sqrt{\left(\frac{1}{\mathrm{RD}^2} + \frac{1}{d^2}\right)^{-1}}$$

The positive of the Glicko system is that computationally it isn't very demanding and because of this, it can be run after every match is played so the player's skill can be updated constantly (Morrison, 2019) (Herbrich, et al., 2007), which is positive when players want instant feedback from the system. This allows the system to save and process very little data and when making a rating system for video games that run on servers is very helpful to save compute time. Because the system is an extension of the Elo system it has the same benefits of being simple to understand with the player being represented now by two values. The system also has been built where new players can get placed quicker (Glickman, 1998) into their real skill rating and has clear rules when adding them. This means that it is easy to add players over time and place them more efficiently resulting in fewer random matches. As well as this there is control for the administrator of the system to change the values depending on how they want the system to work. This allows the system to be adaptable to different games and gives the system some flexibility.

Disadvantages of the Glicko system include no tracking of player performance or how close the game was. This is a disadvantage because the players will lose the same amount of rating even if the game is close or not. If this was tracked the system could better place people and therefore be more accurate (Morrison, 2019). Glicko still has the issue of only working in a 1v1 scenario meaning that in multiplayer games the mean of the team's score will have to be taken making the game therefore less accurate (Morrison, 2019). This also doesn't take in variety from player to player so each player will gain or lose the same amount. There is also the issue of stagnation of the ranks when the player's RD is very low. This creates the issue of the player's improvement being very slow and it would be an advantage for the player to have a higher RD to move up quicker which could be exploited. Glickman has the solution to this issue by not allowing a player's RD to go below thirty (Glickman, 1998).

The Glicko System also gains more improvements over time with the Glicko-2 System bringing more factors into the calculation. This version of the calculation incorporates the player's volatility into it. This is important due to player's performance will never truly be consistent (Glickman, 2022). This is another value when lower shows that the player is more consistent in their performance therefore improvement can be measured more accurately and vice versa. Like the Glicko system, the volatility will increase if the player doesn't compete over a rating period as the system expects change over time. It is still recommended a rating period would cover five to ten games (Rotou, et al., 2015).

TrueSkill is one of the most well-known systems in the Video Games industry being developed by Microsoft in 2005 for the beta of Halo 2 (Herbrich, et al., 2006) and used after on a large amount of Xbox Live games. The reason TrueSkill was created was to deal with rating team-based games with potentially multiple teams. TrueSkill still uses a Gaussian distribution system by Microsoft which uses the values from Zero to Fifty to rate the player and new players start in the middle at Twenty-Five which in the formulas are represented by µ. The system skill incorporates deviation of the player skill like the Glicko system and is set to 8.333 as a new player (Dehpanah, et al., 2020). This is the formula represented by σ. This allows the system to know if the victory is unlikely and calculate the difference it will make to the player's rating.

TrueSkill is shown to have fewer errors compared to Elo and Glicko when predicting games as shown via sample data pulled from PUBG: BATTLEGROUNDS (KRAFTON. Inc, 2017). This was measured by calculating the "Mean Absolute Error" of over One Hundred Thousand games and over Two Million players (Dehpanah, et al., 2020). As well as this the data shows that TrueSkill is the best at rating new players as well as frequent players and described as the "best performer overall" (Dehpanah, et al., 2020). This data set being large cannot be fully relied upon due to the game being a "Battle Royal" genre meaning it is Free For All and therefore may not translate to other games. This point is once again proven in the data for Halo 2 when measuring the match quality. In data produced by Microsoft, it shows that the system is better than Elo at finding matches that are considered competitive but only in "Free For All" and "Head to Head" modes. Using the TrueSkill system meant having closer matches as well as more draws. When moving to "Small Team" game modes it fails to beat Elo. This is possible due to more players meaning more volatility in their skill levels at the time of the games (Herbrich, et al., 2006).

The first version of TrueSkill has a glaring issue. That it assumes that a player's performance is separate from other players within the team and teamplay isn't taken into consideration. An example of this could be having to go in first in a tactical shooter game where you are more likely to get killed first and have less chance to have an even or fair fight. The system doesn't take into account that the player could have sacrificed for the team. The other issue with TrueSkill was during the testing of the system in Halo 2 it showed higher prediction errors when used in smaller teams (Herbrich, et al., 2006). Show in Appendix B. In the case of a 4v4 full run Elo performed better than TrueSkill but it was also shown in closer matches to be more accurate and with a lower error rate. Even taking this into account the difference is very low but not insignificant.

In 2018 Microsoft published Trueskill-2, this system added to the original and looked at the flaws of TrueSkill and tried to build upon them. They had serval criteria that they wanted to meet. These were Support for team games, changeable skills rating, and single number representation which was possible in TrueSkill but they also wanted to add additional requirements. (Minka, et al., 2018) Aligned incentives were important because they want the player to work for the overarching goals instead of being selfish and exploiting the systems to gain rating. They also want minimal training data because it is difficult to test the data with systems before releasing it into a game, as well as low computational costs meaning running the system should be cheap for the company to update. Finally, minimal tunning needs to get to work this the game as it is being implemented.

Trueskill-2 considers more data points, such as kills and deaths in addition to the win and loss. This is a dramatic change because it separates the player's performance from the rest of the teams allowing for a more accurate representation of the player's skill rating. It also handles player quitting or disconnecting as a loss punishing the player for this to avoid people leaving to avoid rating decreasing. This could have been used previously as an exploit and will now allow the other team to gain the rating they have earnt. Trueskill-2 also now uses data from other game modes to more accurately predict where they are going to be placed in a new mode, this is because it is assumed that the player's skills will translate through modes if they are similar for example being 2v2 to 5v5 because the player has the base skills they have developed, and they are now using it in a larger team game. The system now has a bias toward newer players meaning the first few games have a large swing on the player's rating as the system now understands that a large range of skills is possible. This could mean more accuracy quicker in the player's ranked experience. Finally, the system now takes into account the performance increase when the player is queuing with other people and can balance the teams more effectively. This has been proven as a team that plays together regularly develops a "Collective Intelligence" and skills where they can adapt quickly to a range of different scenarios (Kim, et al., 2017).

With all these new features that have been implemented, Trueskill-2 can predict results more accurately as well as give more accurate skill ratings to the player. This is also shown the improvement of the predictive accuracy being 52% for the original but with this update, it is around 68%. Microsoft implemented Trueskill-2 into Gears of War 4 and believe the system was superior and worked well. Microsoft also uses this skill rating on the player to change the difficulty of the AI in the game to challenge the player. This provides feedback to the designers about the average skill of each player.

Trueskill-2 doesn't come without its disadvantages with the main issue being the complexity and difficulty of implementing it into other games. As well as this Microsoft keeps the inner workings and balancing of the model private. Because it isn't fully disclosed the system is impossible to replicate all that is available is the variables it takes into consideration, this is to stop people from finding exploits in the system or simply coping with their research and work. The metrics they collect also are basic with just Kills and Death collected which in modern competitive shooters isn't the only thing that can be tracked. A lot of FPS games have different roles and people doing jobs that may mean they get fewer kills but are impactful Kills meaning they had more of a swing on the outcome of the game. An example of statistics that are important in first kills or entry kills. The team with the first kill normally gives a large swing on the round and can be an important metric to have. This is shown in the 5v4 stats of HLTV which is the leading stat provider of all CSGO professional games which shows that teams have between 70% to 75% of winning the round after winning the first duel therefore giving weight to the first kill (HLTV, 2023). Trueskill-2 also being such a new system that only a few games developed by Microsoft including Gears of War and Halo currently use the system meaning testing is on only a few sets of data meaning this system could have flaws that haven't currently been found. Other games use similar systems which consider other statistics other than Wins and Losses and are currently used but Trueskill-2 is one of the only documented systems.

When developing a matchmaking system, the Team Skill Gaps need to be measured. A Team Skill Gap is the difference in raw skill between the teams. This can be calculated by finding the average team Skill Rating Score and comparing them. If they are too far apart first of all it feels unfair for the team that has a large disadvantage as well as means they are more likely to disconnect causing a total imbalance in the game's integrity. This is shown in Appendix D which is a study that shows the difference between the skill gaps and the likely hood of a player leaving. This example of Halo 5 shows that once the player is over 400 score there is a high chance that one player in the game is going to leave (Menke, 2020). This data shows that 200 is around the maximum before there is a large jump in someone leaving as they find the game unfair. These numbers are specific to the game of Halo 5 but can be used to show proof that it is an important metric to review when in development.

Personal Skill Gaps are the difference between the player's skill verse the average of the enemies' team average. This shows how successful the player is going to be compared to the enemy team. For example, if it is high the player should have an above-average game because they feel like they are better and statistically are better than the opponents. This is also important to make sure there isn't a high variation due to the fact they will think that the game is too easy or too hard which can cause players to quit or even stop the play session. The graphic of Appendix E is similar to the previous graph and shows a clear curve when the gap gets higher but a more significant incline once above 500 Rating. It is also discussed the player has a high chance after having a game that was too hard that they will stop the play session which is bad for user retention which is the goal of many games companies (Menke, 2020).

Stacked parties have to be considered, this is due because the skill of the party could inflate the skill and responsiveness of the team due to the increased communication and collective intelligence they have gained from playing before (Kim, et al., 2017). This will allow them to tackle in-game problems more efficiently giving them an advantage. Some games disallow large teams to queue together an example of this is Valorant (2020) which the top ranks you can only queue with one other person at the higher ranks. Another solution to this problem is allowing only parties to queue against other parties this will increase the wait time for everyone as the population queuing at the time due to the matchmaker having to take longer to find a party that works. This could also result in games having higher ping. 343 didn't use any of these solutions in Halo 5 and don't have anything to counteract this and let everyone face everyone (Menke, 2020).

Ping will not affect this research topic but it is something that will need to be considered when deployed into a real game, Halo 5 studies show that there isn't a correlation between the players leaving and having higher ping but it is noted that they have got global restrictions meaning that players can't connect to people in different continents meaning the geographical range isn't large enough to cause issues to the player (Menke, 2020). Other server issues such as stability and pack loss will have a more impactful effect on the player meaning a lag compensation is needed to counteract this issue, but it isn't something this research project is going to investigate.

Wait time for a server or to make a game is also shown not to have any correlation with the player quitting the game early this is covered briefly by the Halo 5 study (Menke, 2020), but it is discussed that the more modes and maps that you let the player select the longer the wait times, as well as a discussion on a minimum number players for a game mode, is allowed for larger based games such as battle royals should always be considered.

One external rating tool that has been created is the HLTV Rating System (HLTV, 2017). This rating system was created in 2010 and rates the performance of professional players' matches. This system uses a rating from 0 to 2 and shows the impact the player had on the match more accurately than Kills / Deaths. The system takes a handful of inputs such as Kill Rating, Survival Rating, Impact Rating, and Damage Rating. It uses all these inputs to balance the rating. All these data points allow the algorithm to reflect how the player performed (HLTV, 2022). The introduction website shows the changes from the 1.0 version to the 2.0 version and shows the difference it will and that the players that have more of an impact will gain more score. These inputs that are given to the system can be implemented into a Skill Rating system and will more accurately reflect the player's performance. One of the most important scores is the Impact Rating, this takes into effect the multi-kills, opening kills, and clutches which can show that a player has performed well in the game and is something that isn't currently tracked in systems built into games. The HLTV still has many issues and has been broken down and analyzed and shows that the system still relies heavily on the Kills / Deaths and a lot of the results can have the same conclusion when other variables are removed which shows the system doesn't have the same complexity that is suggested (Sardegna, 2017). This doesn't mean they don't take all the variables into account but proves they don't have a major swing to the final results.

Research Methodologies

The artifact is going to be investigating current rating systems and comparing them between themselves and a new formula using new data points that have been researched. This is going to be done by simulating a competitive shooter and comparing the results to the expected findings such as the natural distribution curve and analyzing the user's performance and contrasting their giving rank to them. This will be done by using the Elo formula to see the most simplistic ranking system and comparing it to the TrueSkill formula a more detailed system. Then a new formula will be included that is going to take inspiration from the serval other factors that have been discussed. This formula will be developed and tuned throughout the process of development to replicate or improve over the other systems named. This means there are going to be three forks of the project made with each one with the same development area such as maps bots and the statistics created for each bot.

The artifact will be using simulated player also known as Artificial Intelligence (AI) to evaluate each system and test the performance of each system. That means there will be multiple skill levels using previously discussed statistics of general player performance and applied to the AI in the system to show unique performance differences like in real life where not all players are at the same skill level, this will distribute the players into a large range. The two main statistics that are going to vary on each bot are accuracy and reaction times. These two have been picked due to them being the core mechanic in a basic first-person shooter and an attribute that can be built into the bot aiming script. This also gives the bots at a lower skill level a chance to still compete with higher skill bots due to the accuracy beginning in a range.

The data that will be collected will be scrutinized using several methods the first will be the Kolmogorov-Smirnov test which if the data that is inputted will follow the normal distribution curve will be done due to the research into player performance fitting to the bell curve (Izquierdo, 2019). This test if performed correctly should show with the Elo and TrueSkill formulas follow the bell curve as they have been tested before but will be used to show evidence of correct data in the artifact's development. When developing the new formula this will show that the formula is considered the natural distribution of player skill and will show evidence of a functional system.

Another data-driven way to test for the normality of the results is to create a histogram of the bot's skill rating. All bots data is going to be sorted into bins depending on the spread of the data and then a histogram will be created. This will then be plotted onto a graph to show the curve that has been created. Either the results will show a similar shape to the bell curve therefore backing up the data or the results lack uniformity with the bell curve and prove the data isn't normal. This will help show if the data collected follows the pattern that is expected or that the data collected is somehow wrong and will have to be scrutinized more.

The system is going to need to follow a structure of ranking and the easiest way to do this is following the current system that has been developed. This will mean having stages and levels associated with the current player rating. An example of this is using the system bronze to diamond and using the numbers one to three to show where on the level they are this will give me fifteen unique placements for each player to be placed along this will have to be set later into the development of the artifacts to make each one have a correct pool size and should also show the bell curve for the amount in each which then provide data to show it is working correctly.

Due to the large nature of the project, there are going to be serval assumptions that will have to be made. The first is there isn't going to be any networking and location-based pooling of players due to the simulation being performed locally. This will mean all AI are able if at the correct skill level to play each other but for the outcomes of this study this isn't a necessary step. As well as this it is going to assume each game will finish with no leaving or disconnects, this allows for a reliable pool of data and means every game can be analyzed without external variables allowing the data not to have outliers. Finally, all AI will be in a solo party and not have an advantage queuing with the same AI this is due to the smaller amount of AI in the data set meaning AI will most likely play with AI of similar skills a lot more than in a real-world setting. The bots also will be all playing the same amount of matches at the same time meaning the Trueskill formula will always have the same Mu on each bot. This wouldn't be replicated in the real world as people will have different numbers of games played and therefore would be different.

Data from each match in the running of the simulation will be taken and plotted in an Excel spreadsheet. This will allow for a story of the bots and allow each match to be analyzed and used in the results of this document. This will help to see if there are any inconsistencies in data and allow for more data to be used to see the success or failings of this research. The data is going to focus on bots 0,50 and 99 and plot all matches onto a line graph to show the progression of these specific bots but even 5 matches a scatter graph from all bots will be created. The scatter graph should show a trend line that follows the bot's programmed skill and the results from the skill rating system. For example, bot 0 should in a perfect run have the highest skill rating with it slowly declining when going down the leaderboard.

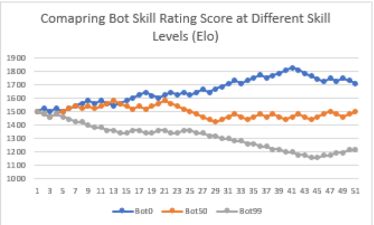
The final formula is going to try to predict the player's performance in the match and then at the end use this predicted data to see if they performed to the standard that the bot is meant to. It will then use this as a way of disturbing the Elo that the AI gains from each match. For example, if the highest-skilled bot underperforms in the match but they still win it will give less skill rating to that bot. This is going to be dubbed in this document as "Percentile Skill Rating".

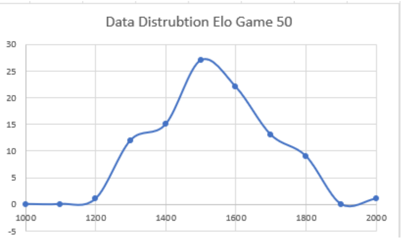
When comparing each skill rating, they are going to compare data to the perfect outcome and see what percentage they get correct. There is also going to be an analysis of each skill rating to see how close they got to this as the results are never going to represent the perfect solution as skill ratings are estimates of the player's skill.

The Unreal Engine is going to be to create this Artifact as many of the features such as Decision trees are built into the engine. As well as this environment can handle a large amount of AI at each level as all 100 bots are going to be performing at the same time. Finally, the use of C++ and blueprints should allow for all functions that need to be created.

Results and Findings

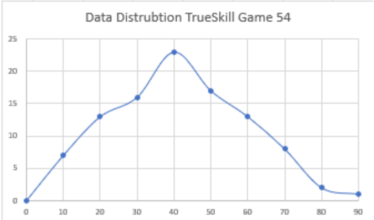
The first test that was run was the Elo system. The K factor of the Elo system was set to 40 to allow an average of 20 Elo scores to be gained or lost over each game. The system ran for 50 matches to get a large pool of data and to see the long-term effectiveness of the Elo system. All the raw data (Appendix I) were collected and mapped into several different graphs to help interpret the data as well as run through calculations to show the normality of the data. The normality test returned a P-Value of 0.97384 which can be used with the K-S score of 0.04674 to determine the data has some correlation with the normal distribution as a high P-Value shows the percentage chance of the data being normally distributed and the K-S score being low meaning a high chance of the data being normally distributed. The data was also made into a

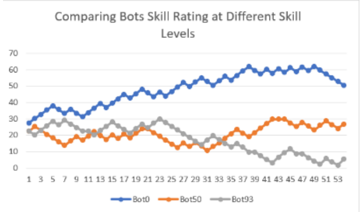




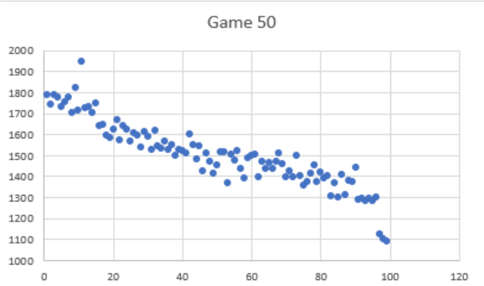
histogram and binned with intervals of 100 to see where the majority of the bot's skill rating was and plotted to a line graph to see. The results of the graph show a similarity to the bell curve, and this is also shown by the 27 of the bots being binned into the 1500 Elo rating, and the further from the midpoint the fewer bots under each bin. Skill rating data was also collected from a high-skilled bot, a medium-skilled bot, and a low-skilled bot to compare their journey throughout the matches and to see the difference, and to see if the system correctly placed each bot. The results show a slow, but significate split of each bot each of them ending with a difference between the skill levels. This data used Bot 0, Bot 50 and Bot 55 which were all very different skill levels to show either end of the spectrum when it comes to players so scatter graphs were collected of all bots every 5 matches and plotted into a scatter graph to see the overall trends of the bots throughout the process. This is shown in Appendix I. The bot's Skill Rating all starts at the 1500 marker but shows after the initial 15 matches which are classed as placement matches its starts to for a trend from the top left to bottom right and this becomes more apparent the more matches played.

After the initial TrueSkill test of Appendix F, there were some changes. The program was run over 54 games with a higher K factor of 5. This data was to allow for more spread as the initial test results were close together and ran for longer to see the long-term effects of the TrueSkill algorithm and to gather more data points for analysis. The final Mu was collected and run through the same tests as before. This data gave a K-S score of 0.04956 and a P-Value of 0.95639 which mathematically gives a closer alignment with the standard deviation shown in Appendix G. This was also plotted onto a graph using the same methodology of using a histogram. This time the data was plotted from 0 to 90 as the range was much bigger with an interval of 10 between each one. This result was more expected and shows that running the test with a higher K and for a longer period gave a large data pool to analyses. Similarly, before Bot 0, 50, and 93 data was collected and represented as a line graph to allow for an analysis for different skilled bots. Bot 99 was changed due to serval factors discussed in Appendix H. Scatter graphs were also created off all bots every 5 matches and at the end to help plot the changes over the matches, this data will allow us to see a correlation of bot placements over the 54 games. Appendix G shows all the raw data that is collected as well as scatter graphs of all the bots Mu every 5 games. This will help us analyze the general trend of the bots and if they are being placed in the correct positions.

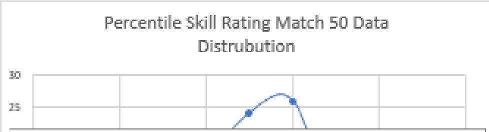


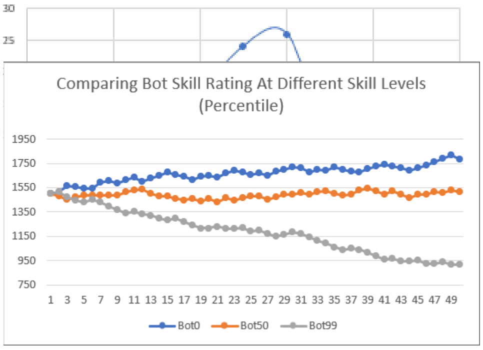


The final set of data that was collected was Percentile Skill Rating. This followed the same principles as before. The game was run for 50 matches and all data was recorded shown in Appendix J. The results of the final match were run through a Kolmogorov-Smirnov Test of Normality. This data had the results of a K-S value of 0.07361 and a P-Value of 0.6237 which show the data is far from the normal distribution. This is also shown in the histogram which was made. The data was binned with intervals of 100 between 1000 and 2000 as all results were in this range. The results once plotted clearly show the data doesn't follow the normal distribution but has some characteristics of a bell curve such as the peak but there is a clear lean towards the higher values. Due to this more data was collected from early into the test with data also being gathered from round 30 to see the changes from earlier



in the experiment which is shown in Appendix J. The Bots 0,50 and 90 were also analyzed and plotted onto a line graph to show the journey of different level bots and to see where they ended up. The data objectively shows the increase of the higher skill bots and the reduction of skill rating on the lower skilled bot. It also shows how the average bot stays consistent with the average Elo but does still reduce by a small amount. The data from all bots every 5 matches were also taken and plotted on a scatter graph to show the general trend of all bots and to see if the system is working functionally by placing bots in the correct skill group. This graph is the game from Game 50 and shows the higher skill bots are placed high was a general downward trend showing the bots reducing in skill rating. The progression of these graphs are shown in Appendix J. There are some clear outliers that are significantly higher or lower than expected but this could have been due to several factors including an element of luck with which teams they are placed on or significantly out performing what they are expected to do.





Discussion and Analysis

The Elo data collected has many signs of the system working correctly. The first is the K-S test giving a low score of 0.04674 help prove that the data is close to the normal distribution which is expected for the Elo rating system. This is expected when using this system by the creator Arpad Elo (Elo, 1986). This proves that the results collected are correct and follow the normal distribution pattern. This is also backed up by the Histogram created in Appendix I. The histogram when binned at 100 skill rating intervals shows a similarity between itself and the bell curve. This is shown with the middle Elo 1500 being the peak with 27 of the bots falling under this category. With the next bins showing fall off meaning fewer bots are at 1400 and 1600 making the bell curve. This reflects the theory that people's skill falls onto a bell curve and that the Elo algorithm distributes them accordingly (Izquierdo, 2019). This in no way proves that the bots have been placed in the correct skill group but helps to show the data is correct. One issue that represented itself in the investigation is the sample data isn't very big with the data when binning at 50 intervals showing a much lumpier line as the difference isn't as big. This could be caused by all the bots constantly playing the same similar-level bots causing a cluster of bots all staying around the same numbers. This is also exaggerated due to the bots all playing the same number of games due to the experiment being tested that way and more divergence would happen in the real world as people will encounter a large pool of players. A larger data set theoretically has reduced this lumpiness on the line but more tests would have to be done to prove this.

The analysis of Bot 0, 50, and 99 under Appendix I helped prove that the system is placing bots at the correct skill rating. The data shows Bot 0 (Blue Line) gain skilling rating consistently due to it winning the games with a downturn in winning closer to the end most likely by being placed with bots of similar levels and not being able to carry other Bots to the victory as they are all skilled players. Bot 50 (Orange Line) is shown to increase and decrease throughout the process but later becomes more stable. This could be interpreted as the placement matches being sporadic with a large mix of skill groups but slowly over time becoming fairer. This data is consistent with what should be expected from a skill rating system and therefore helps prove the system is working. Finally, Bot 99 shows a consistent drop in skill rating due to it being worse than other bots. From game 43 the bot does start to consistently win games and this could be the same effect as before with it finally being able to play games with bots at a fair skill level. The data is consistent with what a skill rating system should look like but does prove that the Elo system does take a long to split bots into fair skill levels that they have competitive games as discussed before (Izquierdo, 2019). This mobility of the system means that if the Bots skill did improve significantly, it would take a long time to climb the ladder as the system does look at personal performance. The other notable outcome would be the Skill Rating from top to bottom only being 800 score after 50 matches. This could be due to the number of matches played but also could be to the K factor. This sample used a K factor of 40 which would be considered high in chess but for this experiment could have been higher to get a large range of results. This would have to be investigated to see for differing results.

The scatter graphs created of all bots every 5 games were made to show the correlation between Skill Rating and how good the bot is. The first 10 games clearly show the placement matches scattering the data as many of the games have unpredictable results as the bots are mixed the most. Which will be normal due to the population all starting at the same skill rating at the same time. Around game 25 you can see the data starting to form a trend from the top left down which is to be expected, with this slowly becoming more prominent over the matches. This data shows the system is placing the bots correctly obviously with some outliers which could simply be put down to lucky placement in each team which is bound to happen in a data set of 100 samples. This data concretely proves the system's fundamental part is working as spoken about by Josh Menke at GDC using a similar method (Menke, 2017). This data also proves with the outliers that bots can be carried through games even if they have poor performance or luck, this shows the limitation of using Elo for a Team Vs Team game and means all bots gain and lose the same amount. It also shows the slow pace of the system with it taking 20 to 30 matches to start looking like a fair system with it taking all 50 to be completed. Which is a game that could take a player a long time to play if their retention is low. This backups the research into the Elo system in the Literature review that stated this.

TrueSkill data also shows that the system performed correctly. When using the Kolmogorov-Smirnov Test of Normality it gave a K-S Score of 0.04956 which is below the 0.05 rating (Ghasemi & Zahediasl, 2012) that is seen as the acceptable rate for the data to show it isn’t significantly different from the normal distribution. This is also reflected in the histogram in Appendix G which shows a smooth bell curve when binned with intervals of 10. The histogram shows a near-identical reflection of data from the middle point which shows normal distribution this is shown with a low Skewness. The P-Value is also high with a 0.95639 which shows 95 percent of the results are within one standard deviation making a clear peak in the graph. The one issue with this data set is there isn’t a cap to Mu which Microsoft did have in the TrueSkill formula. This was due to the high K factor of 5 being used and therefore bots exceeding the 50 normal maximum. Using a lower K factor and implementing a maximum could have replicated more accurate results but would have meant bots reaching the high end would have bunched up and given the bell curve a flick up on the right side. Overall the proof of normality shows the system is functional and accurately reflects the player's ability.

The analysis of Bot 0,50,93 in Appendix G shows a clear sign that the system places each bot differently and in the correct order, but as discussed in Appendix H that there are some clear outliers. Bot 0 had a steady but clear early increase winning a majority of the placement matches with a more steady but consistent increase over the match period. Bot 50 had a dramatic losing streak at the start and got stuck in the lower end of the skilling rating till around game 30 where the Bot was clearly too low and started to increase dramatically working its way back to the middle of the pack. This shows the clear importance of the first few matches and the chance that the player can get stuck with a bad set of teams in a row and have to work their way back up. This data proves that TrueSkill longevity works well, and the algorithm works well. This could have been a reduced effect if the bot performance was also considered as it would have in TrueSkill 2 (Minka, et al., 2018). For the reason mentioned in Appendix H, bot 99 was a clear outlier but is proof that singular bots can be boosted through the ranks not by having skill but by pure luck of being on good teams. This is proof there is a floor in the TrueSkill system and shows that queueing in groups may carry a player not deserving of the Skill rating up making the game feel unfair or broken. More games should have been played to see if Bot 99 could have carried on increasing or if the system would bring the bot down to where he should have been. The data K value was set high in this testing due to the shortness of the test and wanting the data to have a larger range to review. In the deployment of this, the K value should be much lower so players do not exceed the 50 cap like in this test.

Finally, the Scatter graphs in Appendix G show a clear correlation even after 15 games with a clear trend of higher-skill bots closer to the top in a short period. The spread of these bots is very large but becomes smaller with each interaction of 5 games. By the end of the test, the data shows a clear trend line and clearly shows the system is working and placing bots in theoretically the correct place. With a few stray middle to low-skill bots being pushed to a higher skill level. This may be due to the carry effect that was shown on bot 99 or that they outperformed what was expected of them. The issue could also be part of the matchmaking system. The system finds the 10 players close to each other and then randomizes the teams. This system may not be the most effective as many lower-skill bots may be placed with a high-skill bot that could carry them. This would have to be something that is looked into and fixed maybe placing them depending on other factors but heavily leaning on the skill rating. Examples of this could be average Kills per game or winning and losing streaks.

Percentile Skill normality data is much more skewed and doesn’t represent a bell curve. This is shown by the P-Value being 0.6237 which is for a high value, and the K-S stat is 0.7361. This mathematics shows the data isn’t on a normal distribution. This could be caused by serval issues within the algorithm that displaces the bots higher or lower than they should be. Looking at the histogram that was made of the percentile system shows the data has a large increase of Bots in the 1500 and 1600 hundred sections with 24 bots and 26 bots respectively. This shows the system keeps a large amount of players close to the middle of the pack. When going to the Skill rating there is a lot of fluctuation in the graph with the line going up and down which doesn’t reflect the bell curve. This doesn’t prove the system is a failure but shows that the data doesn’t fall on the normal curve. Ideally, this test should be run again to prove that this is consistent with the data but this is a new type of Skill rating.

The analysis of bot 0 shows the rise of the skill rating that is very consistent and increased the bot skill rating over one hundred score in the first 10 matches. The bot consistently rises and when losing doesn’t impact the skill rating by a high amount due to the performance of the bot being higher than the rest of the team. Bot 50 shows mid-ground where it stays steady in the middle of the pack with no major peaks and loses, this shows the system working for the bot and shows they are being placed well, when looking closer it shows that the bot never peaks above 1540, and never goes below 1440 which show the consistency of the rating system. It would be an interesting test to see how the bot skill rating reacts once the bot stats get better to see if the system can handle a change in skill as a future test. Bot 99 shows a consistent losing streak and it falls does the rating system with it ending at 915. This shows the system has understood the player is worse and is reflecting this well. It would be interesting to see what would happen to the bot if the test carried on to see what rating it would settle at. All of these bots prove the system is working correctly and placing them in the correct order.

The scatter graph shows similar results to the other rating systems, but the clear trend lines seem to form much more quickly. By game 15, there is a clear downward trend, with most bots being very close together and grouped well. This data becomes more apparent as the game continues. At game 30, the bots seem to split to a higher degree, with some bots overperforming and gaining significantly more skill ratings than others. Closer to the end of the games, the bottom skill bots from 95 to 99 seem to fall off significantly more than any other bots. This shows a consistent losing streak and demonstrates that they are much worse than the next 5 bots above them. This is where a larger pool would allow them to be placed with bots of similar skill, but due to the limited pool, they don't have fair matches. The consistent line shows the system working to its full effect, and looking at the data, there is a low amount of outliers, which gives credit to the system's reliance on performance. This system benefits from the basic nature of the game, with kills being the only factor, and therefore the system performs well in this context. However, it may not be as consistent if the game had more features, such as assists, headshots, and team-based motivation, and the system would need to adapt to this. The data also doesn't have a large range, with all the bot's skill ratings being between 900 and 2000, and a sign that the majority of bots are getting stuck in the 1600 to 1700 range. This could be due to the basic matchmaking system or something with the algorithm, but this was also consistent with Elo. If the test were to be rerun, a higher amount of skill rating should be given to see more of a split from higher to lower skill bots and potentially a more complex matchmaking system that takes into account previous games. Overall, the scatter graph shows the success of this test, and the data reflects this well.

When examining all three outcomes of the normal distribution, TrueSkill clearly displays the most normalized data, indicating that the system is placing bots closer to the bell curve. This does not necessarily mean that it is the best system, but rather reflects the accuracy of the system's approximation to the normal distribution of the bots. This is because people's skill in real life also follows a bell curve, and so did the bot data. Elo also followed this pattern but to a lesser extent. This difference is small but could be due to the matchmaking systems and the use of a rating system designed for 1v1 games in a 5v5 game. However, the variation is not significant, and therefore the data is reliable. This is what is expected from these tested algorithms, which have been used for years and have undergone many tests. The normality test of the Percentile skill shows that the data is not normally distributed and accurately reflects the bot's distribution. This would have to be further investigated to determine if it is consistent across multiple runs, but it also suggests that there may be some rank inflation over time, with the general population slowly moving up the ranks, which would need to be monitored.

Percentile skill, when it comes to the speed of a trend line forming in the scatter graphs, is considerably faster than both TrueSkill and Elo. This shows that the system is the quickest to find bot skill ratings and start dividing them into their respective sections. TrueSkill takes around 20 matches to form the trend, but also has a much larger spread than Percentile. Elo is similar to TrueSkill, taking 20 matches to start the trend line, but also has a large spread. This indicates that many of the bots are placed above or below where they should realistically be, which shows some level of inaccuracy. Overall, by game 50, the trend lines for all 3 algorithms have formed similar shapes, but there is a clear high spread in TrueSkill and Elo, which indicates that the algorithms have placed some bots higher than they should be. However, there is never an instance where a bot is at an extreme difference, which would be classified as 25 percent higher than it should be.

The results from the percentile skill need to be scrutinized because the game is so simple. The only raw metric being recorded and inputted is kills per rounds played. While this simplistic approach works well for this game, it cannot be assumed that it would work as effectively in a game with objectives or a team-based approach. Another design feature that could have impacted the data is the lobby-making system. In this case, all 100 bots were ordered and queued together with the closest bots possible. However, in a real project, lobbies would be sorted into regions, maps, and team queues, meaning that there would be many more variables to consider. This may result in placing bots with a wider skill rating. Hopefully, a completed game would have more players, which would offset this disadvantage, but further testing would be required.

Conclusion

Throughout this project, several different skill rating systems have been investigated. Two currently used systems and one new system were tested, and the results from all three gave positive data, indicating that all of them are viable options. Elo, being the most basic, gave consistent and reliable data and showed that it could place bots in the correct order within a margin of error. The downside of Elo is the time it takes to do this, as it requires over 20 matches to start showing a clear divide between high and lower-skilled bots. Elo has proved to be reliable but has some main issues: it is not suited for team-based games, and it does not consider player performance, which was proven in the data. Overall, this system is good for games that are less complex but lacks performance-based balancing, which could help place players in a more accurate order. This is why Glicko-2 was developed (Glickman, 1998). Elo also deserves merit for how simple the system is and how easy it is to calculate and implement, which could benefit smaller games that don't rely on advanced matchmaking but still want to place players in skill bands.

TrueSkill has consistently shown results but is slightly more balanced as it takes into account a player's current Mu and Sigma values and compares them to the enemy team. However, the algorithm requires 20 matches before it can accurately reflect a player's skill. TrueSkill was a clear first development step for Microsoft in early multiplayer games, but the improvements in TrueSkill-2 would have clear benefits. Research clearly indicates that rating players based on their performance in matches would give the system more data points to analyze and use for matchmaking. Microsoft owns TrueSkill, so most developers not part of Microsoft take inspiration but rarely use it, which stifles the use of this algorithm in many games. Although TrueSkill is much more complex than the Elo system to implement, the results can vary depending on the game it is used in. The newer TrueSkill-2 algorithm would be a future development to test, but due to the system not being publicly available, it is difficult to recreate and test.

The "Percentile skill" algorithm developed for this project shows great signs of working and is the only algorithm tested that uses performance metrics. This helps prove that this approach is the way forward for skill systems. This system gave the closest results to what was expected, as well as the least amount of outliers. Several improvements could be added, as the algorithm is currently restricted to kills. Comparing these results to older skill rating systems shows that the "Percentile skill" system works well for this game, but it should be reassessed and compared to TrueSkill-2 and Glicko-2 to evaluate its effectiveness more fully.

Overall, this project proves that there are many ways to approach skill rating systems, and it is possible to develop and balance a new system that can produce consistent results. The takeaway is that the objective of the game is crucial to balance the system based on the objectives of the game. These systems also need to take into consideration how matchmaking works and how the skill groups are divided. Many large first-person shooters have a large player base, which means they can place more players together to get a fair game, but this also means that the complexity of the system will be higher.

Recommendations

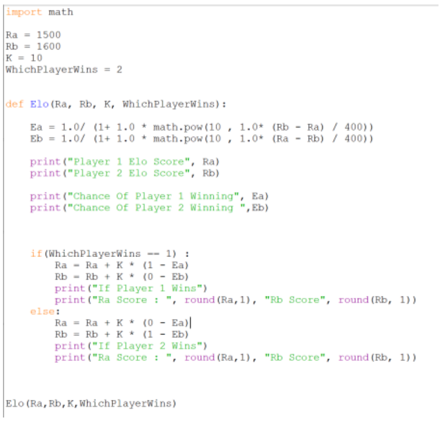
The large nature of the Skill Rating system there is much to be researched. The first would be to use either real player data or using a real testing audience on the project. This will give merit to the results as there could be any faults or failures using AI. This may also produce issues with finding a large enough group of participants so using real-world data from a popular game may be a solution. This would allow for multiple systems to access the same data collected from each match and make separate Skill Rating Scores, this could then be compared and analyzed. This would allow the algorithm to deal with real data and therefore give more accurate results.

The next is the progression of players' skills, this project kept all bots at the same skill stats and didn't show if the system could handle changes in the player skill. A further study into players' skill level changes and seeing which algorithm would deal with the changes the quickest and accurately would help with future developments as in the real world players' skill changes a lot and therefore would be an interest for game developers to know the best solutions.

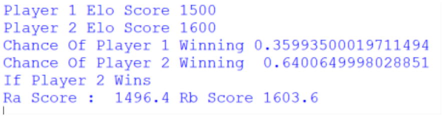
Finally, more testing of more complex systems such as TrueSkill-2 or Glicko-2 would be interesting to collect and analyze because they are newer and are balanced using player performance which is clearly shown to have a major impact on the system. From this research, there wasn't a large testing of the systems outside of Microsoft's research, and therefore external testing of the Trueskill-2 algorithm would be important to see how it works and is developed. This is a difficulty due to the code not being publically available but there could be a mockup using the same inputs could be made and tested. Using the combination of TrueSkill-2 and other external inputs a better solution could be created.

Appendices

Appendix A: Python Program using Elo formula to calculate example Elo and Results



```
import math

Ra = 1500
Rb = 1600
K = 10
WhichPlayerWins = 2


def Elo(Ra, Rb, K, WhichPlayerWins):

    Ea = 1.0/ (1+ 1.0 * math.pow(10 , 1.0* (Rb - Ra) / 400))
    Eb = 1.0/ (1+ 1.0 * math.pow(10 , 1.0* (Ra - Rb) / 400))

    print("Player 1 Elo Score", Ra)
    print("Player 2 Elo Score", Rb)

    print("Chance Of Player 1 Winning", Ea)
    print("Chance Of Player 2 Winning ",Eb)



    if(WhichPlayerWins == 1) :
        Ra = Ra + K * (1 - Ea)
        Rb = Rb + K * (0 - Eb)
        print("If Player 1 Wins")
        print("Ra Score : ", round(Ra,1), "Rb Score", round(Rb, 1))
    else:
        Ra = Ra + K * (0 - Ea)
        Rb = Rb + K * (1 - Eb)
        print("If Player 2 Wins")
        print("Ra Score : ", round(Ra,1), "Rb Score", round(Rb, 1))


Elo(Ra,Rb,K,WhichPlayerWins)
```

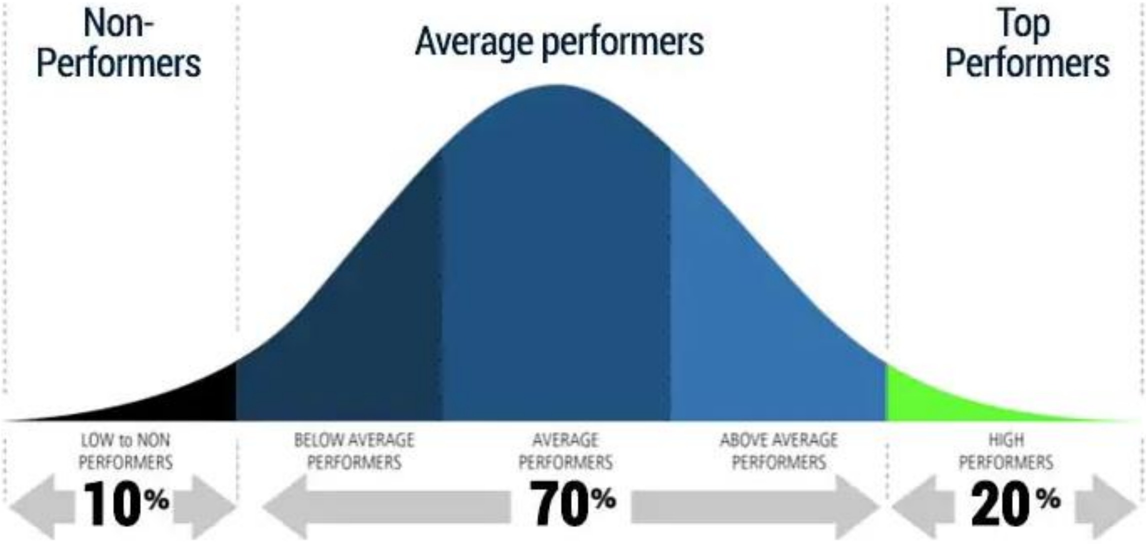


```
Player 1 Elo Score 1500
Player 2 Elo Score 1600
Chance Of Player 1 Winning 0.35993500019711494
Chance Of Player 2 Winning  0.6400649998028851
If Player 2 Wins
Ra Score :  1496.4 Rb Score 1603.6
```

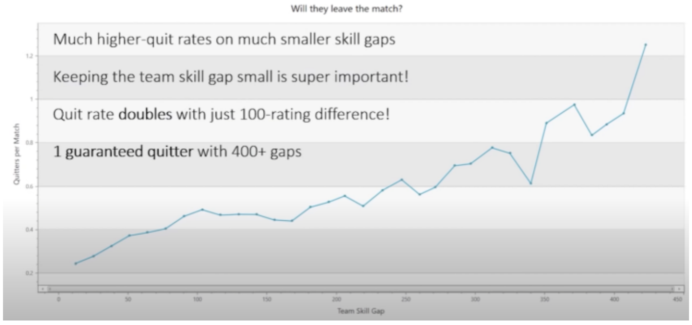
Appendix B: Results from Microsoft predictive performance Elo VS TrueSkill (Herbrich, et al., 2006)

	ELO full	TrueSkill full	ELO "challenged"	TrueSkill "challenged"
Free for All	32.14%	**30.82%**	38.30%	**35.64%**
Small Teams	**34.92%**	35.23%	42.55%	**37.17%**
Head to Head	33.24%	**32.44%**	40.57%	**30.83%**
Large Teams	39.49%	**38.15%**	44.12%	**29.94%**

Appendix C: Example Of Bell Curve



Appendix D: 343 Industries Research into players leaving when Team Skill Gap is High (Menke, 2020)



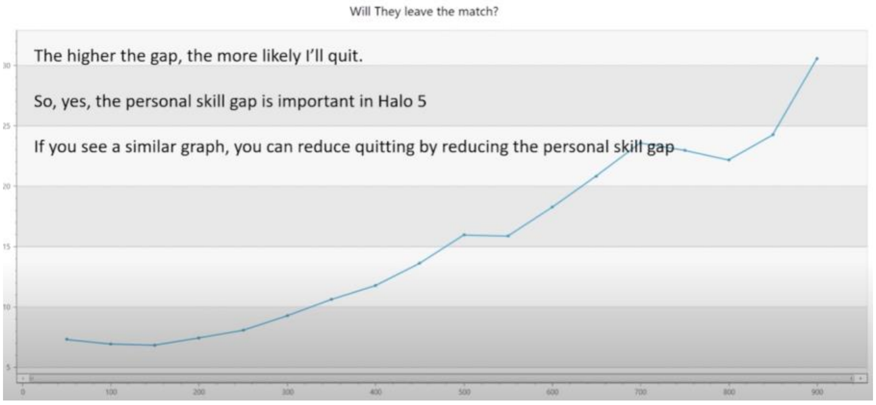
Much higher-quit rates on much smaller skill gaps

Keeping the team skill gap small is super important!

Quit rate **doubles** with just 100-rating difference!

1 guaranteed quitter with 400+ gaps

Appendix E: 343 Industries Research into players leaving when Personal Skill Gap is High (Menke, 2020)


Will They leave the match?

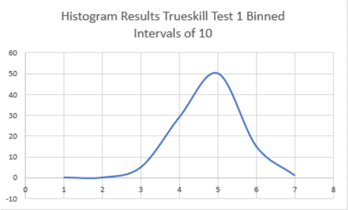
The higher the gap, the more likely I'll quit.

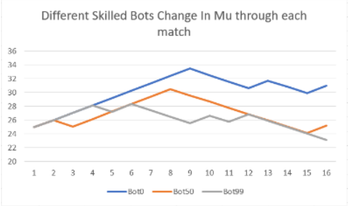
So, yes, the personal skill gap is important in Halo 5

If you see a similar graph, you can reduce quitting by reducing the personal skill gap

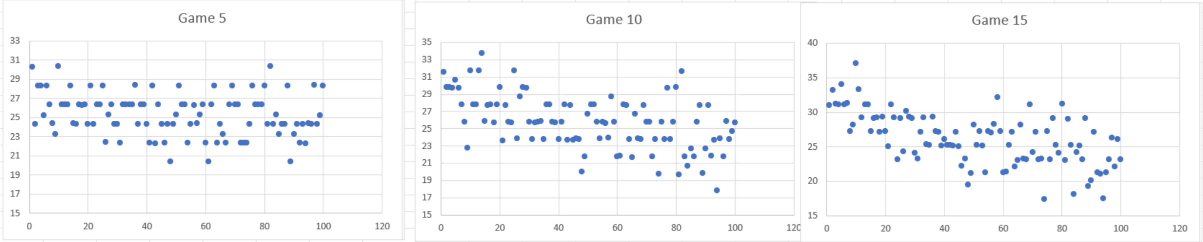
Appendix F: TrueSkill Preliminary Test Data

The first sample of TrueSkill was run over a span of 15 games with a K factor of 2.5 all 100 bots had successful entries and no math errors were found leading to a reliable set of data shown below. Once the data was collected the last entries of the Mu were run through a Kolmogorov-Smirnov Test of Normality it gave a K-S statistic of 0.07822 and a P-Value 0.54699 as shown in artifact F. The data was also made into a histogram and 2 sets of bins were created. One binned data from 15 to 39 with intervals of 2 and the second binned between 10 and 40 with intervals of 5. The data created a line graph to show the results which then can visually see the curve and compare it to the standard deviation. This graph is the result of the histogram and shows features of the bell curve but doesn't mathematically translate with a low P-Value. Data from the 3 bots were collected and represented on a line graph to show the journey they took through the process. Bot 0 which should represent high-skill players, Bot 50 which represents the average player, and Bot 99 which represents the lower skilled players. Scatter Graph data was also collected to show the bots through the progression of matches. This was taken at intervals of 5 matches and plotted to show all the bots Mu at the current match.





Scatter Graph



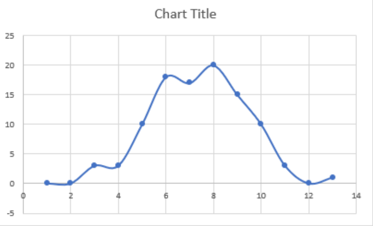
Raw Data

RowName	Game 0	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	Game 7	Game 8	Game 9	Game 10	Game 11	Game 12	Game 13	Game 14	Game 15
Bot0	25	26	27.06963	28.13681	29.20253	30.28289	31.35026	32.41623	33.46575	32.51332	31.58026	30.66676	31.73371	30.81547	29.88596	30.95861
Bot1	25	24	25.07483	24.16192	25.24842	24.33835	25.42681	26.51635	27.60452	28.69041	29.77808	30.85618	31.95171	33.04753	32.12468	33.21027
Bot2	25	26	27.06963	26.15105	27.23564	28.32268	27.41908	28.50831	29.59334	30.6949	29.78414	28.89295	27.98515	29.07411	30.17892	31.26673
Bot3	25	26	25.06963	26.13641	27.22116	28.30609	29.39078	28.4812	29.5666	30.63207	29.72209	28.80126	29.87821	30.96462	32.06521	31.16071
Bot4	25	24	23.07483	24.16318	24.16318	25.24172	26.32025	27.41307	28.49261	29.57247	30.68057	31.77112	32.85543	31.9237	33.01263	34.08768
Bot5	25	26	27.06963	28.15105	29.23476	28.3104	29.39503	28.4854	27.57091	28.65726	29.74538	28.82426	27.9067	28.98533	30.07124	31.16042
Bot6	25	24	25.07483	26.16192	27.25579	26.35835	27.44803	26.53754	25.63154	26.72111	27.81762	28.90362	29.99351	31.11319	32.21195	31.30571
Bot7	25	24	23.07483	22.16318	23.25435	24.34765	23.44224	24.53189	25.6244	26.71409	25.80153	26.89122	27.97891	27.06877	28.15694	27.24942
Bot8	25	24	25.07483	24.17628	24.17628	23.2671	22.36984	21.46815	22.55358	21.64214	22.74738	23.82919	24.90883	25.99361	27.08869	28.18744
Bot9	25	26	27.06963	28.15105	29.23476	30.31469	29.38486	30.47591	31.54961	30.62031	31.71519	32.79295	33.86499	34.9384	35.99221	37.03334
Bot10	25	24	25.07483	26.17157	25.26981	26.36424	27.47598	26.5651	27.65674	28.74807	27.83299	28.93698	30.02642	31.14569	32.24406	33.32822
Bot11	25	24	25.07483	26.16192	27.24924	26.33511	25.42506	26.51463	25.60103	26.69107	27.78037	26.86751	25.95669	27.0454	28.13391	29.22985
Bot12	25	26	27.06963	28.15105	27.23476	26.3193	27.40183	28.48718	29.57249	30.67432	31.76852	32.84563	33.91705	32.97286	32.05088	31.14656
Bot13	25	26	27.06963	26.15105	27.23564	28.32268	29.41593	30.50658	31.57988	32.65649	33.72651	34.78024	33.83249	32.88928	31.96828	31.06494
Bot14	25	24	25.07483	26.16192	25.2603	24.35024	25.44262	24.53923	23.63825	24.73885	25.83088	26.92013	28.00741	27.09688	26.18481	27.27295
Bot15	25	26	25.06963	24.15178	25.23121	24.31627	25.39914	26.48482	27.56958	26.64493	27.73001	26.8109	27.89614	26.97501	28.05585	29.14115
Bot16	25	26	27.06963	26.15105	25.23554	26.3205	27.40574	26.49107	25.57782	26.66481	27.75449	28.84137	27.93425	27.02472	28.11352	29.19804
Bot17	25	26	25.06963	24.14162	25.22122	26.29837	27.38122	26.44948	25.53498	26.62262	25.70821	26.79441	25.87541	24.95628	26.03877	27.12213
Bot18	25	24	25.07483	24.16192	25.25155	26.34625	27.43611	28.52511	27.63604	26.73618	27.83247	28.91826	28.01013	29.09874	28.19138	29.28654
Bot19	25	24	25.07483	24.16192	23.24947	24.33863	25.42709	26.51662	27.60479	28.69067	29.77835	30.85644	29.95512	29.03825	28.11679	27.20981
Bot20	25	26	27.06963	28.13681	29.20253	28.2786	27.35955	26.42811	25.51393	24.58223	23.64807	22.71769	23.80381	22.89223	23.97618	25.05648
Bot21	25	26	25.06963	26.13641	25.22112	24.29561	25.37881	26.44893	25.53444	26.60533	27.69097	28.76759	27.85079	28.93021	30.01684	31.10672
Bot22	25	24	25.07483	24.16192	25.24842	26.33832	25.42822	26.51774	27.61007	26.71056	25.79805	26.88779	27.97554	29.06462	30.16956	29.25484
Bot23	25	26	25.06963	26.13641	27.22116	26.30589	25.3862	26.47208	27.55703	26.63255	25.71801	24.80409	23.89084	22.97786	22.04469	23.13412
Bot24	25	26	27.06963	28.15105	27.23476	28.3195	27.39988	28.48525	29.57059	30.63601	31.73069	30.81536	29.91455	28.99821	30.08394	29.17032
Bot25	25	24	23.07483	22.17868	23.29064	22.38549	23.47865	22.58792	23.69353	24.79324	23.88473	24.97626	24.97626	24.07073	23.17197	24.2654
Bot26	25	24	23.07483	24.17361	24.17361	25.26711	26.3653	27.45746	26.53835	27.63534	28.71894	27.81134	28.90178	30.00091	31.09377	30.20096
Bot27	25	24	25.07483	26.16192	25.24832	26.33822	27.42819	28.5173	29.61655	30.71782	29.80677	28.9153	30.00502	31.12456	30.22473	29.30931
Bot28	25	26	25.06963	24.14162	25.22122	24.29571	25.3789	26.44902	27.53431	28.61716	29.68722	30.7665	29.86628	30.95284	30.0216	29.10877
Bot29	25	24	23.07483	24.16318	25.25279	24.34284	23.4375	22.5278	23.61688	24.70485	25.79741	24.88749	24.88749	23.97059	23.05068	24.14611
Bot30	25	24	25.07483	24.16192	23.25156	22.33961	23.42102	22.51158	23.60094	22.68921	23.77642	22.86494	21.94721	23.04053	24.13797	23.23221
Bot31	25	26	27.06963	26.15105	27.23558	26.32011	25.40021	24.48625	23.56146	24.63278	25.70997	24.79618	25.88248	26.96347	26.04426	27.12754
Bot32	25	24	25.07483	26.16192	25.2603	26.35487	25.44453	26.55023	25.64403	24.73348	25.82559	26.91493	26.00343	27.09145	28.1793	29.27463
Bot33	25	24	25.07483	26.16192	25.2603	26.35487	25.44453	26.55023	27.64208	26.74214	25.84015	26.94331	26.05152	25.15659	24.2462	25.33723
Bot34	25	26	25.06963	26.15178	25.23833	26.32837	25.41443	24.50027	25.58934	24.67961	23.76612	24.85184	25.93728	27.02628	26.11521	25.2066
Bot35	25	24	25.07483	26.16192	27.25579	28.36254	27.4584	28.54708	27.65772	28.74904	27.83395	26.93827	26.04655	27.15161	28.26239	29.35659
Bot36	25	26	25.06963	26.15178	25.23833	24.3284	25.41702	24.50621	25.59519	26.68532	27.7747	26.86192	25.95118	27.03997	26.12871	27.21768
Bot37	25	26	25.06963	26.15178	27.23636	26.32241	25.40856	24.49448	25.58365	24.66902	25.75626	26.84173	27.93014	29.01984	28.09862	27.17936
Bot38	25	26	27.06963	26.15105	27.23558	26.32011	25.40021	24.48625	25.56091	26.64815	25.73338	24.81923	23.90575	24.9887	26.07069	25.15404
Bot39	25	24	23.07483	24.16318	25.25279	24.34284	25.43534	24.52425	25.61688	24.70673	23.79957	24.89247	24.89247	25.9775	25.05471	26.1331
Bot40	25	24	25.07483	24.16192	23.25156	22.33961	23.42102	24.51101	23.59791	24.6862	25.77317	24.8636	23.94944	25.03168	26.12357	25.21484
Bot41	25	26	27.06963	26.15105	27.23564	28.32268	27.41908	28.50418	29.58926	28.68472	27.77049	28.85714	27.94982	27.04008	26.12882	25.22001
Bot42	25	26	25.06963	24.15178	23.22594	22.2947	21.37145	22.45676	23.52473	22.59699	23.68577	22.77576	23.8609	24.94457	26.02725	25.11124
Bot43	25	26	27.06963	28.15105	27.23476	26.3193	27.40183	26.48722	27.57195	26.65795	27.74283	26.82355	27.90861	26.98731	28.06797	27.14913
Bot44	25	26	25.06963	24.15178	23.22594	24.29479	25.378	24.45754	25.53265	24.60066	23.66622	24.73264	25.79779	26.88005	25.96204	25.04701
Bot45	25	24	23.07483	22.16318	21.25434	22.35734	21.45324	22.53708	23.626	22.72396	23.83202	24.9244	24.9244	24.01967	23.12171	22.2154
Bot46	25	26	25.06963	24.15178	23.23949	24.32882	23.41692	24.49662	23.58375	24.67227	23.75889	22.8477	21.93025	23.02387	24.12159	23.21608
Bot47	25	24	23.07483	22.17868	21.28552	20.38788	19.4988	18.62314	19.76188	18.86988	19.99002	19.09131	20.20655	19.28291	18.38667	19.4972
Bot48	25	24	25.07483	26.16192	25.24832	24.33825	23.42621	22.51669	21.60639	22.68173	21.76648	20.86802	19.93669	19.01825	20.12303	21.19906
Bot49	25	24	23.07483	24.17361	24.17361	25.26711	26.3653	25.44824	24.53332	25.6197	26.69825	25.79372	26.89377	25.98673	27.06419	28.13957
Bot50	25	26	25.06963	26.15178	27.23924	28.32623	29.41943	30.51003	29.59535	28.69072	27.77641	26.8636	25.95284	25.0428	24.13414	25.22695
Bot51	25	24	25.07483	26.16192	27.24924	26.33511	27.42013	26.51003	27.5983	26.68393	27.77334	28.85995	29.95042	29.03362	28.11221	27.19276
Bot52	25	26	25.06963	26.15178	25.23636	26.3213	25.40747	26.49302	25.57974	24.66517	25.75247	26.838	27.92285	27.00135	26.0816	25.16479
Bot53	25	24	23.07483	22.16318	23.25435	22.34979	23.44357	24.53319	23.63231	22.73017	23.83813	22.93334	22.03107	21.12228	22.23683	21.32381
Bot54	25	26	25.06963	24.15178	23.23949	24.32882	23.41692	24.49662	25.58576	24.67608	25.76321	24.85379	25.9392	25.02936	26.12128	27.21036
Bot55	25	26	27.06963	28.13681	27.20714	26.26826	25.34912	26.4197	27.4835	26.56006	25.64656	26.71051	25.79273	26.87506	27.95733	27.04002
Bot56	25	24	23.07483	22.17868	23.29064	24.38335	23.47738	22.58666	21.69283	22.79592	23.90279	24.99404	24.99404	26.08846	27.18215	28.27958
Bot57	25	24	23.07483	24.16318	24.16318	25.25685	26.33515	27.42775	28.50708	27.59536	28.67951	29.77209	28.85276	29.92993	31.0237	32.12265
Bot58	25	26	25.06963	24.15178	25.23844	26.32849	27.41361	28.49878	27.58411	26.66995	25.75802	24.8435	25.92907	25.01938	26.11146	27.20068
Bot59	25	24	25.07483	24.16192	23.24947	22.33755	21.41355	20.50253	19.59909	20.7117	21.79653	22.89473	21.9931	21.08497	22.20018	21.2878
Bot60	25	24	23.07483	22.16318	21.25434	20.35725	21.47401	22.58675	23.69238	22.78927	21.8844	20.98389	22.06312	21.15377	22.26776	21.35421
Bot61	25	26	25.06963	26.15178	25.23636	26.3213	27.40653	26.49185	27.58038	26.66626	27.75592	26.8434	25.93293	27.02199	26.11098	25.20244
Bot62	25	26	27.06963	26.14163	27.2263	28.31116	29.39578	28.48614	27.57164	28.65798	27.74411	26.83175	25.91221	24.99254	26.07447	27.1573
Bot63	25	24	23.07483	22.16318	23.25435	22.34979	23.44357	22.53377	23.62274	22.71066	23.7975	24.88272	24.88272	23.9659	23.04606	22.141
Bot64	25	26	27.06963	26.14163	25.22627	24.3114	23.39735	22.47842	21.53936	22.61591	21.70177	22.7636	23.84894	22.93663	22.00416	23.04513
Bot65	25	24	25.07483	24.17628	24.17628	23.2671	24.34539	25.43162	26.51026	27.60766	26.69346	25.789	26.88912	27.98207	29.08146	28.1615
Bot66	25	24	23.07483	22.16318	21.25434	22.35734	21.45324	22.53708	23.626	24.72679	23.81931	22.91483	24.00951	25.10838	24.19872	23.292
Bot67	25	26	25.06963	26.15178	27.23636	26.32241	25.40856	26.4941	25.5808	24.66622	23.75293	24.83887	23.92509	23.01155	22.07781	23.16666
Bot68	25	26	27.06963	28.15105	29.23476	28.3104	27.39091	26.45903	27.54417	28.62688	27.69865	28.77516	29.85247	30.9392	30.00813	31.09812
Bot69	25	24	25.07483	24.16192	25.24842	26.33832	27.42829	28.5174	27.62843	26.72868	25.82688	24.91652	24.91652	26.00118	25.09595	24.19391
Bot70	25	26	25.06963	26.15178	25.23636	26.3213	27.40653	28.4918	27.57723	26.66316	25.75133	26.83688	25.91727	25.00775	26.08945	27.17205
Bot71	25	26	25.06963	24.15178	23.23949	22.32773	21.40391	22.48864	21.57882	22.65466	21.73986	20.80883	19.8786	20.97961	22.04662	23.13602
Bot72	25	24	25.07483	24.16192	23.25156	22.33961	23.42102	24.51101	23.59791	24.6862	23.7726	24.85822	23.94413	25.02646	24.11806	23.21261
Bot73	25	24	23.07483	22.16318	23.25435	22.34979	21.44582	22.5298	21.61927	20.69284	19.77902	18.88434	17.99138	19.12951	18.23629	17.366
Bot74	25	24	23.07483	24.16318	25.25279	24.34284	25.43534	24.52425	23.6235	24.71137	25.80383	26.89348	27.98114	27.07097	28.15911	27.25156
Bot75	25	26	27.06963	28.15105	27.23476	28.3195	27.39988	26.4853	25.57028	24.65586	23.74274	22.83181	21.91463	21.00787	22.07435	23.16326
Bot76	25	26	27.06963	26.15105	25.23554	26.3205	25.40668	26.49225	27.58077	28.66698	29.75497	28.83372	27.91604	28.99454	28.07366	29.15872
Bot77	25	24	23.07483	24.16318	25.25279	26.34747	25.43724	24.52612	23.62534	22.71322	23.80002	22.89585	21.9942	23.0867	24.18338	25.27541
Bot78	25	24	25.07483	26.16192	27.24924	26.33511	27.42514	26.51497	25.60136	26.6914	25.77916	24.86951	24.86951	23.95289	25.03544	24.11563
Bot79	25	26	25.06963	26.15178	27.23924	28.32623	29.41943	30.51003	29.59535	28.69072	29.7784	30.88034	29.97872	29.06155	30.16653	31.2545
Bot80	25	26	25.06963	24.15178	23.22594	24.29479	23.381	22.46235	21.52356	20.59885	19.68678	20.78628	21.86916	22.93334	22.00093	23.04195
Bot81	25	26	27.06963	28.15105	29.23476	30.31469	31.38165	30.44667	31.52074	32.59808	31.664	30.74948	31.84633	30.92672	29.99581	29.06382
Bot82	25	24	25.07483	24.16192	23.25156	24.34069	23.42861	24.51848	23.60527	22.69347	21.77801	22.87653	23.97186	25.07132	26.1626	25.2533
Bot83	25	24	25.07483	24.17628	24.17628	25.26973	24.36549	23.46069	22.55241	21.64099	20.70981	21.78986	20.89058	19.95396	19.04467	18.15827
Bot84	25	24	23.07483	24.16318	24.16318	23.24389	24.32256	23.41843	22.51084	23.59981	22.68151	21.7673	22.86976	21.97345	23.0731	24.16816
Bot85	25	26	25.06963	24.15178	25.23844	24.32852	23.41663	22.49738	21.58741	20.66155	21.74732	22.80833	23.89291	24.97607	24.06319	25.14208
Bot86	25	26	27.06963	26.15105	25.23554	24.32053	25.40334	24.48934	25.57859	24.66403	25.75135	24.83693	25.9226	25.013	24.09956	23.17729
Bot87	25	26	27.06963	28.15105	29.23476	28.3104	29.39503	28.4854	27.57091	26.64624	27.73129	28.80734	29.88421	30.97054	30.0726	29.15912
Bot88	25	24	23.07483	22.16318	21.25434	20.35725	21.47401	20.56191	19.65735	20.76885	19.85362	20.9499	20.01704	19.09704	20.20026	19.29152
Bot89	25	24	23.07483	24.16318	24.16318	23.25421	22.335	21.4339	22.51995	21.60909	22.67747	23.76047	22.84461	21.92184	21.00692	20.08307
Bot90	25	26	27.06963	26.15105	25.23564	24.32063	23.40644	24.48631	25.56097	26.64821	27.73323	28.80926	29.8861	28.97013	28.04957	27.13098
Bot91	25	24	23.07483	22.16318	21.25434	22.35734	21.45324	20.54151	21.64381	20.74809	21.83225	20.93264	22.01281	23.10499	22.19923	21.28685
Bot92	25	26	27.06963	26.15105	25.23564	24.32063	23.40644	24.48631	23.56152	24.63283	23.69788	22.78767	21.87124	20.91658	19.98909	21.0677
Bot93	25	26	25.06963	24.15178	23.22594	22.2947	21.37145	20.46118	19.5585	18.6704	17.79544	16.93982	18.09855	19.23451	18.33922	17.46685
Bot94	25	24	23.07483	22.16318	23.25435	24.34765	23.44224	22.53246	21.62189	22.72622	23.83425	22.92953	24.02397	23.12063	22.2146	21.30196
Bot95	25	26	25.06963	26.15178	25.23833	24.3284	25.41702	24.50621	23.59319	22.68159	21.76633	20.83482	19.90411	21.00464	22.07118	23.16015
Bot96	25	24	25.07483	26.17157	27.2653	28.37192	27.46765	26.55689	25.6506	26.76048	25.85823	24.96584	24.96584	26.06069	25.15458	26.2512
Bot97	25	24	23.07483	24.16318	23.2528	24.34191	25.43031	26.5198	25.61405	24.70394	23.79682	24.88205	24.88205	23.96524	23.04541	22.14036
Bot98	25	24	23.07483	24.16318	24.16318	25.24172	24.32245	25.40904	26.48802	25.57882	24.6583	23.74052	22.82498	23.9032	24.98654	26.06599
Bot99	25	26	27.06963	28.15105	27.23476	28.3195	27.39988	26.4853	25.57028	26.65738	25.74248	26.82816	25.90867	24.98905	24.07597	23.15408

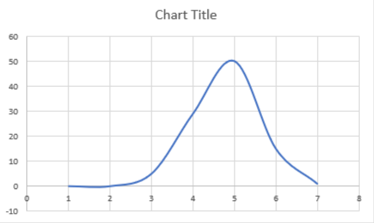
Normality Test

Bins
10
15
20
25
30
35
40

Bin	*Frequency*
15	0
17	0
19	3
21	3
23	10
25	18
27	17
29	20
31	15
33	10
35	3
37	0
39	1
More	0



Bin	*Frequency*
10	0
15	0
20	5
25	29
30	50
35	15
40	1
More	0



Distribution Summary

Count : 100

Mean: 26.19134

Median: 26.192147

Standard Deviation: 3.825234

Skewness: 0.036557

Kurtosis: -0.12189

Result: The value of the K-S test statistic (D) is .07822.

The *p*-value is .54699. Your data does *not* differ significantly from that which is normally distributed.

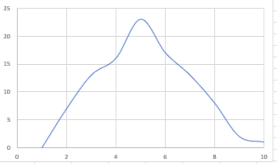
Appendix G : TrueSkill Data

Raw Data

RowName	Game1	Game 2	Game3	Game4	Game5	Game6	Game7	Game8	Game9	Game10	Game11	Game12	Game13	Game14	Game15	Game16	Game17	Game18	Game19	Game20	Game21	Game22	Game23	Game24	Game25	Game26	Game27	Game28	Game29	Game30	Game31	Game32	Game33	Game34	Game35	Game36	Game37	Game38	Game39	Game40	Game41	Game42	Game43	Game44	Game45	Game46	Game47	Game48	Game49	Game 50	Game 51	Game 52	Game 53	Game 54
Bot0	27.5	30.16546	32.83152	35.4044	38.06501	35.65453	33.27334	35.8931	33.50223	31.18163	33.87957	36.58902	39.31503	36.9566	39.57314	42.24214	45.04656	42.76396	45.39766	48.16651	45.8939	43.66809	46.3344	43.96898	46.66967	49.35434	52.12201	49.83752	52.45235	55.1804	52.86102	50.62199	53.25428	56.01982	53.73603	56.52228	59.2328	61.93859	59.62886	57.32538	60.12953	57.88334	60.65776	58.41714	61.18056	58.92623	61.70108	59.45754	62.06002	59.81143	57.43801	55.115	52.83608	50.59197
Bot1	27.5	25.16546	27.79524	30.49853	33.20371	35.86045	33.57029	36.28603	33.88439	36.54594	39.2382	42.0072	44.69112	47.34695	49.98502	47.58582	45.22546	42.93905	45.56873	48.33402	51.02316	48.69571	46.4436	49.29226	47.02427	44.66499	47.3868	50.06488	47.84596	50.49376	53.13348	55.86639	53.58986	56.34946	59.08704	56.76135	59.4678	62.16975	64.81709	62.43196	65.15548	67.77834	65.39879	63.08595	65.77566	68.47112	71.10107	68.72003	71.37169	74.02924	71.6367	69.30722	66.9762	64.7124
Bot2	22.5	20.19815	22.93494	25.66789	23.39896	26.1315	23.86357	21.58007	24.30723	27.07013	29.79811	32.5197	35.25166	37.99746	40.69885	43.46294	46.24075	48.96195	51.63331	54.27805	56.85313	54.41901	57.02822	54.56134	57.22001	54.81688	52.47044	55.19221	57.84907	55.49215	58.19856	55.86697	58.56049	61.23479	58.86426	56.54224	54.30591	57.0943	54.86256	57.68041	60.47883	63.17453	60.86385	63.58024	61.30804	64.07088	66.76573	64.44637	62.18463	64.97428	67.70882	70.39047	73.07993	75.71722
Bot3	27.5	30.16546	27.85826	30.55936	28.25916	30.96229	33.66814	31.3791	34.09185	36.81492	34.48245	37.17484	34.88257	32.58701	35.26173	37.9689	35.69313	38.41015	41.14808	43.84342	46.4952	49.25894	51.96558	49.59094	52.34182	55.04534	57.70804	60.33717	62.90603	65.45583	62.96763	65.53435	68.07053	65.59841	68.18768	70.74243	73.23152	70.7228	73.24239	70.73576	68.25965	70.83644	73.41468	75.94667	78.45308	75.95455	78.4816	81.01679	83.50515	80.96465	83.48306	85.95736	83.41286	85.9189
Bot4	22.5	25.19815	22.92408	25.63652	28.36898	31.10094	33.86655	31.67844	34.47133	37.18375	39.96582	42.71742	45.38501	43.04021	45.77091	48.42175	46.04424	48.76953	46.43539	44.16327	41.9725	39.68783	37.46797	40.18307	42.84662	45.61323	48.3148	51.11464	48.87616	51.671	49.41492	52.21631	54.97463	57.70994	55.39742	58.15498	60.83793	63.51779	66.14404	68.7831	66.33488	68.94002	66.54368	64.21394	61.93223	64.68546	62.41822	60.1637	62.9432	60.68115	63.48022	61.26647	59.05352	56.70194
Bot5	22.5	25.19815	27.92408	25.6803	28.41424	31.14467	28.89476	31.59627	34.30238	37.01953	34.78611	37.53682	35.34077	38.08416	40.9292	38.72301	41.43597	44.26042	42.01971	39.70152	37.45624	40.1626	42.90966	45.62291	48.28769	51.06806	53.80331	51.48811	49.24273	52.0306	49.7679	47.58524	50.278	48.09937	50.9832	48.79783	51.49748	49.33024	52.02379	54.68681	57.53424	55.32956	53.14467	51.02569	48.74213	51.51348	54.22162	56.91684	59.56236	62.3919	60.16499	62.95933	65.75507	63.50879
Bot6	22.5	25.19815	27.92408	30.65534	33.45374	36.2346	33.93441	36.70458	39.46166	42.17046	39.8113	37.52059	35.32494	38.06876	40.91417	43.67326	46.44653	49.16346	51.83082	49.45165	52.11853	54.77222	57.37502	54.9021	52.52929	50.21019	52.96159	50.66167	53.40139	51.12225	53.90673	51.6491	49.44684	47.0939	44.81355	42.59028	45.31988	43.11028	40.82172	43.5002	41.21536	43.97907	46.69022	49.35841	47.10664	49.77994	47.55458	45.25542	47.99871	50.69852	48.48441	51.17948	53.97335	56.73077
Bot7	27.5	30.16546	27.85826	30.56066	33.26733	36.05343	38.76878	41.41048	44.05094	41.63049	39.28397	42.05187	39.74793	42.37728	40.09951	37.78824	40.41851	38.10501	40.74134	43.44629	46.10698	48.87863	46.62295	49.46812	52.22136	54.9271	52.57869	55.29848	52.98451	50.71289	53.50489	51.25438	54.03025	51.78431	54.60127	57.37251	55.12236	57.89675	55.65181	58.45644	56.16808	53.98569	51.6331	54.33105	57.00291	59.83357	57.63983	60.47314	58.27143	60.89007	63.68594	61.46916	59.25312	61.92068
Bot8	27.5	30.16546	32.85826	30.55717	33.26049	30.96159	33.66747	36.38042	34.13956	36.86128	39.5452	37.26094	39.96945	37.7468	40.45458	43.10202	45.88766	48.61621	46.28515	44.01613	41.82845	44.54053	47.34266	50.17385	47.88884	45.65842	48.35903	51.15802	53.88842	56.59046	59.27789	61.90439	59.52789	62.18619	59.80046	57.46305	55.2114	52.9794	50.81713	48.51146	51.24861	53.95221	51.60023	49.31845	52.08335	54.79144	57.43954	60.27603	58.07736	60.69929	58.49813	61.15051	63.97325	66.73908
Bot9	22.5	20.19815	22.93494	25.69965	28.43288	26.16258	28.89311	26.60947	29.33803	32.05305	29.77073	27.49234	30.22385	32.95046	35.67878	33.47868	36.22637	39.01356	36.75629	39.46789	42.22123	39.93087	42.68343	40.39796	43.17941	45.9387	43.76066	41.48577	39.16385	41.92331	44.74085	47.48135	45.17943	47.94986	50.64508	53.48607	51.30167	48.9735	51.67408	49.35217	52.07286	49.75748	52.49888	55.1807	53.04052	50.73027	53.45316	51.14791	48.91156	46.59127	44.33604	46.99336	49.71759	52.3849
Bot10	27.5	30.16546	27.85826	25.56068	28.26339	30.96938	28.6751	26.37669	29.0843	31.7609	29.44753	32.15251	34.83511	37.52939	35.24728	37.95485	40.68705	43.36319	46.15076	43.88452	41.54259	44.26127	46.91438	49.75388	47.47695	50.27315	48.01049	45.64546	48.34624	46.16089	43.8533	41.62758	44.33643	47.12455	44.84358	47.60492	50.32842	52.99686	55.79717	58.59938	56.30867	54.12397	56.78405	54.60509	52.25563	49.95982	47.73106	50.41081	53.1735	55.88157	58.56137	56.21944	58.92405	56.57462
Bot11	22.5	25.19815	22.92408	25.63652	28.36898	31.10094	33.86655	31.67844	34.47133	32.17198	34.884	32.59883	35.32847	33.07359	30.81596	33.54216	31.29724	34.03659	31.81953	34.55246	37.3169	40.02686	37.799	40.50561	38.29209	41.00888	43.66976	46.42639	44.13094	41.9035	44.72148	42.47723	45.27798	48.04635	45.7467	43.50397	41.18598	43.95525	46.64981	49.41771	52.13713	49.82055	52.56075	55.24142	53.10024	55.78963	53.65971	51.35073	54.09589	51.82584	54.57812	57.29787	59.98406	62.80989
Bot12	27.5	25.16546	27.86071	25.57008	28.27245	30.97813	28.68357	31.38587	34.09842	31.80957	34.53249	37.29015	39.99789	37.77457	40.48165	38.16115	40.88816	43.55949	46.34284	49.09216	46.80125	49.55878	52.25955	49.87935	52.62471	55.32302	52.96756	50.66754	53.40715	51.1279	53.91228	56.63124	59.31156	56.97571	59.70271	57.3669	60.06309	57.7504	55.50785	53.27292	55.91933	58.53767	61.30149	64.01098	66.68654	69.36866	67.0338	69.72449	67.38664	65.05872	62.79207	60.58849	58.21737	55.87976
Bot13	22.5	25.19815	27.92408	30.64673	28.35449	26.05652	28.76285	31.46878	29.17894	26.90164	29.6356	32.36244	30.09081	32.82164	30.57129	33.30512	31.06693	33.81332	31.51532	34.25743	36.94209	39.66176	37.44252	35.17572	32.86679	35.64083	38.33618	41.0967	43.79507	41.57481	39.36692	42.13487	44.83202	47.60971	50.31183	52.96216	50.78683	53.44641	56.23885	59.03372	56.73587	59.49282	62.24129	64.93607	62.64359	60.36665	58.16467	60.98967	63.75633	66.52252	64.23451	66.96698	64.66933	62.43881
Bot14	22.5	25.19815	27.92408	30.65534	28.45354	26.18254	28.91235	26.66741	24.39328	22.13939	22.13939	24.81952	27.4892	30.15112	27.93032	30.58953	28.26278	30.90834	28.5803	28.5803	31.32731	29.00202	31.68452	34.37239	37.09473	34.73	32.45732	35.14576	37.90676	40.57662	38.3	40.98343	38.71045	36.38463	34.14002	36.86004	39.6197	42.28658	45.01841	47.70578	45.46471	48.13406	45.89227	48.57724	51.22237	53.94651	56.60982	54.24855	51.95596	54.6863	52.40024	50.16537	52.82629	55.60399
Bot15	27.5	30.16546	27.85826	25.56068	23.26917	20.97002	23.63622	26.30667	24.01086	26.73104	29.43917	27.10955	29.81386	27.49989	30.20544	32.88442	30.59338	28.28063	25.97295	23.64109	26.33046	24.07276	26.80959	29.54976	32.20447	34.90645	37.62191	35.29308	38.05012	40.83674	43.55151	46.31759	49.03641	46.69164	49.41252	47.09574	49.82954	52.5077	55.14026	52.91159	50.57069	48.28364	51.05356	48.78201	51.55722	54.2751	56.93247	59.58011	62.36875	60.11543	62.72355	60.521	63.15367	65.93164
Bot16	22.5	20.19815	23.0375	25.798	23.52797	26.28678	29.09344	31.84349	34.63153	37.46329	40.23832	37.9373	40.71866	43.46448	41.16228	38.95079	36.65041	34.43048	32.2026	29.93434	32.63694	30.38264	33.08617	35.81647	38.59053	41.29984	38.96257	41.7077	39.51384	37.22774	34.9289	32.71019	35.44729	38.09995	40.81071	38.5856	36.28056	33.93967	36.6581	39.30383	37.01853	34.69408	32.44289	35.21481	37.92822	40.56541	43.29009	41.08035	38.81516	41.58887	39.31808	41.98019	44.70459	42.51714
Bot17	27.5	25.16546	22.76042	25.39323	23.09981	25.81346	28.46264	26.17141	23.88059	26.54988	29.26457	31.97556	34.66353	37.36259	40.08023	42.73679	40.48058	43.16166	40.94464	38.65157	41.30801	44.03213	41.71287	39.44946	37.14015	39.88618	37.58279	40.21798	37.92615	40.59551	43.31597	45.99216	48.71775	46.37936	49.10668	51.78072	49.43502	52.12091	54.76074	57.37336	60.17674	57.9298	60.70347	63.4224	66.10695	63.77792	66.47722	64.16206	61.90455	64.69841	67.43702	70.12257	72.81574	70.47099
Bot18	22.5	25.19815	27.92408	30.64673	28.35449	26.08683	23.82053	26.54132	29.27233	31.98951	29.70909	27.43269	30.16629	27.89395	30.62122	33.35349	31.11392	28.8648	26.60281	26.60281	24.33977	27.07993	29.82841	32.57436	35.3478	38.0524	35.79425	38.47714	41.23857	38.91106	36.56919	39.29728	36.96787	39.71496	42.48833	45.1872	42.83212	40.54294	43.21423	40.9199	38.59557	36.3478	39.02825	41.76515	39.45304	37.20709	39.87734	42.61806	45.30008	43.05357	40.74943	38.50293	41.30898	44.03758
Bot19	27.5	30.16546	32.85826	35.55716	33.21335	35.86981	38.59007	41.23631	38.87431	41.59755	39.25181	42.02048	44.70409	42.37407	40.09637	42.75253	40.49597	38.18061	40.81499	38.52498	36.20058	38.82134	41.50456	44.24971	41.952	39.70318	42.39558	45.05917	42.79245	40.42872	43.15313	40.80316	38.5344	41.2417	38.97023	41.66777	39.39146	37.09021	34.85402	37.54896	40.32095	43.0184	40.78069	43.47531	41.22874	43.92731	41.69395	44.39185	42.16448	39.87778	42.62758	45.32317	43.10943	45.79686
Bot20	27.5	25.16546	27.86071	30.56303	33.26962	36.05566	38.77095	36.45431	34.21152	31.91947	34.63908	32.36069	30.0891	32.81999	30.56969	28.31361	31.05218	33.79902	36.47765	34.18616	36.87284	39.59432	42.25832	44.98627	47.66476	45.43876	43.13588	45.90414	43.6196	41.40311	39.10706	41.88125	39.58742	37.33304	35.0639	32.72826	32.72826	35.48846	33.29363	31.05497	33.77066	36.5297	39.20529	36.94403	39.61094	42.34801	40.04113	37.79228	40.47922	43.21309	45.8855	48.63846	51.32461	53.96075
Bot21	27.5	30.16546	32.85826	35.55716	33.21335	35.86981	33.5794	31.2929	33.94881	31.6153	29.30639	26.98117	29.69007	32.39605	35.07649	32.79326	35.50532	38.22741	40.96989	38.67622	41.33204	44.0556	46.71328	49.55668	52.30822	49.99322	52.74873	50.45271	48.22653	50.86655	48.62537	51.28537	49.08969	51.78067	49.57155	52.23639	54.86956	52.64343	50.30909	48.01315	45.76599	48.42889	51.19597	48.92175	51.69427	49.40887	52.05718	54.79161	52.48939	50.24806	53.02954	50.78336	53.43229	56.19925
Bot22	27.5	30.16546	32.85826	35.55716	38.21357	35.79922	33.41403	31.02867	28.69722	26.41168	24.11982	21.83851	24.55829	27.2686	29.98229	32.66848	35.38422	33.10576	30.82814	28.52694	31.27573	28.95204	31.63622	29.33116	31.99313	34.70147	32.42958	35.11885	37.88057	40.55111	43.27262	40.91993	43.65628	41.29651	44.03283	46.69698	44.45105	47.14736	44.91897	42.58707	45.3232	47.99559	50.62149	53.33854	56.02834	53.85631	51.55579	49.28537	51.94623	49.71473	52.38845	55.14728	52.8678	50.62312
Bot23	22.5	25.19815	27.92408	25.63126	23.3637	26.09768	23.83099	26.55135	24.2814	26.99079	29.72158	32.44564	35.17979	32.92893	35.65788	38.42698	36.13967	33.84085	31.62918	29.37807	27.10273	29.80431	27.53257	30.24723	27.98763	30.70497	33.44186	31.22584	33.92001	31.6001	34.30979	36.96657	34.6963	32.37303	35.12949	32.79203	32.79203	30.54863	33.27961	36.01902	33.71366	36.4743	39.15136	41.88525	44.56857	47.29544	44.99138	42.74533	45.42445	48.17711	45.88982	48.63771	46.35697	49.09194
Bot24	27.5	30.16546	32.85826	35.55716	38.21357	35.79922	38.4288	41.07915	43.72749	46.33593	48.90427	46.41074	44.01011	46.68095	49.33293	51.90978	49.46333	47.08956	49.79876	47.45888	45.20042	42.9889	40.69289	43.32756	46.04243	43.70384	41.43841	39.09805	36.83335	34.5509	37.17345	34.89558	32.56025	35.29521	32.96571	35.71918	38.50842	41.20298	43.95955	41.64866	44.40601	42.11139	39.89375	42.60961	45.38107	48.09056	50.76531	53.52366	51.24403	49.02534	51.71265	49.49023	47.19273	44.95461
Bot25	22.5	25.19815	22.92408	20.64279	23.37796	26.11136	28.84377	26.56178	29.29206	27.01104	24.73961	27.46688	30.19928	27.92589	25.67688	23.42895	26.1719	28.89216	31.63282	34.37138	32.15614	34.89213	37.67732	40.38705	38.17627	35.90566	38.69392	36.41997	34.11471	36.75914	39.48263	42.2478	40.05664	42.82877	40.52089	38.30248	36.00457	38.67295	41.39	44.15788	46.85919	49.648	47.37669	45.17577	42.89252	40.67663	38.40855	41.05489	43.77306	46.43118	44.17923	41.85496	39.56723	37.22837
Bot26	22.5	25.19815	27.92408	30.64673	28.35449	26.05652	23.75759	21.47837	19.20969	21.91726	24.63993	22.38001	25.14908	22.90763	25.65956	28.40076	26.1456	28.86682	26.60476	26.60476	29.339	27.07699	29.82558	32.57161	35.22302	32.90892	35.57885	38.26759	35.91407	38.63622	41.31152	39.00408	41.68772	39.38368	37.0629	34.80791	37.5091	35.25487	37.93652	40.68557	43.38085	41.1087	43.79358	41.53687	44.2283	41.98349	44.67501	47.41851	50.11695	47.77289	45.4937	43.25636	40.93674	38.68953
Bot27	22.5	25.19815	22.92408	20.64279	18.36481	21.03894	23.70193	26.42751	29.16264	31.88342	29.6062	27.33313	30.0702	32.80168	30.55191	28.29639	26.04473	28.76967	31.51438	34.19085	31.8955	29.66298	32.38959	30.1528	32.87907	35.65275	38.34778	36.08244	38.81842	36.54937	34.26827	36.92624	34.65701	37.33171	40.06204	37.73198	40.46939	43.25517	45.96524	48.74704	51.47957	54.17882	52.01325	54.70409	52.35286	50.05525	47.82469	50.50253	53.2635	55.96994	58.6482	61.29808	64.1186	61.89613
Bot28	27.5	25.16546	27.79524	30.49853	28.20026	30.9054	28.47722	31.18649	33.84574	36.50841	34.18409	31.87293	29.56586	27.26	29.974	32.66045	30.376	33.07977	30.80291	33.50155	36.20782	38.82838	36.52498	34.17225	31.89127	29.59842	27.26455	29.90128	32.63718	35.32485	38.08628	35.78503	38.55127	36.22947	38.98835	41.68543	44.43552	42.11072	39.84469	42.54667	40.28309	37.99436	35.75785	38.43649	41.06456	43.76698	46.53222	49.23663	46.90988	49.63181	52.30715	55.06745	52.78936	55.39775
Bot29	22.5	20.19815	17.93494	15.68235	18.56005	21.29798	19.12744	16.99665	19.76796	22.61589	22.61589	25.27524	22.94069	20.59874	23.38099	21.13736	18.88515	21.55047	24.26824	27.03069	29.74969	32.48837	35.23647	37.90587	35.63505	38.33181	36.06669	38.74219	41.49712	44.2012	46.96936	44.67819	42.43459	45.15179	42.91164	40.63884	43.41298	41.11079	38.77556	41.50372	39.16557	36.90384	34.5933	32.34958	35.01113	37.72625	40.38295	43.11163	45.78243	48.52763	46.23334	43.9807	41.64489	39.38134
Bot30	22.5	25.19815	27.92408	30.64673	33.35069	36.13444	38.84763	36.52907	39.2907	36.98262	39.76977	42.52604	45.19801	47.84279	45.44656	48.10436	50.78503	48.38522	46.05881	48.81397	51.49351	54.159	51.80398	49.4324	47.16169	44.79954	47.51846	45.16356	47.87458	50.52179	48.12571	50.7958	48.42797	46.09541	48.82861	46.52337	44.28097	41.95956	39.69696	37.39799	40.05351	42.7574	45.49558	43.20229	40.96169	43.66655	46.31974	44.04592	41.71335	39.43699	37.21661	34.88974	37.53612	40.24865
Bot31	27.5	30.16546	32.85826	30.55717	28.25704	30.96024	28.66624	26.36813	24.07007	21.78979	24.51805	27.22785	29.92795	32.62622	35.29977	33.01041	30.71569	33.40869	36.09861	33.81718	36.51439	34.24264	36.94026	39.66898	42.34509	45.1228	42.82666	45.6017	43.32351	41.1134	38.82413	41.60514	44.31451	42.06749	39.77696	37.45387	40.19834	42.85104	40.56828	38.24824	41.00278	43.68396	46.4016	49.07584	46.82952	44.52994	47.27879	49.96779	52.61519	50.37159	48.16353	45.87168	43.64665	41.33789
Bot32	27.5	30.16546	32.85826	30.55717	28.25704	25.96016	23.60087	26.27279	28.9842	31.66416	34.34721	32.03142	34.71769	37.41524	35.13606	32.85119	30.56113	28.2494	30.94248	33.63675	31.35714	34.04513	31.75162	34.43744	37.15796	34.91313	37.6284	40.4065	43.12122	40.74995	38.46923	41.14838	38.87154	36.54168	34.29298	37.0087	34.74383	37.44684	40.19471	37.88366	35.63359	38.34127	41.09314	38.78663	41.54379	39.24838	36.8736	34.56893	37.34123	40.02885	42.77506	40.48211	43.24116	45.92563
Bot33	27.5	25.16546	22.86071	25.57581	28.31055	31.01493	33.78315	36.4928	39.25536	36.94816	34.71656	37.46918	40.1723	42.93094	40.64068	38.44109	36.15343	33.85424	31.6422	29.3907	32.11097	34.8483	32.5322	30.29125	28.03025	25.73948	28.39696	28.39696	31.11425	28.87723	31.58136	29.3381	29.3381	27.05859	29.73084	27.45716	30.15947	32.89795	30.66214	28.39598	31.07574	33.81725	31.59029	34.30896	32.07037	32.07037	29.88907	27.67859	30.3912	33.0396	33.0396	35.75054	38.48383	41.17224
Bot34	27.5	25.16546	27.86071	30.56303	28.27342	25.97822	28.68745	26.41068	29.14642	26.87019	29.60527	32.33309	35.07056	32.82265	35.5547	33.35784	36.10897	38.81482	36.56242	34.26868	36.95302	34.6698	37.3554	35.09083	37.79323	40.52261	43.19514	40.9327	43.63494	46.37202	49.09453	51.74513	49.54114	47.37606	45.08997	47.84612	45.57701	43.36212	41.06794	38.82239	41.56274	39.33133	42.05887	44.82744	42.55162	40.23298	42.96553	45.63423	43.38072	46.04765	48.79522	51.48409	54.27241	57.0246
Bot35	22.5	20.19815	18.00508	15.92479	18.78875	21.51496	24.33784	24.33784	27.03023	24.80172	27.58122	30.34875	28.08883	30.84785	28.6055	26.36196	29.11202	26.84711	29.58915	32.32645	30.08477	32.81273	30.5546	28.28307	30.98045	33.71967	31.47514	29.20838	26.99215	26.99215	29.68142	32.33955	35.08751	32.7533	35.49867	33.15097	30.88504	28.584	31.37784	34.07575	36.8212	39.49709	37.22364	34.90952	32.65447	32.65447	35.44946	38.17367	35.97768	33.69351	33.69351	36.50295	34.22702	36.92792
Bot36	22.5	20.19815	17.93494	20.68235	23.42291	21.15739	18.89256	16.62811	14.52379	17.24446	15.01939	17.60785	20.34747	23.09054	20.85338	23.57769	26.3146	29.02963	26.7622	26.7622	24.49344	22.23504	24.91586	27.64694	25.39082	23.05801	20.84857	18.59087	21.27525	24.03831	26.83789	24.64505	22.3956	20.1091	17.93267	20.5381	23.36647	21.04879	18.83198	16.51177	14.245	17.14329	19.89343	17.43937	20.11041	22.96978	25.71288	28.35068	26.07659	28.87183	31.57362	34.32798	36.99026	34.71665
Bot37	22.5	20.19815	18.00508	15.92479	13.66555	11.59104	14.61559	12.35039	15.2647	18.18393	15.90843	18.80063	21.47701	24.16812	26.86868	29.56562	32.26257	29.97878	32.68399	30.40149	33.08909	30.82165	28.51757	26.20801	24.0023	26.77823	29.54812	29.54812	27.32103	27.32103	29.99853	32.64624	30.3754	28.17889	28.17889	30.85507	30.85507	28.55497	31.1984	33.90187	31.65464	29.33734	26.99731	26.99731	29.75988	29.75988	27.41632	30.16399	30.16399	32.81974	32.81974	30.53404	33.19224	35.92269
Bot38	22.5	20.19815	17.93494	20.68235	23.42291	26.18596	23.91603	23.91603	26.62533	24.41101	24.41101	27.12503	24.82834	22.53533	20.1949	22.94982	25.62692	28.31427	26.00543	23.67235	21.28083	24.0369	26.77516	24.52616	27.24888	29.99183	27.64504	27.64504	25.28598	23.01773	20.70636	18.48584	21.12461	23.86877	26.4859	24.19016	26.86327	29.58926	32.35062	30.13899	27.87374	25.5754	28.38415	28.38415	31.0989	31.0989	33.82537	36.45955	34.16453	36.83219	34.54858	37.33467	40.02619	42.78484
Bot39	27.5	25.16546	27.86071	30.56303	33.26962	30.99084	28.69589	26.41883	24.15367	21.87005	19.5837	22.28272	24.98309	27.67682	25.37708	28.06813	25.7311	23.41562	21.07516	23.81142	23.81142	26.45894	29.10415	31.76492	34.44083	32.14848	34.84115	37.55017	35.21517	32.97561	30.67679	33.30252	36.02242	38.79404	41.48734	39.2467	36.92516	34.68583	37.38327	40.14626	42.85444	40.59397	38.29413	36.05523	38.74584	36.51701	39.20548	36.97659	34.66794	37.42685	40.1055	42.8596	45.56403	43.3589
Bot40	27.5	30.16546	27.85826	25.56068	23.26917	25.97577	23.67984	21.40377	24.13878	21.85576	19.57004	17.24204	20.00162	17.7911	20.52975	23.26903	26.0185	23.76351	26.50402	26.50402	26.50402	24.24004	21.98155	19.67219	22.47957	22.47957	20.16853	22.95933	25.78324	28.49252	31.20958	33.95785	36.65896	39.41402	42.09191	39.83754	37.604	40.32151	38.00517	35.74802	33.44997	31.07866	31.07866	33.81299	31.58814	31.58814	34.29961	37.05528	39.7613	37.53056	40.20652	42.95822	45.66044	43.45333
Bot41	22.5	25.19815	22.92408	20.65742	23.39191	26.12474	28.85666	26.57423	24.30346	22.05308	22.05308	24.73701	27.40994	30.07467	32.72895	35.39685	38.09101	40.83075	38.52974	41.28811	43.99829	46.66127	44.44943	47.12853	44.76937	42.4581	45.22815	42.92145	45.68114	43.42096	41.17214	38.86797	41.55501	44.29229	41.95168	44.66283	42.31919	45.06273	42.87655	45.61091	43.412	41.13917	43.82332	41.56596	39.25849	37.01723	34.69978	32.4534	32.4534	35.17087	32.93132	30.64236	28.44922	26.17088
Bot42	27.5	25.16546	22.86071	25.4892	28.19198	30.89741	28.46949	31.17902	28.84285	31.52757	34.21481	36.91475	34.62924	32.34071	35.02282	32.74106	35.45466	38.17812	40.81256	43.51582	41.18214	38.91571	41.59657	39.33583	42.02015	44.80508	42.51577	45.29765	48.00582	50.65034	48.25174	45.93448	43.66445	41.31525	39.04208	41.73783	44.48673	47.18226	49.91867	52.62185	50.28631	48.00469	50.6304	48.36682	46.01724	48.71328	46.38049	44.10541	46.87312	44.594	47.23562	44.96249	42.60505	40.31963
Bot43	22.5	20.19815	22.93494	20.6695	23.41066	21.14563	23.88152	23.88152	21.60356	19.31804	22.02028	24.70566	27.37982	25.05667	27.72213	25.40044	23.04705	25.83565	23.61435	26.40249	26.40249	24.14219	21.88755	19.58234	22.17061	22.17061	24.88458	22.60523	25.30037	28.02783	25.76511	28.47459	28.47459	31.08374	31.08374	33.77448	36.50468	34.27616	36.98509	39.62209	37.32902	39.99154	37.70613	40.33279	38.05439	40.68831	38.41995	41.06601	38.80116	36.59336	34.316	37.10841	39.80581	37.58506
Bot44	27.5	30.16546	27.85826	25.55928	23.25956	20.96081	18.66097	21.40043	19.13523	21.84655	24.57231	22.31502	20.09986	17.88476	15.59373	13.13015	15.64429	13.02776	15.57648	12.79603	15.22851	17.40523	20.1713	22.95533	25.61531	23.2739	26.02854	28.71066	26.42294	26.42294	24.11605	26.77957	24.45007	22.25616	24.94183	27.73457	25.40702	23.16956	25.87811	23.64149	21.3444	24.13946	26.81392	26.81392	29.58293	29.58293	32.27459	29.99123	32.62566	30.33157	32.98534	35.69787	33.44326	31.1448
Bot45	27.5	30.16546	27.85826	25.55928	23.25956	25.96656	28.67622	31.37877	29.09168	31.81481	29.53965	27.26874	24.9975	27.75106	25.50801	23.26634	26.01592	23.76102	26.50163	26.50163	26.50163	24.23774	26.96804	24.71221	22.43925	22.43925	25.1416	22.85236	25.53694	28.25546	25.985	23.70643	26.48337	24.21411	26.99283	24.67873	22.27666	25.02505	22.64115	20.3729	22.95256	20.6905	18.48762	21.16058	18.98231	21.54763	19.33943	21.89482	19.68992	22.23953	25.05049	22.72556	25.49934	28.16176
Bot46	22.5	20.19815	22.93494	20.66782	23.40183	26.13426	23.86622	23.86622	26.57753	24.24085	24.24085	26.9616	24.67074	27.37664	30.08653	27.79469	25.46722	28.16062	30.85675	28.55466	26.30646	28.97154	26.64529	24.2948	22.03812	22.03812	19.74628	22.27061	24.98016	27.7198	25.36617	28.09067	28.09067	30.71322	30.71322	28.40819	28.40819	26.06312	28.79516	31.44629	29.14015	31.78755	31.78755	34.50023	37.23333	39.88866	42.62943	40.32042	43.0559	40.74897	38.49766	36.13766	33.87137	31.56059
Bot47	22.5	20.19815	23.0375	20.7678	18.53522	21.27443	19.00432	21.72633	19.44663	17.12916	14.91039	12.55518	15.3281	12.89493	15.61596	13.51048	15.99615	13.82703	11.2679	14.03026	16.37184	19.1777	21.85061	24.55853	27.27998	30.02185	27.67408	27.67408	30.31983	30.31983	28.10107	25.86516	28.55882	26.30505	29.00475	31.7619	31.7619	34.45052	32.17075	34.84442	37.56854	35.22969	32.96389	30.76547	28.50164	31.19312	33.91669	36.68299	34.38206	37.1488	39.8347	37.60967	35.42302	38.19082
Bot48	27.5	25.16546	27.86071	25.57008	28.27245	25.97729	23.6813	26.40771	24.1082	26.82448	24.51762	22.22053	24.9236	22.62689	25.31949	28.01274	30.70445	33.39781	36.08805	38.81729	36.59328	34.31946	32.01819	34.69588	32.40024	30.09207	27.8544	27.8544	25.59571	23.31578	20.99191	18.75849	21.38284	19.14057	21.73223	24.46314	22.06975	24.82701	22.45095	25.19774	27.99156	30.67822	30.67822	30.67822	28.4171	31.11146	33.83754	36.47137	34.17603	31.94088	31.94088	34.68424	37.33642	40.05409
Bot49	22.5	20.19815	17.93494	15.68235	18.56005	16.30611	19.02815	21.74895	19.46826	17.1497	19.96463	17.77992	15.53146	13.08518	10.74362	13.58743	16.06743	13.89424	11.33029	14.08742	17.03272	19.80155	22.59304	25.41606	28.10436	25.81104	28.4658	28.4658	31.18076	28.94172	31.64369	34.37879	32.058	34.80779	37.49461	35.22857	32.90392	30.6573	28.35818	31.02428	33.74093	31.50553	31.50553	34.22678	31.99046	31.99046	29.68963	32.44993	32.44993	30.16106	27.82365	30.58148	33.23816	30.94564
Bot50	22.5	25.19815	22.92408	20.64279	18.36481	16.0155	13.70559	16.57192	19.21147	16.90581	19.44161	22.14767	19.85009	17.47811	20.23365	17.98027	20.66283	18.41877	21.11992	23.85415	23.85415	21.62084	19.3378	16.95965	14.71738	12.59418	15.13567	13.05826	15.57228	13.40356	10.65157	13.01575	15.3977	18.19465	20.83633	23.60725	21.24896	19.02229	21.5755	24.35986	27.01187	29.73295	29.73295	29.73295	27.50155	25.2308	27.88306	25.61315	23.25773	26.00816	28.80912	26.50733	24.12685	26.84296
Bot51	27.5	30.16546	27.74554	25.45048	23.15488	20.86049	18.56529	21.14187	23.70063	21.32476	18.89317	16.59933	14.11659	16.73426	14.14854	16.72836	14.51886	17.03083	14.80867	12.07614	9.775563	12.3852	14.97991	14.97991	17.82475	15.52276	13.3686	15.57277	18.42398	21.0795	23.84766	21.49118	19.24468	21.82588	24.53047	22.16154	24.91893	27.71599	30.3886	28.131	25.8064	28.41845	26.10943	26.10943	23.72984	26.43427	24.20474	26.90153	24.6773	22.34218	25.14887	27.82596	25.58312	28.24233
Bot52	27.5	25.16546	27.86071	25.56304	28.26567	30.97158	33.67714	31.38784	29.10048	26.82577	29.53049	27.19784	29.899	32.59821	30.30303	32.97887	35.68549	33.39887	36.08908	38.81829	41.58733	39.31152	36.99612	34.74078	32.44389	35.13871	37.84778	40.6204	38.31895	41.09897	43.80757	41.58283	44.29272	41.92949	44.65124	47.30174	50.03136	47.72757	45.48762	43.14342	40.86649	43.55091	41.30153	38.99011	36.74404	39.41231	37.17427	34.86173	37.62607	35.29849	33.05551	30.76292	28.56613	31.28514
Bot53	22.5	20.19815	22.93494	25.69965	23.43328	26.19591	29.00578	26.75778	24.56748	27.32029	25.03793	27.75368	25.4655	23.21217	20.97004	18.68242	21.32754	24.03622	26.76582	26.76582	29.49427	32.24117	29.99974	27.74572	30.46162	33.2169	30.88417	28.63548	31.34471	29.1007	31.79737	29.54764	29.54764	32.24995	32.24995	35.02417	32.7052	30.46432	33.19794	35.93969	33.63646	31.40399	31.40399	29.12089	26.7965	24.55051	22.21747	24.99605	27.66752	30.40686	30.40686	33.07927	35.7776	33.53577
Bot54	27.5	30.16546	27.74554	25.45048	28.15474	25.86136	23.50582	26.18167	28.89643	31.57934	29.27154	31.9823	29.67191	27.36258	30.07296	27.78156	25.45454	23.14955	25.79776	23.4725	21.08936	23.85399	21.61076	24.32932	27.05977	24.80279	27.49638	25.11976	27.85935	27.85935	25.60238	23.33803	26.02331	28.72061	28.72061	26.34576	29.08776	31.86055	29.52399	27.16001	29.8828	27.62102	25.33949	22.97133	25.69787	23.33594	26.06392	23.6895	21.40997	23.87609	26.62034	24.39403	27.10023	29.86942
Bot55	22.5	25.19815	22.92408	20.65742	23.39191	21.12504	23.86186	21.57843	24.30567	27.06862	24.79515	22.52924	20.30511	23.05017	20.81467	18.5342	16.22701	14.04472	16.51851	19.29194	22.17127	19.88359	17.67992	20.40015	18.16313	20.79849	23.34312	20.97577	23.74251	26.39985	24.09381	21.72723	24.48124	22.28614	20.01308	17.83867	20.47795	17.99481	15.74136	18.44552	21.123	23.92776	26.61079	26.61079	24.21242	21.90861	24.69639	27.37366	30.09692	27.77028	30.50944	28.15172	25.89781	23.5571
Bot56	27.5	25.16546	22.86071	25.4892	28.19198	25.89733	28.54334	26.24937	23.95567	26.67806	24.3765	22.08499	19.79016	22.45641	20.11941	22.67786	25.36655	28.06379	25.76356	28.46884	31.13761	28.81823	26.49714	24.15212	21.90105	21.90105	19.61522	22.14619	19.86078	22.44222	25.15057	22.90318	20.59561	18.38862	21.01988	18.79987	21.38732	24.17416	26.8415	24.57009	22.23556	20.00363	17.5356	15.20612	18.00794	15.6936	13.51061	16.40707	14.18494	17.04886	19.75354	22.28234	20.06932	17.51649
Bot57	27.5	30.16546	27.85826	30.55936	28.25916	25.96221	23.60285	26.27468	28.98602	31.66592	34.34891	37.04507	34.75617	32.46411	30.17291	32.85294	35.56325	33.27993	35.9736	38.70588	36.37692	39.11137	36.80093	34.55061	37.26798	35.02034	32.73967	35.41969	38.17333	40.95692	38.67133	36.35529	39.10656	41.90119	44.62358	47.27469	45.01706	47.79254	45.55131	43.3497	41.06819	38.7608	41.50232	44.17991	46.91702	44.61563	42.36754	40.0645	37.82315	35.49048	33.24235	35.94739	38.67542	41.35901
Bot58	22.5	25.19815	22.92408	25.65749	23.38894	21.1222	23.85915	21.57583	24.30318	22.01362	19.72096	17.38546	15.15823	17.70528	20.44854	18.18509	20.85661	23.58675	26.33438	26.33438	26.33438	29.06364	26.81592	24.56547	22.29821	22.29821	19.99502	22.79389	20.4806	23.27938	25.9522	28.6547	28.6547	31.38654	31.38654	34.18616	36.90474	39.64024	42.33343	45.07995	47.76121	45.52869	43.23677	45.97915	48.67786	46.44976	49.15817	46.93298	44.65262	42.41974	45.11017	47.75051	50.45936	48.15715
Bot59	22.5	20.19815	22.93494	20.66782	23.40183	21.13456	23.87095	23.87095	26.58207	24.24521	24.24521	21.95891	19.6696	17.30661	20.07148	22.63231	20.31432	17.91611	15.64586	13.49916	11.08932	13.57354	10.96517	10.96517	13.66611	11.12552	13.78957	15.96504	13.74613	16.67357	19.41259	21.94973	24.69404	22.4909	25.16636	27.95073	27.95073	25.62152	23.40849	26.11524	23.86229	21.56286	24.34539	26.98781	24.73669	27.40073	30.1658	27.94669	30.65	33.29007	33.29007	30.99064	28.78699	31.49859
Bot60	27.5	30.16546	27.85826	30.56066	33.26733	36.05343	38.76878	41.41048	39.04434	36.74236	34.41181	32.09419	29.78042	27.46754	25.17514	22.86049	25.54139	28.23198	30.92566	28.6214	26.37098	29.09892	26.85004	29.58877	27.35008	30.0895	32.7472	30.44229	28.18695	28.18695	30.91437	33.53249	36.24576	33.98345	36.69347	39.44873	37.12219	34.87781	32.58617	30.36775	33.1049	30.7438	30.7438	33.48847	36.11606	33.8529	31.62113	34.32108	34.32108	37.0895	39.77696	37.55329	35.25001	33.02222
Bot61	22.5	20.19815	17.93494	15.68235	18.56005	21.29798	24.13016	24.13016	21.84223	24.59746	24.59746	27.33024	30.06741	27.79822	25.55356	28.29871	26.04697	23.79094	21.51875	19.24106	22.12273	24.84175	27.54838	25.27219	27.96599	30.68407	28.4279	28.4279	26.1497	23.84913	21.6399	24.40762	22.16735	19.8907	17.4651	20.0966	22.61769	25.35159	23.14845	25.86597	23.62213	21.33247	24.12505	26.77639	29.35294	27.01914	29.79742	27.58981	25.3417	23.1779	25.95026	28.77321	26.49844	24.13524
Bot62	27.5	25.16546	22.86071	25.4892	23.19213	20.89618	18.59933	16.09705	13.74815	11.46513	14.37038	12.05123	9.878628	12.82797	10.50579	13.36984	15.86594	18.69665	16.38527	19.16631	21.82756	19.5549	22.35806	25.04376	22.75799	25.58342	28.24685	28.24685	25.97479	23.6807	26.49418	29.17664	29.17664	26.90243	24.60236	27.40786	25.09184	27.88245	25.58897	23.36296	26.05571	28.8112	31.5069	29.22065	26.89293	29.64024	32.33003	30.04502	32.67768	30.38206	28.0375	25.76188	28.41499	26.13782
Bot63	27.5	25.16546	27.86071	25.56304	23.27144	25.97795	23.68194	26.40832	24.14354	26.85841	29.59391	27.32124	25.04816	22.81051	25.56647	23.32262	26.06991	23.81303	26.55156	26.55156	26.55156	29.27294	32.01222	29.69569	32.43658	30.12732	27.88854	27.88854	30.62315	33.37207	36.02873	33.78074	31.47699	34.2441	36.94675	39.69547	42.38402	40.10496	37.79385	35.54202	38.24705	36.00789	38.69747	36.44862	34.15216	31.94186	29.6425	32.31492	32.31492	35.0365	37.77877	35.43726	33.10545	30.81679
Bot64	22.5	20.19815	17.93494	15.68235	18.56005	21.29798	19.12744	21.99686	19.79667	22.64328	22.64328	20.33927	23.12655	20.90125	23.66978	26.42765	29.17534	26.90835	29.64822	27.38456	25.09371	27.80461	25.5182	23.20987	20.84818	20.84818	23.62076	26.39583	24.08194	26.72536	29.42426	27.14448	29.79105	32.48542	30.23588	27.94599	27.94599	30.63385	28.33547	31.00235	28.70996	26.38293	29.16268	29.16268	31.85127	31.85127	29.55465	27.22847	24.99284	27.67403	25.41972	28.08637	30.82539	28.46909
Bot65	27.5	25.16546	22.76042	20.46419	17.9584	15.63097	13.34455	16.23468	18.89439	16.60482	14.15365	16.80069	19.28836	21.97961	19.66353	22.24475	19.94352	22.55525	25.22889	22.92529	25.64437	23.34183	25.97511	28.66605	26.37522	24.00511	21.75774	24.47661	22.23519	19.94315	22.50702	25.23738	27.95477	30.5821	30.5821	33.28857	36.03262	33.69844	31.43981	29.14959	31.92556	29.59997	27.25122	27.25122	24.99085	22.65625	25.41242	23.06288	20.809	18.3141	15.94042	18.67961	21.2229	19.07066
Bot66	22.5	25.19815	22.92408	25.65749	28.38917	31.12045	33.88546	31.69684	34.48919	37.32472	40.10323	37.80547	35.60278	33.34053	31.07523	33.79338	36.53215	34.31524	37.05323	34.85487	37.61106	35.31081	33.09791	30.84058	28.56237	26.25341	24.03455	21.7884	24.51899	22.28006	20.00016	22.84101	20.53607	23.30701	20.9907	18.77199	16.39183	14.12733	12.09158	10.16136	12.54588	9.794145	12.48204	15.50723	18.29074	15.96123	18.67842	16.28237	18.95399	16.55197	14.27678	17.11888	19.74866	17.21186
Bot67	27.5	30.16546	32.85826	30.55717	33.26049	30.96159	33.66747	36.38042	34.13956	36.86128	34.52758	32.2067	34.88766	32.59196	35.26653	37.97358	35.69769	38.41458	36.17202	33.88864	31.60185	34.3544	37.04887	34.79216	32.49385	30.18288	32.93611	35.6103	33.32675	35.99406	33.72764	31.42132	29.18687	26.91232	29.58986	27.32072	30.02785	27.75394	30.42522	28.16646	25.84063	23.6146	21.28544	19.08476	21.667	19.46874	21.99043	24.77864	22.45562	25.23917	22.86655	20.62927	18.21636	20.92623
Bot68	22.5	20.19815	17.93494	20.68235	23.42291	26.18596	28.89617	31.74941	29.47815	32.27303	35.08331	32.79265	30.50833	28.22516	30.94109	28.67348	26.4092	24.13997	21.85379	24.55517	24.55517	22.29437	24.97259	27.70149	30.41893	28.17135	30.89295	28.64399	26.35851	29.04643	26.74941	24.55962	22.31347	25.00498	22.77482	25.46053	28.23491	30.91277	33.63238	31.38411	34.08965	31.84451	31.84451	29.54797	27.32245	25.05795	22.70488	20.46407	22.90903	25.67377	23.2843	26.03555	23.67276	21.41883
Bot69	22.5	25.19815	22.92408	25.65749	28.38917	26.12035	28.85243	31.55536	29.26287	31.98035	34.69813	37.45125	40.15483	37.92783	40.63099	38.43161	41.15184	38.95482	36.69898	39.41209	37.17374	34.88479	32.68322	30.43788	28.17227	25.87662	23.67128	26.44434	29.13445	29.13445	31.92139	29.66796	29.66796	32.36634	30.12028	32.84142	35.59832	38.27776	41.00467	43.78136	41.49031	44.24773	41.98322	39.76642	37.50157	35.20222	32.93329	35.59369	38.33831	41.00025	38.74308	36.37684	34.10423	31.78679
Bot70	22.5	25.19815	22.95352	25.71747	23.45044	26.21238	23.94531	23.94531	21.66478	19.37654	22.07586	24.75878	22.44435	25.09247	22.77552	25.5696	28.3485	31.11825	28.89944	31.65917	29.43717	32.18591	34.9429	37.62045	40.34782	38.02375	40.75777	38.43358	36.0758	33.81328	31.49011	29.2496	29.2496	31.9617	31.9617	29.71537	29.71537	32.46798	30.11292	32.85041	30.50169	33.26092	31.04952	28.77732	26.46448	29.06206	26.74166	24.51148	27.20199	24.97241	22.61024	25.38924	28.05661	30.79287
Bot71	22.5	20.19815	22.93494	20.6695	18.4414	16.19355	13.87289	16.7283	14.61868	17.33308	20.13817	17.94544	15.68817	18.57216	16.24455	19.01149	21.866	24.55053	22.24806	19.93819	22.7879	25.4783	23.17189	20.95563	23.70362	26.49131	29.27134	29.27134	27.05309	27.05309	24.72328	22.33126	25.05911	27.79275	27.79275	30.48234	30.48234	33.21063	30.96587	33.67655	31.43565	34.16615	36.90627	39.55401	42.29253	44.96636	42.71082	45.38531	43.13701	45.80943	48.56193	51.25546	49.04538	51.72596
Bot72	22.5	20.19815	17.93494	20.68235	18.45366	16.20518	13.88382	11.66726	9.61563	12.69422	15.50773	13.11381	15.84539	18.72049	21.59048	24.28126	21.97185	24.65168	22.34523	25.02504	25.02504	27.73857	25.45445	28.16498	25.89111	28.59478	31.30202	29.04053	31.73619	29.48038	27.2878	25.07949	22.81338	25.48333	23.23524	25.90145	28.65961	26.3059	24.06806	26.74788	29.48531	32.27642	32.27642	30.09751	32.82892	30.65524	28.39538	31.10946	31.10946	28.86097	31.56313	29.17194	26.88393	24.65942
Bot73	27.5	25.16546	27.86071	30.58554	28.29522	25.99929	28.70773	31.41552	34.12716	31.8375	34.55958	37.31649	35.02054	37.7726	35.48427	38.18537	40.91177	38.58648	41.32003	44.01133	46.79003	44.54594	42.37705	40.09851	37.77333	35.51286	33.21873	31.00897	33.70989	36.36603	39.09982	36.84526	39.58378	42.36707	45.07883	42.85	45.57377	43.35894	46.06671	43.8546	46.56256	49.35729	47.09161	44.76486	47.48938	50.15478	47.92235	50.73468	48.50599	51.19561	48.97234	46.66439	44.42318	47.08135
Bot74	27.5	25.16546	22.86071	25.4892	28.19198	30.89741	28.46949	31.17902	33.8385	36.50138	39.19482	36.79571	34.51331	37.21657	34.94251	37.65845	35.30162	37.92395	35.60343	38.22706	40.8943	38.63458	41.32248	44.07181	41.778	44.40992	42.12913	39.77257	37.49147	35.19194	37.95693	40.6491	38.38397	36.0664	33.71576	31.41824	31.41824	29.1006	26.85146	24.57969	27.22288	24.94731	22.56426	20.30861	23.15049	25.8787	28.69713	26.39953	24.19295	21.87715	24.33534	27.0443	29.81917	32.49663
Bot75	22.5	25.19815	28.0348	25.78726	28.51723	26.24409	29.05226	31.80366	29.53076	27.33046	25.04774	27.76311	25.47461	23.22094	20.97845	18.69044	21.33514	19.06054	16.91461	14.69602	12.51741	14.88144	17.29341	20.0348	22.82518	25.6479	23.33695	25.98775	28.69472	28.69472	26.40945	29.09502	29.09502	26.82349	24.52627	27.13935	24.83288	22.45558	20.17733	22.63607	25.35931	27.98861	30.71225	30.71225	33.42424	31.23399	33.9563	31.7304	31.7304	34.46946	34.46946	32.21651	34.94032	37.62121
Bot76	27.5	30.16546	27.74554	25.29349	27.83688	25.4024	28.0673	28.0673	30.82809	33.58083	36.35402	34.02885	31.70871	29.5038	32.1768	29.87148	32.55845	30.26586	32.96185	30.6712	28.35424	31.0119	33.69556	36.40833	34.17585	31.89094	29.59776	32.37441	35.0334	32.79874	35.47232	38.22944	35.92681	38.70094	36.39713	34.15935	31.86461	34.65	37.34844	34.9989	37.71878	40.48013	38.183	40.79727	43.50608	41.27684	38.9947	36.77089	34.46764	32.22445	32.22445	29.95633	27.64265	25.39181
Bot77	22.5	20.19815	17.93494	15.68235	13.4377	16.39799	14.3241	12.07809	15.01169	12.64302	15.46026	18.01999	15.75876	13.60642	16.27542	14.13303	12.07461	9.715294	7.501987	10.6089	13.22782	10.88892	13.60951	13.60951	16.09705	18.84933	21.49141	19.2046	16.80692	19.55126	17.1372	14.86433	17.71031	20.37342	18.18495	15.87278	18.62506	21.28161	24.07095	26.89294	29.6252	32.41189	32.41189	30.22911	27.98204	30.69131	28.43033	31.14323	31.14323	33.90006	33.90006	36.70382	39.41183	37.07681
Bot78	27.5	30.16546	27.85826	25.55928	28.25942	25.96246	23.66702	21.33597	23.88564	21.61275	19.33777	17.0214	14.51362	12.13453	14.91333	17.44077	15.19197	17.65874	20.40037	22.9685	20.60674	18.13722	20.86408	18.60492	16.2735	19.01541	21.64886	19.35501	16.9496	14.70178	17.55788	20.19454	17.72109	20.3836	18.19467	20.78574	23.60308	21.2756	24.0652	21.73799	19.52088	17.07945	14.76736	12.60076	10.59595	7.69809	7.69809	5.336662	8.263037	5.799705	8.646066	11.1206	8.259566	10.98146
Bot79	27.5	30.16546	27.74554	30.45056	33.15726	35.81537	33.52642	31.24145	28.90332	26.61089	24.31176	27.02971	24.73642	22.44699	20.11039	17.76808	20.46216	18.22734	20.93858	23.68104	23.68104	21.32928	19.05927	21.7065	19.41011	21.97978	19.6905	22.21765	19.92914	17.74069	15.42219	13.24839	16.19567	14.00329	16.89125	19.55551	17.13488	19.87215	22.3818	20.12455	22.71638	20.46417	23.29519	21.009	18.83734	21.41028	18.92582	21.5027	24.31744	21.99664	19.75712	22.28574	20.07258	17.51958
Bot80	27.5	30.16546	32.85826	35.55716	33.21335	30.91583	28.62322	26.32655	29.036	26.73914	24.43537	22.14153	19.84422	17.47253	15.20392	17.71211	15.4486	17.89869	15.62937	12.84574	15.27437	12.79305	10.24346	10.24346	13.00951	15.4227	13.27441	15.48518	18.3415	21.00141	18.77772	21.34795	24.11861	26.73394	29.41795	27.15439	24.84739	22.63091	25.36206	28.1354	25.81064	23.58571	21.25774	24.03088	26.71388	24.47082	22.14095	19.92385	22.39546	25.18152	22.81115	20.57617	23.02307	20.7955
Bot81	22.5	25.19815	27.92408	30.65534	28.45354	31.18264	28.93157	31.68692	34.47957	32.29534	30.08816	32.90963	30.62189	28.33514	26.07227	28.79821	31.52053	34.25308	36.99279	34.68774	32.46391	30.21466	32.92355	35.65856	33.44564	31.18145	33.9036	31.67468	29.38128	29.38128	27.19182	29.93464	29.93464	27.75167	27.75167	25.41053	23.1672	20.85784	23.31923	21.02259	18.51819	16.12905	18.93647	21.58598	19.38931	21.93352	19.70868	22.24523	25.02837	22.67942	25.47218	23.13095	20.88268	18.29038
Bot82	27.5	30.16546	32.85826	30.55717	33.26049	35.91556	33.62392	36.33812	33.93506	31.60194	29.29344	26.96866	29.67799	27.36846	25.07954	22.7686	20.44477	18.04022	20.76138	23.31206	20.93569	18.70273	16.36018	14.14337	11.47994	14.0177	11.28301	13.65019	10.76528	13.3732	10.62336	12.99015	15.37404	13.22934	11.18473	13.34381	16.25465	13.99817	11.9701	14.02256	16.95324	19.6914	17.23905	19.97949	17.54866	15.25933	18.01945	15.65882	13.48012	11.39848	13.5896	11.52928	8.636054	11.31483
Bot83	27.5	25.16546	22.86071	20.56023	18.04977	20.74073	23.41765	21.09692	23.65781	21.28371	18.85404	21.58958	19.31658	22.00642	19.68915	22.26908	19.9668	22.57738	25.25006	22.94565	20.58487	18.1164	15.8049	18.63062	21.26809	21.26809	24.02181	26.78098	24.453	22.06804	24.79257	22.55876	20.26584	22.79561	25.45794	23.2002	20.85897	18.35745	20.94601	18.52106	16.14256	18.92709	21.5816	24.34045	27.01098	29.75413	27.41075	30.15862	30.15862	27.82997	25.5703	28.40677	31.13495	33.92595
Bot84	22.5	25.19815	28.0348	25.78726	23.51764	21.24825	18.97932	16.71049	14.60181	17.31733	20.12325	17.93122	15.6747	18.18836	15.88106	13.76066	16.22803	19.03796	16.8931	14.67571	17.58572	20.32422	18.10004	15.78667	13.61132	15.97982	13.79911	11.79938	9.048645	6.655385	9.691316	7.500619	5.31372	8.450891	11.02824	13.20021	11.14731	8.342924	8.342924	10.73132	8.013519	10.50826	7.461662	10.07032	7.567757	10.4495	10.4495	13.55395	11.50316	13.73681	16.64134	14.39774	17.19395	19.95899
Bot85	22.5	20.19815	22.93494	20.66782	18.38867	21.06154	18.80105	16.54124	14.16558	11.85365	9.725063	7.754816	10.9225	8.811631	11.86633	9.668039	7.668475	5.715875	8.955723	11.92363	14.42646	16.65355	14.42268	14.42268	11.7402	14.25561	11.50487	9.197622	12.04966	14.54548	12.41335	14.63012	12.46801	9.773777	7.468163	5.458365	8.536181	5.990646	5.990646	4.081224	7.272465	9.863791	6.867743	4.673147	7.691711	5.096668	5.096668	3.109402	6.416159	9.219878	11.61516	8.84536	11.45676	14.56514
Bot86	22.5	25.19815	28.0348	25.78726	28.51723	26.36297	24.09041	24.09041	21.80407	24.56096	24.56096	22.3041	20.0894	17.87479	15.58431	13.12132	10.84907	13.6449	16.14749	18.94221	16.51904	19.31658	16.94231	14.69248	12.58196	10.12376	7.710154	5.757223	8.97236	6.587465	9.631448	12.09541	9.440891	12.08169	14.308	12.2181	14.54939	12.39615	12.39615	10.4468	7.754951	5.476126	8.651064	6.233521	8.999112	11.72015	9.784854	7.185121	9.834998	12.22041	9.421972	11.81113	8.89673	6.23386
Bot87	27.5	25.16546	27.86071	25.57008	23.27822	25.98445	28.69345	31.40171	34.11378	31.82449	29.54904	32.27869	35.01776	37.70697	35.42032	33.12768	30.82952	28.5093	26.1938	28.88304	26.62396	24.35567	22.09263	19.77838	17.57044	20.23831	17.8303	15.60454	18.45391	16.12415	13.89719	16.75551	19.48968	17.11969	14.84104	12.71886	15.01116	17.87145	15.62454	18.33588	15.96728	18.76201	16.35768	19.1477	16.75901	19.44696	21.96976	19.75993	22.23977	20.00471	17.54346	20.18981	22.65558	25.43158
Bot88	22.5	20.19815	17.93494	20.68235	18.45366	16.20518	13.88382	16.73852	14.62835	12.28508	10.12419	8.121586	6.269622	4.56113	2.976771	1.550722	0.242043	4.024976	7.444726	5.373498	3.692624	2.19326	0.772425	0.772425	4.507894	2.856204	6.384309	4.56763	7.913994	10.81218	13.40758	11.35761	8.765125	11.47823	9.014153	11.37862	13.77993	16.7155	19.39618	21.89428	19.67044	17.22141	19.96723	17.82515	20.47479	18.32844	20.91019	18.40185	16.06965	13.82807	16.72678	14.47832	12.39863	10.30768
Bot89	27.5	25.16546	22.86071	20.58208	18.30693	15.96071	18.70324	16.4484	19.0953	16.79551	14.33298	16.96765	19.44545	17.09371	14.48694	12.09646	9.900991	7.7309	5.719268	9.002206	6.968728	5.164859	8.461232	8.461232	6.298961	4.448157	7.80342	5.841073	3.766682	7.158037	5.015465	3.315582	6.745885	4.645308	2.92527	1.433445	0.057082	3.85259	3.85259	2.213478	5.70372	8.528584	5.657228	8.528706	6.190773	9.240284	9.240284	11.75195	13.92145	16.80215	19.52088	17.12219	14.8903	17.7869
Bot90	27.5	25.16546	22.86071	20.58208	18.30693	20.98414	23.64968	21.31935	23.86979	21.4869	24.22855	26.94979	24.65936	27.3657	25.07688	27.77945	25.45251	23.1476	20.81838	18.57228	16.16867	18.98608	16.62878	19.40728	22.00445	22.00445	24.72566	22.45246	20.1538	22.9675	25.65345	23.38719	21.05927	18.83141	16.45995	14.24299	12.12391	14.52378	12.4646	10.51096	12.86218	10.81202	7.743444	5.434799	3.49647	6.892842	6.892842	4.63847	2.784706	6.170522	4.03396	7.185246	9.996433	7.221604
Bot91	27.5	25.16546	22.86071	25.57581	23.28373	20.98398	23.64952	21.3192	18.98251	21.70154	19.42263	17.102	19.86929	17.66497	20.4104	23.15524	20.89155	23.62009	21.3548	19.08444	16.65384	14.39321	11.7272	11.7272	14.36258	12.26101	14.82918	12.76937	9.944741	7.457608	10.40009	8.143033	5.878829	3.894128	7.121494	9.720142	7.225017	10.12389	10.12389	12.32585	15.36288	13.15398	16.14042	13.89085	11.80366	8.813885	8.813885	11.37262	13.57242	16.47555	14.2048	12.1061	10.17259	12.6895
Bot92	22.5	20.19815	22.93494	20.6695	18.4414	16.19355	18.92224	21.6484	24.37253	27.13289	24.85714	27.57986	25.29773	28.03992	30.76218	28.50012	31.23241	28.97968	31.71745	34.45345	32.23599	29.99342	27.71562	30.42389	33.14156	35.90775	33.70432	31.48095	34.16723	36.93686	34.64559	37.29283	35.01413	32.68197	30.42668	33.13807	30.8725	28.57186	31.21471	28.93141	26.70496	29.437	32.11183	29.80721	32.54788	32.54788	35.34592	33.08197	33.08197	30.77445	30.77445	33.43512	31.15962	33.94988
Bot93	22.5	20.19815	23.0375	25.798	28.52757	26.37297	29.17659	26.92301	24.72701	22.46015	22.46015	20.164	22.77164	25.40554	28.05747	25.83221	23.57537	21.34376	24.07079	26.84096	24.56939	27.30058	30.04133	27.78598	25.52508	23.18712	20.97245	18.7091	16.33723	14.1241	17.01603	19.68341	17.2355	14.98467	12.83072	14.86938	12.71155	9.78921	9.78921	7.449066	5.09199	3.177191	6.63409	9.357466	11.72335	8.739195	8.739195	6.25193	4.163125	2.304283	5.747733	3.656173	1.808201	5.394666
Bot94	27.5	25.16546	27.86071	25.57008	28.27245	30.97813	33.68349	31.39401	29.10646	26.83155	29.53606	27.20322	24.90375	22.60781	25.30122	22.98172	20.72521	18.47829	21.17632	18.91399	16.49229	14.24095	11.58535	11.58535	9.119784	6.971118	4.90726	3.244839	6.734588	9.767735	7.327164	5.375935	3.468468	1.823959	0.439011	-0.79895	3.082398	6.520864	6.520864	4.546083	7.662898	5.395523	8.580357	11.05002	13.25608	16.16165	13.95137	11.83193	14.79585	12.63118	10.60014	12.8744	10.89271	14.03718
Bot95	27.5	25.16546	22.86071	25.57581	23.31031	21.04679	18.743	21.47827	19.20959	21.91717	24.63984	22.37993	25.149	27.89681	25.64879	23.4019	21.12807	18.8628	16.54282	14.34499	17.27477	14.97898	17.88207	15.58044	18.3892	16.0569	18.85287	21.42329	19.16967	16.80262	14.53653	12.41624	14.8449	12.73154	14.90907	12.78281	10.01924	7.316054	7.316054	9.835093	7.202218	9.803158	6.81216	9.509998	11.86	9.914918	9.914918	12.35636	10.38168	7.692439	10.26797	7.616917	10.37344	7.564042
Bot96	22.5	25.19815	28.0348	30.76227	33.55743	31.27035	29.01661	26.76825	29.57347	27.37183	25.19923	28.05037	30.86268	33.56916	36.27959	34.06391	31.80431	29.53425	27.25028	27.25028	24.96417	22.68755	20.35783	23.13322	20.77478	20.77478	18.34081	20.93855	23.50584	21.15974	18.92899	16.55938	14.28108	11.45838	13.73506	11.15043	8.518961	11.26662	11.26662	13.37154	11.2975	13.45983	11.36859	8.680439	6.325231	3.924801	3.924801	7.161736	4.949929	2.960403	1.329857	-0.05186	3.755129	1.879155
Bot97	22.5	25.19815	27.92408	25.6803	23.41465	21.14946	23.88518	23.88518	26.59572	29.27218	32.03066	29.78202	27.54002	30.31767	28.09169	25.86528	28.63335	31.39365	29.16655	26.9185	29.6415	27.36968	25.09841	22.80613	25.47249	23.13655	20.92393	23.68011	21.46983	19.2114	21.81236	24.57258	27.31553	25.0165	22.78591	20.489	23.31956	26.02408	23.79641	21.48014	19.27419	21.88749	19.63161	17.19073	14.90732	12.77039	10.76717	8.859962	6.442006	4.22133	2.386338	5.821971	8.817092	6.16302
Bot98	22.5	20.19815	22.93494	25.66789	23.39896	21.13181	18.86813	16.60492	14.22547	11.90944	9.776648	12.76185	10.53598	13.42953	16.11128	13.97801	11.64455	9.320717	7.145868	5.109496	3.45467	1.976628	5.60242	5.60242	3.770342	7.158351	5.071587	8.172151	5.783346	3.798464	2.113534	0.721425	4.450989	7.703586	5.618044	3.817741	2.09702	0.569663	0.569663	-0.68547	-1.80206	-2.82649	1.187867	-0.16206	-1.34331	2.576838	2.576838	6.023211	3.966558	7.155666	4.88116	2.9251	1.216565	4.877919
Bot99	27.5	25.16546	22.76042	20.46419	17.9584	15.63097	18.39333	15.90216	13.56517	16.35066	18.91969	21.65191	24.37993	27.09725	24.81792	22.51714	25.21273	22.91697	20.59751	18.18804	20.90016	18.6688	21.36783	19.08582	16.72941	14.48818	17.37764	15.17595	13.00409	10.2535	12.90121	15.08215	12.89206	15.22404	18.03627	20.636	18.40742	21.07546	18.85745	21.38364	24.16098	26.83769	24.58369	27.21653	29.97144	29.97144	27.62093	25.36006	28.0174	25.75982	23.5728	21.30659	24.14023	26.85581

Normality Test

Bin	Frequency
0	0
10	7
20	13
30	16
40	23
50	17
60	13
70	8
80	2
90	1
More	0



Result: The value of the K-S test statistic (D) is .04956.

The *p*-value is .95639. Your data does *not* differ significantly from that which is normally distributed.

Distribution Summary

Count : 100

Mean: 36.30867

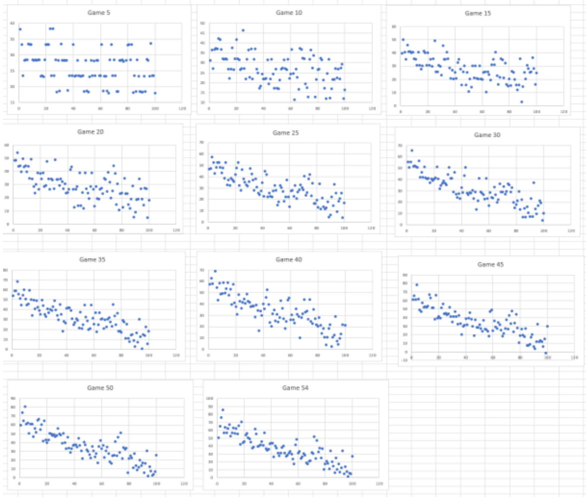
Median: 35.31967

Standard Deviation: 17.79153

Skewness: 0.232796

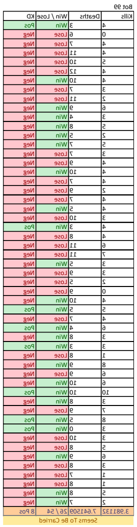
Kurtosis: -0.350236

Scatter Graphs



Appendix H: Bot 99 Inaccurate results of TrueSkill Test 2 for the use in Graphing lower skilled bots.

Bot 99 data was collected and was way above average for the bottom 10 bots. This was then broken down using the data collected for each individual bot. It shows the bot winning 26 matches out of 54 which makes the data correct but when studying the Kills and Deaths of the bot it clearly shows a negative KD with it only going positive in 8 matches. This shows the bot was “Carried” through the games and shows a problem with the TrueSkill System. But for the graphs to show a clearer average low-skilled player Bot 93 was selected.



Bot 99

Kills	Deaths	Win / Lose	KD
4	3	Win	Pos
0	6	Lose	Neg
4	7	Lose	Neg
4	11	Lose	Neg
5	10	Lose	Neg
4	12	Lose	Neg
4	10	Win	Neg
3	7	Lose	Neg
2	11	Lose	Neg
6	9	Win	Neg
3	4	Win	Neg
5	8	Win	Neg
2	5	Win	Neg
5	7	Win	Neg
3	7	Lose	Neg
4	9	Lose	Neg
4	10	Win	Neg
4	7	Lose	Neg
2	9	Lose	Neg
4	7	Lose	Neg
4	5	Win	Neg
3	10	Lose	Neg
4	3	Win	Pos
4	8	Lose	Neg
6	11	Lose	Neg
7	11	Lose	Neg
3	5	Win	Neg
3	9	Lose	Neg
2	5	Lose	Neg
0	9	Lose	Neg
4	10	Win	Neg
5	5	Win	Pos
4	7	Lose	Neg
6	4	Win	Pos
3	8	Win	Neg
3	3	Win	Pos
1	8	Lose	Neg
8	9	Win	Neg
6	9	Lose	Neg
6	10	Win	Neg
10	10	Win	Pos
3	8	Win	Neg
7	9	Lose	Neg
8	5	Win	Pos
3	0	Win	Pos
3	10	Lose	Neg
5	8	Lose	Neg
6	9	Win	Neg
3	8	Lose	Neg
1	7	Lose	Neg
1	8	Lose	Neg
5	8	Win	Neg
2	7	Win	Neg
3.981132	7.641509	26 / 54	8 Pos
Seems To Be Carried			

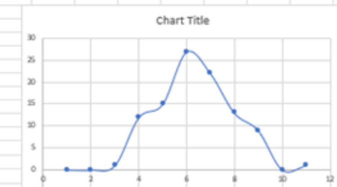
Appendix I : Elo Data

Raw Data

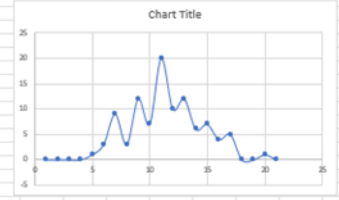
RowName	Game 0	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	Game 7	Game 8	Game 9	Game 10	Game 11	Game 12	Game 13	Game 14	Game 15	Game 16	Game 17	Game 18	Game 19	Game 20	Game 21	Game 22	Game 23	Game 24	Game 25	Game 26	Game 27	Game 28	Game 29	Game 30	Game 31	Game 32	Game 33	Game 34	Game 35	Game 36	Game 37	Game 38	Game 39	Game 40	Game 41	Game 42	Game 43	Game 44	Game 45	Game 46	Game 47	Game 48	Game 49	Game 50
Bot0	1500	1520	1500	1520	1500	1520	1540	1560.434	1581.365	1560.46	1580.455	1560.449	1540.004	1559.581	1579.582	1599.553	1619.965	1640.889	1618.588	1601.318	1620.479	1641.397	1619.678	1641.02	1621.438	1642.901	1664.809	1643.971	1665.019	1685.566	1706.49	1727.428	1706.637	1727.422	1749.116	1770.438	1751.289	1768.247	1785.251	1805.219	1825.023	1806.635	1784.178	1762.997	1742.822	1721.914	1745.826	1724.226	1747.281	1728.491	1708.085
Bot1	1500	1520	1540	1520	1540	1560	1579.99	1560.001	1540.011	1519.567	1539.582	1559.576	1579.131	1599.187	1617.844	1637.463	1615.988	1596.911	1576.913	1597.358	1616.52	1596.978	1617.499	1597.518	1617.623	1637.194	1655.845	1675.459	1654.411	1634.878	1654.975	1675.094	1695.885	1675.1	1653.406	1675.942	1696.621	1673.58	1693.692	1673.66	1653.463	1673.146	1691.831	1710.649	1730.824	1709.916	1733.829	1752.229	1775.283	1756.494	1776.087
Bot2	1500	1520	1540	1560	1579.995	1599.085	1619.075	1639.064	1619.995	1599.09	1579.519	1599.54	1619.514	1638.199	1618.101	1637.721	1656.245	1637.169	1614.868	1634.077	1654.704	1675.622	1693.903	1675.245	1695.663	1717.126	1739.034	1759.872	1780.92	1801.467	1782.391	1763.329	1784.12	1804.904	1826.599	1807.921	1788.771	1805.73	1822.734	1842.702	1822.505	1844.117	1866.573	1885.392	1905.567	1926.475	1910.387	1928.787	1911.842	1893.052	1912.646
Bot3	1500	1480	1500	1519.54	1539.555	1559.55	1579.55	1559.561	1579.571	1599.127	1619.556	1639.55	1619.524	1600.839	1620.741	1600.361	1578.885	1598.497	1618.499	1641.23	1621.858	1642.775	1621.056	1602.398	1582.503	1602.075	1620.725	1640.339	1619.684	1640.151	1621.076	1641.195	1661.734	1682.519	1704.213	1685.535	1704.685	1681.644	1658.648	1678.615	1698.419	1680.031	1657.575	1637.473	1657.331	1676.981	1656.568	1676.883	1696.316	1677.527	1697.145
Bot4	1500	1520	1540	1560	1579.54	1598.63	1578.62	1599.053	1619.984	1640.889	1621.318	1641.313	1621.287	1639.972	1619.875	1639.494	1658.019	1678.942	1696.641	1679.372	1660	1680.917	1699.198	1720.54	1740.958	1722.421	1704.329	1725.167	1704.119	1683.572	1704.497	1725.434	1704.643	1683.859	1662.164	1683.486	1664.337	1641.296	1621.407	1601.745	1582.16	1563.672	1583.388	1604.159	1584.017	1604.373	1624.602	1644.918	1624.351	1645.755	1665.373
Bot5	1500	1520	1540	1560	1579.995	1559.085	1579.085	1599.074	1620.005	1640.91	1661.339	1681.334	1701.307	1682.622	1702.525	1722.144	1740.668	1721.592	1739.291	1722.022	1702.649	1683.567	1661.848	1643.19	1663.608	1645.071	1666.979	1687.817	1708.865	1688.318	1669.243	1690.181	1669.39	1648.605	1670.3	1651.622	1632.301	1650.773	1670.885	1650.852	1631.268	1650.951	1669.635	1648.454	1668.312	1689.22	1713.132	1731.532	1754.587	1773.376	1752.97
Bot6	1500	1520	1540	1520	1539.54	1559.55	1579.55	1559.561	1579.571	1599.127	1619.556	1599.55	1619.524	1638.21	1658.112	1637.732	1656.256	1677.18	1694.879	1677.609	1698.237	1679.155	1697.435	1718.778	1699.196	1720.658	1702.566	1681.728	1702.776	1682.23	1663.155	1644.092	1664.883	1644.098	1622.404	1644.94	1625.619	1604.091	1584.203	1564.369	1584.318	1605.829	1624.514	1644.412	1664.27	1643.362	1663.776	1684.091	1707.146	1688.356	1707.95
Bot7	1500	1480	1460	1480	1500	1520	1500	1520	1538.683	1557.835	1538.266	1557.398	1577.896	1597.951	1616.608	1596.637	1577.048	1597.033	1577.035	1597.48	1616.641	1637.099	1615.38	1595.399	1575.537	1595.267	1615.446	1595.06	1614.384	1634.852	1614.949	1594.83	1613.951	1632.852	1654.367	1676.904	1657.583	1676.055	1653.059	1672.721	1692.525	1714.137	1691.681	1710.499	1730.674	1751.582	1775.495	1793.895	1776.949	1795.739	1775.332
Bot8	1500	1480	1500	1520	1540	1520	1500	1480.021	1460.016	1479.597	1499.598	1519.594	1539.588	1559.165	1539.164	1518.765	1538.966	1558.957	1578.97	1558.179	1578.204	1598.663	1619.184	1639.202	1619.62	1641.083	1622.991	1642.605	1663.26	1683.807	1664.732	1645.669	1624.878	1643.78	1665.295	1686.617	1705.767	1682.725	1659.729	1679.697	1699.501	1721.113	1743.569	1722.387	1742.562	1763.47	1747.383	1725.783	1748.837	1767.627	1787.22
Bot9	1500	1480	1460	1480	1500	1519.085	1499.053	1519.074	1499.053	1519.01	1539.032	1558.165	1537.668	1557.735	1577.736	1557.765	1577.732	1597.716	1617.718	1640.449	1661.077	1641.994	1620.275	1641.617	1662.035	1643.498	1665.406	1686.244	1707.292	1727.839	1748.764	1729.701	1750.492	1729.707	1751.402	1772.724	1791.873	1808.832	1825.836	1805.804	1825.608	1807.219	1829.676	1848.494	1828.319	1807.411	1791.323	1769.723	1752.778	1771.567	1751.161
Bot10	1500	1520	1540	1560.46	1540.466	1519.556	1539.523	1559.099	1577.783	1557.338	1577.768	1597.789	1577.344	1597.4	1616.056	1636.027	1614.551	1594.939	1614.941	1634.15	1654.778	1635.695	1616.217	1636.235	1656.34	1637.803	1659.711	1638.873	1659.529	1680.075	1701	1721.938	1742.728	1763.513	1741.818	1723.14	1742.29	1759.249	1736.252	1716.22	1696.024	1717.636	1740.092	1718.91	1698.735	1677.827	1701.74	1680.14	1663.194	1684.598	1704.216
Bot11	1500	1480	1460	1440	1459.545	1478.635	1498.624	1516.876	1536.855	1556.007	1576.437	1596.458	1616.013	1597.328	1575.984	1596.384	1616.795	1637.719	1615.418	1638.149	1618.776	1599.235	1579.756	1598.671	1618.776	1599.204	1577.855	1597.84	1577.185	1597.428	1617.6	1637.719	1658.259	1679.043	1657.349	1679.885	1699.035	1675.993	1656.105	1636.443	1656.858	1678.47	1700.926	1679.744	1659.569	1639.22	1659.634	1639.318	1658.751	1680.155	1659.773
Bot12	1500	1480	1500	1480	1500	1480	1460	1479.995	1499.995	1519.98	1499.995	1479.127	1459.113	1479.368	1459.372	1479.14	1499.145	1479.117	1498.035	1498.035	1517.841	1537.827	1557.843	1576.757	1556.896	1537.167	1556.576	1536.59	1556.003	1536.218	1555.395	1535.561	1555.485	1575.487	1596.012	1573.475	1554.228	1574.665	1594.895	1615.06	1635.475	1615.158	1593.843	1574.614	1594.577	1614.933	1594.519	1615.152	1594.585	1614.918	1594.536
Bot13	1500	1520	1500	1480	1460	1480	1500	1520	1498.683	1478.726	1458.717	1438.699	1458.214	1438.196	1418.03	1437.594	1457.409	1478.043	1496.961	1496.961	1516.767	1496.782	1517.19	1536.784	1556.108	1575.838	1596.017	1615.631	1594.976	1615.443	1635.54	1615.422	1635.961	1617.059	1595.544	1573.008	1592.255	1570.727	1550.956	1571.695	1550.849	1530.482	1510.198	1530.557	1550.52	1570.414	1590.218	1569.584	1548.872	1568.437	1588.648
Bot14	1500	1480	1500	1520	1540	1520	1540	1560	1580.01	1559.105	1539.535	1519.54	1499.535	1479.542	1499.545	1519.535	1539.555	1519.54	1539.516	1559.496	1579.521	1599.979	1580.501	1560.519	1580.658	1600.229	1578.88	1558.494	1537.818	1557.603	1577.775	1597.941	1578.82	1558.908	1579.432	1599.447	1580.126	1600.092	1620.204	1600.542	1620.957	1600.64	1580.281	1561.053	1541.09	1520.984	1541.16	1561.371	1581.323	1560.99	1581.158
Bot15	1500	1520	1500	1480	1500	1520	1500	1480	1500.005	1479.157	1459.148	1479.165	1499.151	1519.156	1539.652	1560.052	1540.463	1560.448	1540.45	1560.895	1540.056	1560.063	1580.115	1600.134	1580.239	1560.509	1540.33	1560.323	1579.647	1559.404	1579.576	1599.742	1620.281	1601.379	1579.864	1559.878	1579.125	1559.092	1579.226	1599.392	1618.546	1638.229	1616.913	1636.812	1656.669	1636.32	1656.734	1677.05	1656.483	1635.079	1614.697
Bot16	1500	1480	1500	1519.54	1539.555	1519.561	1539.528	1519.528	1539.507	1559.517	1539.511	1559.506	1580.003	1560.059	1538.715	1558.71	1578.677	1559.065	1539.051	1519.031	1538.939	1559.144	1579.196	1598.111	1618.216	1637.788	1656.438	1677.276	1656.228	1635.681	1655.779	1676.716	1655.925	1637.024	1615.509	1592.972	1573.725	1593.692	1573.922	1594.661	1613.815	1595.326	1574.968	1594.931	1615.379	1595.03	1574.801	1595.012	1615.724	1636.057	1655.674
Bot17	1500	1520	1500	1520	1540.016	1560.016	1540.006	1519.572	1539.568	1519.558	1499.573	1479.569	1459.57	1479.824	1459.828	1479.597	1499.602	1479.574	1459.563	1479.613	1499.419	1519.405	1499.421	1479.63	1459.838	1479.865	1459.843	1480.118	1499.91	1519.691	1538.867	1558.802	1577.923	1597.835	1578.359	1598.374	1619.053	1597.525	1577.754	1557.92	1537.869	1557.501	1577.218	1597.989	1578.437	1598.793	1619.022	1639.338	1618.771	1598.438	1618.65
Bot18	1500	1480	1500	1480	1460	1480	1460	1439.995	1420.456	1440.274	1460.722	1440.307	1459.883	1440.138	1460.605	1480.374	1500.379	1520.351	1540.327	1519.882	1539.9	1559.907	1539.856	1518.771	1538.548	1558.6	1578.78	1558.394	1537.718	1557.503	1577.675	1557.841	1576.962	1557.049	1576.578	1556.592	1576.626	1596.592	1576.822	1596.988	1616.141	1635.824	1654.509	1674.407	1654.265	1673.916	1694.33	1712.729	1695.784	1717.188	1736.781
Bot19	1500	1520	1500	1520	1500	1479.085	1459.075	1439.509	1459.518	1439.528	1459.321	1479.338	1499.339	1519.346	1539.343	1559.743	1539.776	1559.761	1579.774	1598.983	1578.144	1558.151	1538.099	1558.335	1578.474	1598.203	1616.854	1596.468	1575.812	1555.569	1536.393	1556.328	1536.252	1515.716	1535.506	1555.422	1535.388	1554.575	1534.709	1554.916	1574.865	1596.376	1616.018	1596.789	1577.237	1557.593	1537.396	1555.738	1535.689	1555.894	1535.726
Bot20	1500	1520	1540	1520	1540	1520.005	1540.006	1519.572	1499.576	1519.561	1539.576	1519.581	1499.576	1479.583	1459.586	1439.818	1460.035	1480.07	1500.06	1480.456	1460.262	1480.266	1500.674	1480.268	1500.477	1520.258	1499.668	1519.849	1499.261	1519.042	1499.323	1478.465	1498.709	1520.334	1540.124	1559.215	1578.462	1558.429	1538.563	1559.302	1579.251	1600.763	1579.448	1560.219	1540.256	1560.15	1579.954	1600.587	1621.299	1599.895	1620.107
Bot21	1500	1480	1500	1479.54	1459.995	1479.995	1459.984	1479.98	1499.979	1479.964	1459.942	1479.527	1499.528	1519.535	1499.537	1479.526	1499.532	1519.504	1499.479	1519.084	1499.065	1518.546	1538.989	1559.225	1539.364	1519.416	1538.825	1558.818	1578.142	1598.385	1578.483	1598.649	1578.109	1598.022	1576.507	1596.521	1617.2	1595.672	1615.902	1635.564	1615.979	1597.491	1577.132	1557.169	1537.206	1556.722	1536.526	1554.868	1574.819	1554.384	1534.216
Bot22	1500	1480	1500	1520	1540	1520	1540	1520	1539.996	1560.005	1540	1520.005	1540	1559.577	1579.577	1599.548	1619.96	1640.884	1658.583	1681.313	1701.941	1722.859	1741.139	1722.482	1702.9	1684.363	1666.27	1645.432	1624.384	1604.852	1624.949	1604.83	1584.291	1603.192	1581.677	1561.692	1580.939	1600.905	1621.017	1640.68	1661.095	1642.707	1661.391	1680.21	1660.035	1679.685	1663.598	1643.282	1622.715	1601.311	1581.1
Bot23	1500	1520	1500	1520	1540	1520.005	1500.006	1519.582	1539.578	1559.587	1579.582	1559.602	1539.157	1558.734	1538.733	1558.728	1538.761	1558.752	1578.765	1557.974	1577.999	1598.006	1578.527	1597.442	1577.547	1557.818	1537.227	1557.22	1576.633	1596.876	1617.048	1637.167	1657.706	1638.805	1660.32	1641.642	1662.321	1680.793	1697.797	1717.764	1697.568	1679.18	1656.724	1676.622	1696.797	1717.705	1701.617	1680.017	1699.45	1718.24	1697.833
Bot24	1500	1480	1500	1480	1460	1440	1460.44	1438.691	1418.701	1438.461	1458.254	1478.742	1458.727	1478.746	1458.768	1438.807	1419.025	1438.803	1458.797	1478.847	1458.989	1478.993	1458.585	1478.619	1499.474	1519.256	1539.244	1519.251	1499.034	1518.814	1539.095	1519.16	1539.195	1559.197	1539.722	1558.813	1538.78	1518.343	1498.091	1518.112	1538.131	1517.764	1537.757	1557.721	1577.683	1598.039	1577.81	1557.177	1537.128	1516.693	1536.93
Bot25	1500	1520	1540	1560	1579.995	1599.085	1579.075	1599.064	1619.995	1640.9	1621.329	1601.323	1621.297	1639.983	1619.885	1599.505	1579.917	1599.529	1577.228	1556.783	1536.764	1556.969	1576.985	1595.9	1616.039	1596.467	1576.288	1596.273	1616.928	1597.396	1577.224	1557.39	1537.314	1517.317	1497.106	1477.572	1497.393	1515.871	1535.619	1555.825	1535.774	1515.797	1535.79	1555.753	1575.716	1595.61	1615.839	1636.472	1655.905	1634.502	1654.12
Bot26	1500	1480	1460	1440	1460.005	1439.09	1418.154	1418.154	1439.539	1419.357	1419.357	1398.869	1398.869	1419.613	1439.447	1459.487	1439.535	1460.17	1479.087	1479.087	1499.229	1519.214	1539.23	1559.466	1579.604	1599.334	1577.984	1557.999	1537.412	1517.627	1497.908	1518.551	1498.586	1520.211	1540.001	1559.092	1539.845	1519.408	1539.156	1518.416	1538.436	1558.068	1577.785	1598.556	1619.004	1598.655	1618.884	1598.568	1619.28	1597.876	1618.088
Bot27	1500	1520	1540	1560	1579.995	1559.085	1539.085	1558.661	1577.344	1556.9	1537.33	1516.463	1536.864	1556.931	1536.93	1556.925	1576.892	1556.876	1536.852	1556.832	1536.807	1557.012	1536.961	1516.725	1536.503	1556.555	1575.964	1595.949	1615.274	1635.741	1615.839	1635.957	1615.418	1634.32	1655.835	1678.371	1659.222	1677.694	1694.698	1674.665	1654.469	1674.152	1651.696	1631.594	1611.452	1591.808	1571.579	1591.79	1612.502	1592.17	1571.959
Bot28	1500	1480	1500	1519.54	1499.555	1478.641	1458.63	1478.197	1458.657	1478.667	1458.658	1438.64	1418.155	1438.566	1458.4	1478.44	1458.488	1439.123	1419.129	1438.703	1459.135	1479.14	1458.732	1478.765	1457.909	1437.883	1458.151	1478.426	1498.218	1517.396	1537.677	1517.742	1537.776	1557.779	1577.308	1557.322	1537.289	1556.475	1536.609	1515.87	1535.889	1555.911	1535.628	1555.987	1575.949	1555.844	1535.647	1553.989	1573.94	1593.505	1573.294
Bot29	1500	1520	1540	1560	1540.005	1560.005	1539.995	1559.995	1580.005	1559.561	1579.555	1559.576	1580.073	1560.129	1538.785	1518.791	1498.59	1518.246	1498.344	1498.344	1478.15	1497.631	1518.039	1497.632	1477.841	1497.612	1517.634	1537.815	1557.228	1536.984	1517.808	1536.95	1516.874	1537.41	1556.939	1576.03	1595.277	1613.749	1593.861	1574.026	1553.18	1572.813	1592.529	1613.301	1593.158	1613.514	1633.928	1613.612	1592.9	1613.233	1633.444
Bot30	1500	1480	1460	1480	1460	1480	1499.99	1480.011	1500.016	1479.168	1499.159	1479.178	1499.164	1519.169	1539.665	1560.065	1580.476	1560.864	1580.866	1560.075	1540.05	1520.057	1500.073	1519.667	1538.991	1519.043	1539.031	1519.038	1538.821	1558.605	1538.433	1518.498	1538.533	1518.535	1498.325	1517.86	1538.225	1517.788	1537.536	1516.797	1496.816	1517.195	1497.188	1517.404	1536.95	1556.466	1576.27	1556.481	1536.432	1516.227	1536.464
Bot31	1500	1480	1460	1439.54	1419.534	1438.624	1457.688	1438.122	1458.131	1477.949	1498.397	1518.378	1538.779	1558.846	1538.845	1558.839	1538.872	1558.863	1578.877	1598.086	1617.247	1597.705	1618.226	1598.245	1618.35	1598.779	1577.429	1597.415	1618.07	1638.538	1659.462	1640.4	1619.861	1638.762	1660.277	1681.599	1662.45	1679.409	1656.412	1636.75	1617.165	1596.848	1616.49	1596.388	1576.836	1556.73	1576.534	1597.167	1576.455	1596.787	1576.576
Bot32	1500	1520	1500	1479.54	1499.084	1518.17	1498.137	1516.389	1496.384	1476.803	1497.251	1477.271	1457.695	1437.676	1457.51	1477.55	1497.502	1517.158	1537.256	1557.236	1537.211	1517.006	1537.449	1517.214	1497.436	1517.207	1537.195	1517.202	1536.984	1556.769	1537.593	1557.528	1537.452	1557.455	1536.984	1556.075	1576.108	1556.075	1576.209	1596.375	1615.528	1597.04	1616.681	1636.579	1616.437	1636.088	1615.674	1636.308	1655.741	1677.144	1656.762
Bot33	1500	1520	1540	1520	1500.016	1480.005	1499.561	1519.582	1539.578	1559.588	1539.582	1559.577	1539.132	1559.199	1539.198	1559.598	1579.565	1599.177	1579.179	1598.388	1617.549	1638.007	1656.288	1637.63	1618.048	1637.62	1656.27	1635.884	1656.539	1635.993	1616.09	1595.971	1576.85	1556.938	1576.467	1556.481	1576.514	1556.481	1576.615	1596.781	1575.935	1597.446	1617.088	1596.986	1577.434	1557.79	1577.593	1556.96	1576.911	1556.579	1576.747
Bot34	1500	1520	1540	1520	1500	1480	1500	1480	1459.995	1440.414	1420.862	1441.35	1460.926	1441.181	1420.714	1440.278	1420.495	1441.13	1420.047	1440.114	1420.256	1399.978	1379.617	1400.039	1419.89	1439.439	1459.707	1479.983	1459.774	1479.939	1459.746	1439.103	1419.486	1439.573	1419.328	1439.253	1459.423	1437.901	1417.687	1437.739	1457.518	1437.931	1457.883	1477.875	1457.652	1438.149	1458.267	1437.989	1457.574	1477.568	1457.585
Bot35	1500	1520	1500	1480	1460	1480	1459.99	1479.985	1459.985	1440.404	1460.853	1480.438	1500.839	1520.906	1500.908	1520.898	1500.918	1520.89	1540.866	1561.311	1540.472	1520.479	1500.495	1480.089	1500.297	1480.516	1500.537	1480.356	1460.148	1439.326	1459.978	1439.335	1419.718	1439.805	1460.05	1479.585	1499.406	1478.593	1499.034	1478.827	1498.871	1478.893	1499.316	1478.957	1498.734	1478.25	1458.271	1437.993	1417.578	1437.571	1416.897
Bot36	1500	1480	1460	1479.54	1459.995	1439.995	1459.059	1478.625	1498.164	1518.121	1538.143	1557.276	1536.779	1516.712	1537.208	1517.214	1537.415	1557.406	1537.392	1517.373	1497.281	1476.761	1497.175	1516.966	1536.744	1556.796	1576.206	1556.22	1535.633	1555.414	1536.237	1516.302	1536.337	1556.872	1536.401	1516.316	1495.951	1514.429	1534.87	1514.664	1494.683	1515.062	1535.055	1514.697	1494.243	1513.745	1493.569	1473.291	1492.876	1513.373	1493.61
Bot37	1500	1520	1540	1560.46	1580.455	1599.545	1619.535	1599.546	1580.477	1601.382	1581.811	1601.806	1581.78	1600.465	1580.367	1560.396	1580.808	1600.42	1618.119	1600.85	1580.011	1560.469	1580.521	1600.54	1580.645	1560.916	1540.736	1520.743	1500.156	1479.937	1500.13	1479.272	1459.029	1437.404	1457.769	1477.276	1457.446	1477.173	1456.732	1477.469	1497.512	1477.134	1457.557	1477.549	1497.326	1477.823	1497.844	1476.186	1496.224	1516.429	1496.666
Bot38	1500	1480	1500	1520	1500	1519.085	1499.053	1477.305	1496.844	1516.425	1496.403	1515.988	1496.389	1476.394	1496.417	1476.549	1496.501	1516.157	1536.255	1516.235	1496.143	1515.624	1496.067	1476.276	1497.132	1477.36	1496.23	1516.19	1535.972	1515.752	1536.034	1555.176	1575.1	1595.012	1575.537	1556.445	1576.479	1556.445	1536.58	1556.786	1536.735	1516.368	1496.362	1476.146	1455.923	1475.497	1455.518	1474.943	1454.981	1434.987	1455.662
Bot39	1500	1480	1460	1480	1500	1520	1500	1480	1460.001	1479.582	1499.582	1519.578	1539.573	1519.995	1539.993	1519.593	1499.614	1479.586	1499.575	1519.179	1499.161	1519.146	1499.589	1479.183	1459.392	1479.418	1499.44	1519.621	1539.404	1519.619	1538.795	1558.73	1577.851	1557.938	1577.467	1597.482	1578.161	1598.127	1618.239	1637.902	1618.317	1598	1617.641	1597.539	1617.987	1637.638	1617.224	1596.909	1617.621	1637.953	1617.571
Bot40	1500	1480	1500	1480	1500	1519.085	1499.053	1517.305	1497.283	1517.241	1497.219	1517.199	1497.6	1517.605	1538.101	1518.107	1538.308	1518.318	1498.416	1498.416	1478.323	1457.804	1478.218	1498.009	1478.231	1458.46	1437.329	1417.35	1437.081	1457.082	1476.417	1497.06	1477.094	1455.469	1475.714	1495.249	1475.427	1453.905	1473.692	1453.671	1433.915	1454.328	1474.28	1494.495	1514.272	1493.788	1513.964	1492.306	1472.848	1453.345	1474.019
Bot41	1500	1520	1540	1519.54	1539.555	1519.561	1539.528	1559.528	1579.538	1599.094	1619.523	1599.518	1579.491	1599.547	1579.45	1559.479	1539.512	1519.496	1499.472	1479.868	1459.674	1439.679	1459.612	1479.646	1459.854	1439.827	1418.697	1398.718	1377.548	1400.313	1420.621	1400.577	1379.003	1397.898	1418.263	1438.187	1418.357	1398.313	1418.161	1438.213	1458.456	1478.87	1499.293	1478.934	1498.711	1518.227	1538.403	1558.615	1538.566	1518.131	1498.368
Bot42	1500	1480	1460	1479.54	1499.084	1518.17	1537.725	1557.301	1575.984	1595.54	1575.969	1555.989	1576.486	1556.909	1576.91	1596.881	1577.293	1557.277	1577.253	1597.698	1576.86	1596.867	1617.388	1637.406	1617.512	1597.94	1576.591	1556.605	1576.018	1555.774	1574.951	1555.117	1575.041	1594.953	1615.478	1592.941	1573.694	1594.131	1614.361	1634.023	1654.438	1634.121	1612.806	1593.577	1574.025	1593.919	1573.69	1553.901	1533.853	1513.647	1533.884
Bot43	1500	1480	1460	1440	1460.005	1440.005	1460.445	1438.697	1418.706	1438.466	1458.259	1438.242	1417.757	1398.168	1398.168	1379.042	1379.042	1398.105	1398.105	1417.68	1437.241	1416.963	1437.324	1456.688	1477.544	1497.315	1477.293	1457.333	1477.9	1497.078	1517.272	1496.414	1516.658	1537.193	1556.983	1537.892	1517.859	1537.045	1557.179	1536.44	1516.389	1536.411	1516.127	1495.769	1475.315	1494.818	1474.641	1494.919	1514.378	1534.583	1514.415
Bot44	1500	1520	1540	1519.54	1539.555	1559.55	1539.55	1559.55	1539.56	1519.551	1499.566	1479.561	1499.562	1519.569	1539.566	1519.167	1539.187	1519.196	1499.294	1499.294	1519.202	1498.997	1519.44	1499.204	1518.982	1499.201	1519.188	1499.007	1478.789	1497.967	1518.249	1537.391	1557.315	1537.317	1516.846	1496.762	1517.127	1536.313	1556.061	1576.8	1555.954	1575.587	1555.303	1575.266	1595.714	1576.07	1555.841	1536.052	1516.594	1496.389	1516.626
Bot45	1500	1520	1540	1520	1500.016	1480.005	1459.561	1439.556	1459.095	1479.105	1459.096	1439.078	1458.594	1438.575	1459.042	1479.082	1499.034	1478.69	1497.607	1497.607	1517.414	1537.399	1517.415	1537.009	1517.684	1537.466	1556.875	1576.86	1556.185	1576.428	1556.256	1576.422	1557.302	1537.304	1516.833	1536.748	1557.114	1577.55	1597.78	1578.118	1557.271	1576.904	1556.546	1576.509	1596.957	1577.313	1597.542	1576.908	1556.196	1575.761	1555.55
Bot46	1500	1480	1500	1480	1460	1480	1500	1520	1500.004	1519.989	1500.419	1479.552	1459.553	1479.808	1459.812	1440.043	1460.26	1480.296	1460.285	1440.335	1460.477	1480.481	1460.073	1440.107	1419.251	1398.8	1418.798	1398.819	1417.65	1440.414	1459.749	1439.106	1458.723	1478.722	1458.429	1437.937	1458.106	1437.833	1457.62	1438.357	1418.6	1438.492	1458.443	1478.435	1458.212	1477.714	1457.735	1437.16	1416.745	1436.397	1415.723
Bot47	1500	1520	1500	1480	1500	1480	1460	1439.995	1459.535	1439.545	1419.338	1439.825	1420.249	1400.66	1420.494	1400.931	1420.746	1441.38	1420.298	1440.365	1460.506	1480.511	1460.103	1440.136	1460.992	1440.965	1419.835	1399.856	1418.687	1398.686	1378.377	1357.069	1375.494	1394.389	1415.284	1395.209	1374.099	1394.298	1414.388	1434.439	1414.218	1434.109	1454.116	1434.107	1414.959	1395.107	1414.699	1393.702	1373.629	1394.481	1414.258
Bot48	1500	1520	1500	1480	1500	1480	1499.555	1519.577	1499.581	1479.566	1459.565	1479.151	1459.136	1439.391	1418.924	1399.36	1419.175	1399.396	1419.419	1439.486	1459.919	1439.923	1459.857	1479.89	1460.098	1440.072	1458.941	1439.216	1419.485	1399.484	1379.176	1357.868	1336.293	1355.188	1334.293	1353.866	1332.756	1312.955	1312.955	1333.28	1352.944	1371.22	1390.304	1369.991	1350.582	1371.154	1391.8	1370.802	1390.875	1370.527	1391.779
Bot49	1500	1480	1500	1520	1500.016	1520.026	1500.027	1519.603	1539.599	1519.589	1499.604	1479.6	1459.601	1479.855	1499.859	1479.849	1459.854	1479.889	1499.879	1519.483	1499.464	1479.479	1499.886	1479.48	1499.689	1519.471	1498.88	1478.699	1498.491	1517.669	1497.95	1477.307	1457.69	1437.69	1458.056	1437.563	1417.026	1437.07	1456.918	1437.655	1457.434	1477.847	1498.27	1477.912	1497.689	1477.205	1497.225	1475.567	1495.605	1476.102	1496.12
Bot50	1500	1480	1460	1480	1500	1520	1540	1519.567	1539.546	1519.536	1539.551	1559.546	1580.043	1560.099	1538.755	1518.761	1538.962	1518.971	1539.069	1559.049	1579.075	1559.533	1539.481	1518.396	1498.618	1478.847	1458.825	1439.1	1419.369	1439.37	1458.705	1478.697	1458.453	1438.454	1458.699	1478.207	1458.385	1478.112	1457.671	1438.407	1458.651	1479.03	1459.453	1439.238	1459.758	1479.26	1499.281	1477.622	1457.66	1478.157	1498.175
Bot51	1500	1520	1500	1480	1500	1480	1459.555	1479.551	1499.55	1479.535	1499.526	1479.545	1499.546	1519.553	1499.555	1479.544	1459.549	1439.514	1459.508	1479.558	1499.699	1479.714	1459.306	1439.339	1418.484	1398.033	1418.031	1438.052	1418.32	1438.321	1458.973	1478.965	1458.722	1438.722	1458.967	1439.432	1419.602	1439.647	1419.434	1439.486	1419.729	1399.838	1419.844	1399.836	1420.688	1400.262	1379.854	1358.857	1379.152	1398.804	1378.581
Bot52	1500	1480	1500	1480	1460	1480	1459.555	1439.551	1419.56	1399.8	1399.8	1420.746	1400.261	1420.672	1400.506	1420.07	1399.885	1419.664	1439.687	1419.753	1399.321	1419.071	1399.005	1379.427	1399.278	1420.272	1400.004	1421.108	1440.839	1461.004	1441.669	1461.625	1481.242	1502.867	1523.16	1543.075	1563.108	1542.671	1562.805	1583.545	1602.698	1584.21	1563.852	1543.888	1523.926	1503.442	1483.266	1503.544	1484.085	1464.583	1485.257
Bot53	1500	1480	1460	1440	1459.545	1478.635	1458.624	1439.058	1459.067	1479.077	1499.068	1519.048	1539.449	1519.872	1499.875	1479.864	1459.869	1479.905	1499.894	1480.29	1500.096	1480.111	1500.519	1520.112	1500.788	1520.569	1499.979	1479.798	1459.589	1439.755	1420.42	1400.376	1418.801	1438.889	1418.644	1398.568	1419.105	1399.061	1379.213	1360.865	1380.529	1400.42	1380.426	1400.113	1420.965	1440.539	1420.657	1400.082	1380.009	1359.662	1380.914
Bot54	1500	1480	1500	1479.54	1459.995	1439.995	1419.555	1419.555	1398.171	1378.41	1378.41	1399.356	1399.356	1419.767	1399.602	1419.165	1398.98	1418.759	1398.782	1418.356	1397.918	1377.668	1377.668	1358.091	1358.091	1377.525	1357.522	1378.626	1397.457	1420.221	1399.569	1420.877	1441.157	1461.244	1481.489	1461.954	1482.124	1460.602	1480.389	1460.368	1480.411	1460.033	1480.456	1500.672	1480.218	1460.716	1440.834	1420.258	1440.331	1420.338	1399.664
Bot55	1500	1520	1540	1560	1540.005	1560.005	1579.995	1599.984	1580.916	1560.011	1540.005	1560	1579.555	1559.611	1538.267	1558.262	1538.295	1518.304	1498.402	1498.402	1518.31	1498.324	1518.768	1538.362	1557.687	1537.957	1517.366	1537.547	1556.96	1536.717	1517.54	1496.682	1516.717	1537.252	1516.781	1496.697	1476.332	1454.81	1434.596	1455.333	1475.577	1455.198	1435.246	1455.238	1435.758	1415.332	1434.924	1414.349	1434.421	1414.428	1434.205
Bot56	1500	1480	1460	1480	1460	1440	1460.44	1438.691	1458.701	1438.71	1418.504	1398.016	1398.016	1378.76	1378.76	1359.634	1359.634	1378.697	1378.697	1397.931	1417.493	1397.243	1417.604	1398.027	1417.877	1397.427	1377.424	1356.321	1335.152	1355.565	1375.874	1397.182	1415.607	1395.52	1416.415	1396.339	1417.449	1397.405	1417.253	1397.201	1416.979	1436.871	1456.822	1436.814	1457.334	1476.908	1456.928	1476.353	1496.391	1476.186	1456.204
Bot57	1500	1520	1540	1560	1540.005	1520.005	1540.005	1519.572	1499.576	1479.561	1459.56	1439.145	1458.66	1438.642	1418.175	1398.611	1418.427	1438.205	1418.211	1437.786	1458.218	1477.94	1457.526	1477.559	1498.415	1478.643	1497.513	1477.553	1458.12	1438.285	1458.936	1438.929	1418.649	1398.562	1378.197	1397.77	1377.233	1357.431	1377.521	1359.173	1338.837	1357.113	1338.029	1358.118	1378.709	1358.856	1379.502	1398.505	1418.578	1398.584	1378.361
Bot58	1500	1520	1500	1480	1460	1480	1499.99	1520.011	1498.694	1478.737	1498.728	1518.708	1499.109	1479.114	1499.136	1519.269	1539.289	1559.28	1539.266	1519.246	1539.265	1559.47	1539.419	1559.655	1539.793	1559.523	1539.343	1559.336	1578.66	1598.904	1579.001	1559.167	1578.287	1558.375	1578.899	1598.914	1619.593	1598.065	1578.176	1558.342	1538.291	1517.924	1537.917	1517.954	1537.501	1517.017	1496.84	1475.182	1495.22	1475.717	1455.735
Bot59	1500	1480	1500	1520	1500.016	1520.026	1500.027	1479.603	1459.604	1479.614	1499.635	1479.631	1499.632	1519.639	1499.641	1519.63	1499.651	1519.623	1499.599	1479.994	1459.801	1439.805	1459.739	1439.772	1418.916	1438.466	1418.198	1438.219	1457.95	1478.115	1498.309	1477.451	1457.207	1477.207	1497.499	1477.964	1458.143	1437.87	1457.657	1438.393	1458.637	1479.016	1499.439	1519.797	1539.344	1559.238	1539.041	1519.252	1538.711	1518.276	1538.512
Bot60	1500	1480	1460	1439.54	1459.545	1478.635	1498.624	1516.876	1496.855	1477.274	1457.722	1437.235	1416.75	1397.161	1397.161	1378.035	1378.035	1397.098	1397.098	1376.672	1376.672	1397.902	1418.263	1437.627	1457.828	1477.854	1496.724	1516.683	1496.466	1515.644	1535.925	1555.067	1574.991	1594.903	1575.428	1556.337	1536.303	1515.49	1495.238	1475.216	1455.173	1435.586	1415.593	1435.279	1455.799	1475.373	1495.394	1515.672	1496.214	1476.009	1496.026
Bot61	1500	1480	1500	1520	1540	1559.995	1579.984	1599.974	1580.905	1560	1579.995	1599.989	1579.963	1560.019	1578.675	1598.646	1579.058	1559.446	1539.432	1559.413	1539.387	1519.182	1539.198	1518.962	1538.287	1518.339	1498.327	1478.367	1498.934	1478.714	1458.521	1478.513	1498.757	1478.221	1498.514	1478.979	1459.157	1478.885	1458.444	1478.465	1498.508	1518.53	1538.524	1518.561	1538.107	1518.001	1538.177	1518.389	1537.847	1517.412	1497.649
Bot62	1500	1520	1500	1480	1500	1520	1540	1520	1538.683	1517.835	1537.857	1516.99	1497.391	1517.396	1496.9	1477.033	1457.081	1437.715	1457.709	1477.759	1457.901	1477.623	1498.037	1517.828	1498.05	1478.278	1497.148	1517.108	1496.89	1476.068	1456.733	1436.726	1457.005	1477.004	1456.712	1476.219	1456.389	1436.116	1416.268	1396.216	1415.995	1396.104	1416.11	1435.797	1456.317	1435.891	1456.009	1475.434	1455.472	1435.478	1414.804
Bot63	1500	1520	1540	1560	1540.46	1519.551	1539.518	1519.094	1539.073	1518.225	1538.247	1557.38	1536.883	1516.816	1496.32	1516.452	1496.251	1475.907	1454.825	1474.892	1455.033	1434.755	1414.689	1435.112	1414.911	1435.905	1456.173	1476.448	1457.015	1437.18	1457.832	1477.824	1457.581	1437.581	1457.946	1477.454	1497.624	1516.102	1495.849	1515.87	1535.89	1515.912	1495.906	1516.121	1495.667	1476.165	1496.186	1475.908	1495.946	1516.443	1496.68
Bot64	1500	1480	1460	1440	1420.455	1439.545	1458.609	1478.175	1458.636	1478.454	1458.902	1478.919	1498.905	1478.91	1458.932	1438.972	1459.189	1439.153	1419.159	1438.733	1418.301	1438.051	1457.984	1438.018	1417.817	1438.811	1459.079	1439.354	1419.921	1399.92	1420.229	1440.185	1459.802	1438.177	1417.932	1437.857	1458.026	1477.754	1457.313	1478.049	1458.006	1438.419	1418.467	1438.154	1418.674	1398.822	1418.414	1437.416	1417.001	1436.653	1457.328
Bot65	1500	1520	1540	1520	1500	1480	1460	1479.995	1459.996	1479.577	1499.578	1519.573	1499.568	1479.574	1499.578	1479.568	1499.573	1519.545	1539.521	1519.076	1499.057	1518.537	1498.981	1518.772	1538.097	1558.149	1578.328	1558.343	1537.667	1517.883	1498.164	1518.807	1498.841	1519.377	1539.167	1520.075	1499.71	1478.897	1458.456	1478.477	1458.433	1478.847	1459.27	1439.055	1419.575	1439.427	1419.545	1438.548	1458.133	1478.63	1498.647
Bot66	1500	1520	1500	1480	1500	1480	1459.555	1479.122	1459.582	1439.592	1459.385	1479.403	1459.404	1479.658	1499.662	1519.651	1499.672	1479.644	1459.633	1439.683	1419.251	1438.973	1418.906	1399.543	1419.393	1398.943	1378.675	1357.571	1376.402	1399.166	1419.475	1439.431	1419.814	1399.727	1379.362	1358.935	1337.825	1358.023	1338.113	1359.766	1339.43	1317.705	1336.79	1316.701	1337.292	1316.72	1337.366	1358.7	1338.405	1359.257	1380.509
Bot67	1500	1480	1500	1520	1540	1560	1539.99	1519.99	1499.994	1519.979	1499.994	1519.99	1539.984	1520.407	1540.405	1520.005	1540.026	1520.01	1499.986	1519.59	1539.609	1519.616	1539.632	1518.547	1498.769	1518.541	1498.528	1478.568	1458.36	1478.525	1458.332	1438.324	1458.603	1478.603	1458.31	1478.617	1497.639	1516.117	1495.865	1515.886	1495.905	1516.284	1496.277	1476.062	1455.839	1435.413	1415.531	1434.534	1454.119	1474.112	1494.13
Bot68	1500	1480	1500	1520	1500	1520	1540	1560.434	1540.444	1560	1579.994	1560.015	1539.57	1559.147	1579.147	1559.176	1579.143	1559.531	1539.517	1519.073	1538.98	1559.186	1579.237	1558.152	1538.828	1558.88	1538.7	1558.693	1538.017	1557.802	1537.63	1557.565	1538.444	1518.447	1498.237	1517.772	1497.407	1515.885	1535.632	1515.426	1535.445	1555.467	1535.184	1555.542	1535.58	1555.096	1534.899	1553.241	1533.782	1553.988	1533.819
Bot69	1500	1520	1500	1520	1500	1480	1460	1439.995	1420.456	1400.274	1400.274	1421.22	1440.735	1421.146	1400.98	1381.416	1381.416	1401.195	1381.218	1360.792	1360.792	1382.022	1361.661	1382.618	1362.468	1341.474	1341.474	1361.177	1340.007	1317.243	1317.243	1297.552	1297.552	1317.136	1317.136	1296.709	1296.709	1275.771	1275.771	1256.096	1256.096	1277.262	1277.262	1294.585	1294.585	1275.787	1275.787	1256.184	1256.184	1235.889	1235.889
Bot70	1500	1480	1500	1480	1500	1480	1500	1480	1500.005	1519.157	1539.172	1518.305	1538.706	1518.639	1539.135	1519.141	1539.342	1519.351	1499.449	1499.449	1479.357	1458.838	1479.252	1499.043	1518.821	1499.039	1479.027	1498.987	1518.779	1538.559	1557.736	1577.902	1558.781	1578.784	1599.308	1576.772	1557.525	1537.088	1517.222	1497.015	1517.059	1497.081	1477.504	1457.289	1437.809	1457.383	1477.501	1497.779	1517.237	1537.442	1557.61
Bot71	1500	1480	1500	1520	1540	1520.005	1540.006	1560.439	1581.371	1602.275	1622.704	1602.699	1622.673	1603.988	1623.89	1603.51	1622.034	1602.958	1580.657	1559.865	1579.891	1600.349	1620.87	1642.212	1662.63	1684.093	1666.001	1645.163	1624.115	1604.582	1624.68	1604.561	1584.021	1565.12	1545.644	1526.553	1546.918	1567.355	1547.585	1526.845	1546.794	1526.427	1546.144	1526.181	1505.727	1525.243	1505.067	1523.408	1542.867	1562.432	1582.6
Bot72	1500	1480	1460	1480	1460	1440	1419.561	1419.561	1440.945	1420.763	1420.763	1400.276	1379.791	1400.534	1380.368	1401.243	1381.058	1400.121	1380.144	1399.378	1378.94	1398.69	1378.329	1398.752	1418.602	1398.152	1418.149	1438.17	1418.439	1438.44	1417.788	1397.744	1416.169	1396.082	1416.977	1396.902	1376.365	1356.563	1336.653	1318.305	1318.305	1296.581	1296.581	1313.904	1313.904	1334.476	1313.83	1335.164	1355.459	1376.311	1396.088
Bot73	1500	1480	1460	1439.54	1419.534	1398.624	1377.688	1377.688	1356.303	1336.543	1336.543	1315.597	1315.597	1336.341	1336.341	1317.215	1317.215	1296.279	1296.279	1315.513	1315.513	1294.283	1294.283	1315.241	1315.241	1334.675	1334.675	1314.973	1314.973	1294.56	1294.56	1314.251	1314.251	1333.835	1354.73	1374.303	1395.412	1375.368	1395.458	1415.51	1395.289	1375.397	1394.482	1374.169	1354.759	1375.331	1395.977	1374.98	1395.053	1374.705	1354.482
Bot74	1500	1520	1500	1480	1460	1480	1500	1480	1499.999	1519.984	1540.414	1520.435	1499.938	1479.945	1459.448	1439.68	1459.897	1439.861	1459.855	1439.905	1460.337	1440.342	1419.928	1439.291	1459.492	1479.519	1499.541	1479.36	1499.151	1478.932	1499.126	1518.268	1498.302	1519.927	1499.717	1479.633	1499.454	1478.641	1499.082	1519.288	1499.307	1479.33	1459.753	1479.968	1459.745	1479.248	1459.268	1438.99	1418.575	1438.568	1459.243
Bot75	1500	1520	1540	1560	1540.46	1519.551	1539.518	1519.094	1539.073	1558.225	1578.656	1598.676	1618.231	1599.546	1618.202	1637.822	1616.346	1597.27	1577.272	1556.827	1576.846	1556.853	1536.868	1557.104	1537.779	1517.831	1497.819	1517.779	1537.561	1517.777	1498.058	1518.701	1498.735	1520.36	1500.15	1480.066	1460.244	1438.722	1458.509	1438.488	1458.731	1438.353	1418.401	1398.088	1418.94	1438.792	1458.911	1479.189	1459.227	1479.724	1459.741
Bot76	1500	1480	1460	1440	1460.005	1439.09	1458.154	1438.588	1458.597	1438.415	1418.208	1439.154	1458.73	1478.749	1498.771	1518.903	1498.702	1518.358	1538.456	1518.437	1538.344	1518.139	1498.583	1478.792	1499	1518.771	1498.759	1478.799	1458.591	1478.756	1458.563	1478.555	1498.798	1478.263	1498.556	1518.471	1498.106	1517.292	1497.04	1477.019	1456.975	1437.389	1417.437	1397.124	1377.976	1397.829	1417.421	1436.423	1416.008	1395.66	1375.437
Bot77	1500	1520	1540	1520	1540	1559.995	1539.995	1559.995	1540.005	1560.015	1540.009	1520.014	1500.009	1479.942	1459.946	1440.177	1420.394	1400.615	1420.638	1400.705	1420.267	1439.989	1419.922	1400.559	1380.409	1401.403	1421.671	1441.692	1462.259	1441.437	1460.771	1481.415	1501.658	1481.123	1460.83	1480.365	1500.187	1479.373	1499.814	1479.607	1459.564	1439.185	1459.137	1439.128	1459.648	1440.146	1420.264	1439.689	1459.274	1439.771	1419.097
Bot78	1500	1520	1500	1520	1500	1520	1540	1560.434	1541.365	1520.921	1541.351	1561.372	1580.927	1600.983	1620.885	1600.505	1579.029	1598.641	1618.643	1641.374	1622.001	1602.919	1583.44	1563.459	1583.597	1564.026	1584.205	1603.819	1583.164	1563.631	1543.459	1523.524	1503.448	1482.912	1503.205	1523.12	1543.485	1563.922	1584.152	1564.318	1584.266	1605.778	1584.463	1605.234	1625.092	1604.743	1584.329	1563.695	1542.983	1562.548	1542.38
Bot79	1500	1520	1500	1520	1500	1479.989	1499.979	1480	1459.995	1479.576	1499.577	1519.573	1539.567	1519.99	1539.988	1519.588	1539.609	1559.593	1579.607	1558.816	1538.79	1518.585	1499.029	1479.238	1499.446	1479.664	1459.642	1439.918	1460.485	1439.663	1458.997	1438.99	1458.607	1478.606	1458.313	1437.821	1458.358	1478.085	1498.526	1518.732	1498.751	1518.773	1498.767	1519.126	1538.672	1518.566	1538.742	1558.953	1578.905	1558.572	1578.741
Bot80	1500	1480	1460	1440	1419.995	1399.085	1378.148	1378.148	1356.764	1376.524	1376.524	1397.47	1397.47	1418.214	1438.048	1458.088	1438.305	1418.939	1438.962	1459.029	1439.17	1458.892	1438.478	1419.115	1398.914	1377.919	1397.917	1419.02	1438.751	1458.752	1439.417	1459.373	1478.99	1457.365	1437.12	1416.628	1437.165	1416.892	1436.74	1457.476	1437.72	1418.133	1398.139	1377.826	1358.678	1379.25	1358.604	1339.938	1360.233	1339.381	1360.633
Bot81	1500	1520	1500	1520	1500.46	1480.45	1500.005	1479.581	1499.581	1479.566	1499.566	1479.562	1459.563	1439.818	1460.285	1480.053	1460.058	1480.094	1500.083	1519.687	1539.706	1559.713	1579.765	1558.68	1538.818	1518.87	1538.858	1518.866	1498.648	1477.826	1498.02	1477.376	1457.76	1437.76	1417.395	1437.32	1457.857	1437.584	1417.37	1397.319	1377.097	1395.373	1415.379	1435.066	1415.918	1435.771	1455.889	1475.314	1455.352	1475.345	1455.363
Bot82	1500	1480	1500	1480	1460	1440	1460.439	1438.691	1418.7	1398.94	1398.94	1377.994	1377.994	1358.738	1358.738	1379.613	1379.613	1398.676	1418.699	1398.273	1417.835	1437.585	1417.518	1397.941	1377.791	1398.785	1378.783	1399.886	1380.155	1357.391	1337.082	1358.39	1376.816	1395.711	1374.816	1394.389	1415.498	1435.542	1415.694	1395.643	1415.421	1395.53	1375.536	1395.625	1416.478	1396.625	1376.217	1357.551	1377.846	1397.499	1377.276
Bot83	1500	1480	1460	1440	1419.995	1399.085	1378.148	1378.148	1356.764	1376.524	1376.524	1355.578	1355.578	1376.322	1376.322	1397.196	1397.196	1377.417	1377.417	1358.183	1358.183	1336.954	1336.954	1317.911	1317.911	1337.345	1337.345	1357.048	1335.879	1356.292	1335.983	1314.675	1314.675	1334.259	1313.364	1293.029	1293.029	1312.091	1312.091	1292.417	1292.417	1271.251	1271.251	1248.574	1248.574	1229.776	1229.776	1249.38	1249.38	1229.085	1229.085
Bot84	1500	1480	1500	1480	1460	1440	1419.561	1419.561	1440.945	1420.763	1400.556	1379.61	1379.61	1360.354	1360.354	1381.229	1381.229	1361.45	1361.45	1342.216	1342.216	1363.445	1363.445	1344.403	1344.403	1324.969	1324.969	1344.671	1344.671	1321.907	1321.907	1302.215	1302.215	1321.799	1300.904	1320.57	1299.46	1278.522	1278.522	1298.848	1298.848	1277.682	1277.682	1255.005	1255.005	1273.803	1273.803	1254.199	1254.199	1274.494	1274.494
Bot85	1500	1480	1460	1480	1500	1480	1459.555	1439.989	1459.529	1439.538	1419.332	1398.844	1398.844	1379.588	1379.588	1360.462	1360.462	1339.525	1339.525	1320.291	1320.291	1299.062	1299.062	1320.019	1320.019	1300.585	1300.585	1320.288	1320.288	1340.701	1361.009	1339.701	1318.127	1297.021	1297.021	1316.687	1316.687	1336.885	1316.975	1338.628	1318.292	1296.568	1296.568	1313.89	1313.89	1295.093	1295.093	1314.696	1314.696	1293.844	1293.844
Bot86	1500	1520	1540	1560.46	1540.466	1559.556	1539.556	1519.556	1499.535	1479.578	1459.577	1439.162	1458.738	1478.757	1498.779	1478.911	1458.959	1439.594	1419.6	1399.667	1379.229	1358.979	1358.979	1339.936	1339.936	1320.502	1320.502	1340.204	1340.204	1317.44	1317.44	1337.132	1315.557	1295.141	1295.141	1274.807	1274.807	1293.869	1293.869	1274.194	1274.194	1295.36	1295.36	1312.683	1312.683	1331.481	1310.835	1292.169	1292.169	1312.464	1291.212
Bot87	1500	1520	1500	1480	1500	1520	1500	1520	1498.684	1518.641	1498.619	1518.599	1499.001	1519.005	1498.509	1518.642	1498.441	1478.097	1497.014	1497.014	1476.821	1456.301	1476.715	1456.924	1436.069	1455.618	1434.488	1454.508	1435.075	1415.075	1394.423	1415.731	1395.452	1414.347	1434.712	1414.219	1393.682	1413.88	1394.032	1373.98	1393.644	1373.753	1354.669	1334.58	1315.171	1294.599	1294.599	1274.995	1274.995	1254.7	1254.7
Bot88	1500	1520	1500	1520	1539.54	1519.529	1499.496	1519.518	1499.497	1479.54	1459.539	1439.124	1458.639	1478.657	1458.68	1438.719	1418.936	1399.157	1379.18	1359.946	1359.946	1381.176	1360.815	1381.772	1361.622	1340.628	1340.628	1320.926	1320.926	1300.513	1300.513	1280.821	1280.821	1260.405	1260.405	1280.071	1280.071	1259.133	1259.133	1279.459	1279.459	1300.624	1300.624	1317.947	1298.538	1279.74	1279.74	1299.344	1299.344	1279.049	1279.049
Bot89	1500	1520	1500	1520	1500	1520	1500	1520	1498.684	1518.641	1498.619	1478.638	1458.624	1478.642	1458.665	1438.704	1458.921	1479.556	1459.545	1439.595	1460.027	1440.032	1419.618	1438.981	1459.182	1479.209	1459.187	1439.463	1460.029	1440.195	1420.86	1400.816	1380.536	1359.431	1380.326	1399.899	1420.436	1440.481	1420.268	1441.004	1421.248	1441.661	1421.709	1441.701	1422.221	1401.795	1381.387	1360.39	1340.317	1319.465	1340.717
Bot90	1500	1480	1460	1440	1419.995	1399.085	1418.148	1418.148	1439.533	1459.351	1439.8	1460.287	1479.864	1460.118	1480.585	1460.817	1480.768	1460.424	1439.342	1419.409	1438.971	1418.693	1438.626	1419.263	1439.464	1459.013	1437.883	1458.158	1438.725	1418.724	1398.073	1419.381	1439.66	1419.573	1399.208	1378.781	1399.89	1419.934	1439.782	1420.519	1400.298	1420.189	1440.195	1420.187	1401.039	1420.891	1440.483	1419.908	1399.836	1419.488	1439.265
Bot91	1500	1520	1500	1520.46	1500.921	1520.932	1540.931	1520.498	1499.181	1479.224	1459.214	1439.197	1419.621	1400.032	1400.032	1419.595	1439.411	1420.045	1400.068	1379.642	1359.204	1380.433	1400.794	1421.217	1401.016	1380.022	1360.019	1338.916	1338.916	1316.152	1316.152	1335.843	1335.843	1314.738	1314.738	1334.404	1355.513	1375.712	1355.801	1377.454	1357.233	1335.508	1354.593	1334.504	1355.095	1334.523	1355.169	1336.503	1316.208	1295.356	1295.356
Bot92	1500	1520	1540	1520	1500.46	1520.471	1500.471	1480.047	1460.042	1440.461	1460.91	1440.495	1420.919	1441.33	1420.863	1400.903	1380.718	1359.781	1359.781	1340.547	1340.547	1319.317	1319.317	1300.275	1300.275	1319.709	1319.709	1300.006	1300.006	1279.594	1279.594	1299.285	1299.285	1278.869	1278.869	1258.535	1258.535	1237.597	1237.597	1257.922	1257.922	1236.756	1236.756	1214.079	1214.079	1195.281	1195.281	1175.678	1175.678	1155.383	1155.383
Bot93	1500	1480	1500	1520.46	1540	1520	1500	1480.021	1500.026	1479.178	1499.169	1479.189	1499.174	1479.179	1499.201	1479.334	1459.339	1439.303	1419.309	1398.883	1378.445	1398.195	1377.834	1358.256	1358.256	1377.691	1357.688	1336.585	1336.585	1356.998	1336.689	1315.381	1315.381	1294.965	1294.965	1274.63	1274.63	1293.693	1293.693	1314.018	1314.018	1335.184	1316.099	1296.01	1296.01	1314.808	1314.808	1336.143	1315.848	1336.7	1315.448
Bot94	1500	1520	1540	1520	1539.54	1559.534	1579.534	1559.545	1539.555	1519.546	1539.56	1519.566	1499.56	1519.567	1499.571	1519.56	1499.58	1479.552	1459.542	1439.591	1419.159	1398.881	1419.242	1438.606	1418.405	1437.954	1417.687	1397.708	1416.538	1439.303	1418.651	1438.607	1418.328	1438.415	1418.17	1438.094	1418.264	1398.22	1378.372	1360.024	1339.688	1317.964	1337.048	1357.137	1337.728	1317.156	1296.51	1316.114	1295.819	1316.114	1294.862
Bot95	1500	1520	1500	1479.54	1459.995	1439.085	1418.148	1418.148	1439.533	1459.351	1439.8	1460.287	1440.711	1461.122	1481.589	1501.721	1481.52	1461.176	1440.094	1420.161	1399.729	1379.479	1379.479	1399.901	1379.752	1358.757	1378.755	1357.651	1336.482	1316.069	1316.069	1296.378	1296.378	1315.962	1315.962	1295.535	1295.535	1314.597	1334.687	1356.339	1376.003	1394.279	1375.195	1355.106	1375.696	1396.268	1375.86	1357.195	1336.9	1316.047	1294.796
Bot96	1500	1480	1460	1440	1460.005	1440.005	1419.566	1439.132	1419.141	1438.901	1458.695	1478.712	1458.698	1438.679	1418.212	1398.649	1378.464	1357.527	1357.527	1376.761	1376.761	1356.511	1356.511	1337.468	1337.468	1318.034	1318.034	1298.332	1298.332	1318.745	1318.745	1338.436	1316.862	1295.757	1295.757	1315.422	1315.422	1334.484	1354.574	1336.227	1315.891	1337.056	1317.972	1338.061	1358.652	1338.08	1317.434	1338.768	1359.063	1379.915	1399.692
Bot97	1500	1480	1460	1480	1460	1480	1499.555	1479.577	1459.578	1479.587	1459.587	1479.172	1499.157	1479.162	1459.184	1478.953	1459.001	1438.965	1458.953	1479.009	1499.151	1518.631	1539.075	1518.839	1499.514	1479.732	1499.754	1519.935	1499.348	1479.129	1458.935	1438.927	1459.207	1437.582	1417.217	1397.141	1376.604	1356.802	1336.892	1358.545	1378.209	1396.484	1376.491	1396.58	1417.432	1397.579	1377.171	1398.506	1378.433	1358.085	1336.833
Bot98	1500	1520	1500	1479.54	1499.084	1478.17	1498.609	1516.861	1536.866	1556.018	1536.448	1555.581	1535.084	1515.017	1494.521	1474.653	1494.605	1514.261	1534.359	1514.755	1494.663	1474.144	1453.729	1434.366	1454.567	1434.54	1414.272	1435.376	1455.107	1435.272	1455.924	1435.88	1415.6	1394.495	1373.6	1353.173	1332.063	1312.262	1312.262	1292.587	1292.587	1271.422	1271.422	1248.744	1248.744	1267.542	1267.542	1247.938	1247.938	1268.233	1268.233
Bot99	1500	1480	1460	1480	1460	1440	1419.561	1419.561	1398.176	1378.416	1378.416	1357.47	1357.47	1338.214	1338.214	1359.088	1359.088	1338.151	1338.151	1357.385	1357.385	1336.156	1336.156	1357.114	1357.114	1337.679	1337.679	1317.977	1317.977	1297.564	1297.564	1277.873	1277.873	1257.457	1257.457	1237.122	1237.122	1216.184	1216.184	1196.51	1196.51	1175.344	1175.344	1152.667	1152.667	1171.465	1171.465	1191.068	1191.068	1211.363	1211.363

Normality Test

Bin	Frequency
1000	0
1100	0
1200	1
1300	12
1400	15
1500	27
1600	22
1700	13
1800	9
1900	0
2000	1
More	0



Bin	Frequency
1000	0
1050	0
1100	0
1150	0
1200	1
1250	3
1300	9
1350	3
1400	12
1450	7
1500	20
1550	10
1600	12
1650	6
1700	7
1750	4
1800	5
1850	0
1900	0
1950	1
2000	0
More	0



Result: The value of the K-S test statistic (D) is .04674.

The *p*-value is .97384. Your data does *not* differ significantly from that which is normally distributed.

Distribution Summary

Count : 100

Mean: 1497.4431

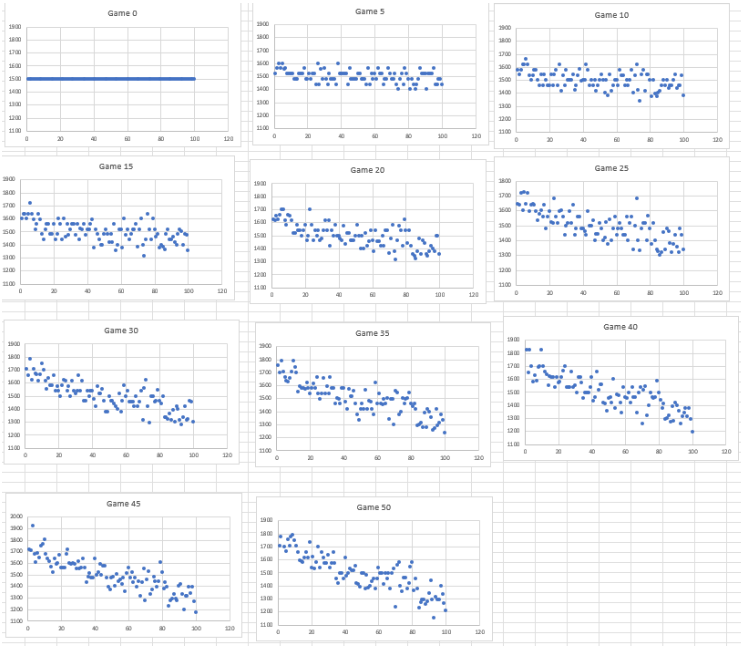
Median: 1496.672546

Standard Deviation: 148.285291

Skewness: 0.126912

Kurtosis: -0.218022

Scatter Graph



Appendix J : Percentile Data

Raw Data

BotID	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	Game 7	Game 8	Game 9	Game 10	Game 11	Game 12	Game 13	Game 14	Game 15	Game 16	Game 17
Bot0	1500	1515.556	1564.492	1556.635	1543.327	1540.169	1592.343	1608.252	1583.807	1613.219	1631.969	1599.661	1629.207	1651.429	1679.69	1659.134	1639.647
Bot1	1500	1520	1551.429	1529.286	1600.165	1616.831	1601.831	1615.468	1599.912	1584.912	1581.082	1580.476	1572.909	1557.909	1601.811	1614.443	1645.871
Bot2	1500	1517.778	1552.064	1582.619	1571.149	1592.578	1569.244	1556.517	1544.103	1578.146	1616.146	1595.377	1576.998	1593.665	1627.875	1645.824	1660.824
Bot3	1500	1483.529	1536.471	1574.566	1605.335	1633.906	1616.129	1632.038	1662.038	1679.111	1652.444	1673.032	1694.461	1711.128	1697.054	1720.13	1705.771
Bot4	1500	1483.529	1515.882	1546.835	1591.651	1617.841	1637.354	1616.708	1636.708	1663.538	1641.316	1670.727	1650.292	1622.414	1631.109	1618.887	1647.459
Bot5	1500	1489.412	1547.19	1549.125	1600.981	1582.193	1594.388	1560.84	1590.84	1567.507	1591.507	1606.507	1599.115	1572.752	1597.142	1627.911	1610.988
Bot6	1500	1477.647	1478.073	1521.176	1498.039	1532.325	1540.241	1540.866	1562.488	1586.017	1565.166	1537.287	1587.287	1572.287	1586.134	1598.954	1613.24
Bot7	1500	1465.882	1503.66	1533.072	1534.797	1533.259	1514.092	1513.116	1564.18	1554.949	1593.838	1618.838	1591.882	1616.882	1636.447	1654.396	1666.896
Bot8	1500	1524.444	1562.444	1590.222	1555.287	1573.892	1591.035	1596.196	1571.751	1595.281	1613.281	1588.666	1613.666	1594.878	1582.878	1615.31	1626.739
Bot9	1500	1522.222	1554.222	1528.508	1552.928	1594.789	1609.423	1582.326	1597.326	1619.277	1597.055	1624.555	1643.603	1663.047	1645.269	1624.714	1600.099
Bot10	1500	1517.021	1548.936	1568.381	1587.568	1577.871	1604.7	1634.246	1656.246	1632.912	1653.746	1680.216	1704.026	1694.329	1724.764	1747.841	1765.341
Bot11	1500	1488.571	1494.913	1531.276	1494.806	1494.806	1594.806	1619.806	1602.028	1619.101	1616.879	1628.644	1638.167	1619.38	1588.639	1619.408	1594.793
Bot12	1500	1525.532	1511.848	1538.038	1533.132	1553.587	1573.587	1563.132	1585.632	1597.397	1614.064	1604.833	1582.224	1617.641	1630.684	1607.351	1594.018
Bot13	1500	1469.524	1496.19	1514.372	1514.904	1546.904	1517.321	1541.81	1566.135	1549.212	1574.212	1591.712	1614.439	1631.106	1607.772	1578.299	1592.584
Bot14	1500	1510.638	1526.452	1564.914	1617.778	1598.99	1589.546	1617.453	1635.453	1620.453	1643.369	1655.134	1632.525	1657.525	1643.451	1620.118	1665.118
Bot15	1500	1479.048	1473.09	1462.82	1531.733	1509.682	1558.4	1588.632	1570.854	1561.624	1581.068	1596.068	1607.432	1585.614	1598.771	1590.35	1557.017
Bot16	1500	1525.532	1506.584	1530.394	1498.741	1518.741	1554.639	1580.829	1564.967	1524.967	1546.536	1580.627	1591.99	1570.172	1587.245	1602.63	1595.963
Bot17	1500	1521.277	1535.562	1524.595	1561.669	1580.274	1545.83	1581.544	1606.544	1623.617	1596.95	1569.072	1539.882	1559.882	1527.575	1547.14	1578.39
Bot18	1500	1481.429	1516.122	1525.646	1561.361	1542.413	1553.283	1541.408	1536.023	1514.773	1538.457	1574.013	1552.932	1584.043	1572.043	1554.265	1591.765
Bot19	1500	1481.429	1496.429	1526.732	1531.017	1501.274	1483.854	1515.433	1507.141	1535.346	1543.679	1566.406	1563.073	1594.184	1612.605	1630.554	1640.554
Bot20	1500	1527.778	1551.852	1568.519	1535.304	1558.032	1564.698	1571.675	1559.261	1563.516	1536.282	1562.949	1546.282	1527.711	1504.732	1536.161	1559.69
Bot21	1500	1493.333	1470.406	1501.359	1560.109	1574.062	1600.892	1577.021	1547.365	1519.13	1536.777	1528.027	1513.834	1534.886	1514.035	1533.6	1506.934
Bot22	1500	1511.111	1530.719	1556.909	1579.495	1548.586	1560.015	1569.317	1539.662	1537.897	1529.147	1495.397	1535.397	1523.522	1511.182	1542.61	1557.316
Bot23	1500	1530.556	1521.667	1537.051	1530.032	1531.496	1540.191	1512.691	1509.277	1496.2	1539.443	1559.898	1575.807	1584.14	1560.14	1545.14	1571.611
Bot24	1500	1463.333	1454.368	1490.082	1513.315	1537.315	1513.981	1536.43	1566.16	1541.545	1514.045	1533.557	1525.815	1558.315	1541.392	1520.904	1535.61
Bot25	1500	1486.667	1497.778	1480	1494.242	1494.242	1454.242	1483.131	1483.131	1474.381	1502.159	1502.159	1536.37	1551.37	1558.687	1591.119	1571.119
Bot26	1500	1470	1487.778	1508.83	1555.08	1541.396	1556.614	1537.068	1550.582	1567.603	1575.603	1544.694	1562.876	1580.654	1601.706	1561.706	1571.081
Bot27	1500	1486.667	1497.778	1491.111	1499.394	1466.537	1492.251	1527.545	1503.334	1482.565	1499.708	1499.708	1481.137	1511.44	1522.76	1509.59	1543.875
Bot28	1500	1516.667	1497.879	1512.585	1531.45	1554.177	1585.606	1611.187	1621.187	1597.854	1618.687	1605.61	1631.801	1606.952	1582.952	1593.209	1566.542
Bot29	1500	1513.889	1524.527	1513.475	1537.036	1520.113	1538.061	1549.966	1540.735	1568.395	1547.544	1556.635	1579.362	1593.945	1565.945	1545.39	1525.39
Bot30	1500	1487.083	1464.156	1448.481	1513.62	1488.254	1476.825	1462.912	1518.468	1507.634	1528.687	1526.187	1528.687	1501.187	1544.583	1564.148	1573.523
Bot31	1500	1537.5	1557.87	1539.299	1566.085	1573.228	1573.228	1542.318	1553.129	1524.894	1504.894	1499.18	1528.127	1535.627	1560.627	1574.141	1548.426
Bot32	1500	1472.5	1498.5	1527.912	1482.658	1505.107	1487.688	1525.923	1504.344	1535.113	1562.564	1536.85	1512.979	1500.979	1480.491	1502.991	1468.874
Bot33	1500	1510.417	1533.946	1510.075	1469.361	1493.805	1493.805	1469.595	1486.261	1452.928	1450.928	1463.869	1489.51	1492.844	1492.844	1480.844	1510.844
Bot34	1500	1518.75	1512.083	1502.083	1540.768	1558.95	1578.95	1552.587	1512.587	1527.971	1519.082	1539.082	1570.901	1588.678	1601.836	1567.099	1579.599
Bot35	1500	1518.75	1512.083	1488.75	1492.992	1492.992	1452.992	1473.923	1464.357	1482.539	1512.269	1529.342	1502.245	1539.087	1562.302	1575.815	1585.815
Bot36	1500	1474.583	1508.583	1488.583	1520.776	1538.776	1551.819	1573.248	1580.748	1592.512	1604.512	1591.785	1568.001	1551.811	1559.128	1544.128	1564.716
Bot37	1500	1514.583	1486.705	1469.285	1475.952	1457.38	1485.952	1491.834	1491.834	1505.168	1478.211	1471.544	1459.451	1433.088	1457.162	1484.662	1457.705
Bot38	1500	1485	1478.333	1458.788	1461.616	1479.394	1509.627	1518.718	1491.875	1465.209	1455.209	1487.124	1455.457	1493.295	1493.295	1461.295	1482.348
Bot39	1500	1480.833	1493.078	1464.189	1504.976	1522.118	1505.803	1530.803	1555.803	1542.273	1550.607	1564.243	1547.576	1524.243	1538.529	1560.268	1534.554
Bot40	1500	1538.889	1510	1486.667	1459.167	1485.833	1457.262	1481.706	1506.706	1493.629	1467.915	1482.621	1498.006	1516.188	1493.261	1509.927	1532.784
Bot41	1500	1511.111	1538.562	1508.239	1475.631	1466.583	1458.162	1478.162	1503.162	1515.983	1489.316	1489.316	1517.316	1496.066	1496.066	1507.495	1496.906
Bot42	1500	1485	1453.333	1467.619	1466.538	1457.094	1474.236	1455.976	1437.927	1459.878	1439.878	1461.155	1475.789	1497.217	1497.217	1514.36	1497.89
Bot43	1500	1468.333	1438.678	1412.567	1452.892	1484.892	1505.822	1526.276	1555.822	1527.586	1507.586	1524.66	1497.563	1518.775	1533.869	1553.434	1513.434
Bot44	1500	1468.333	1442.126	1473.945	1520.537	1530.537	1494.703	1492.203	1492.203	1465.537	1448.87	1470.147	1493.224	1466.557	1447.986	1444.097	1470.287
Bot45	1500	1493.333	1504.444	1507.386	1509.777	1498.348	1513.733	1540.264	1515.648	1539.786	1518.536	1527.425	1544.925	1547.147	1514.84	1499.23	1520.099
Bot46	1500	1505.556	1470.207	1486.873	1467.189	1443.856	1459.738	1447.011	1474.67	1498.354	1503.76	1492.331	1504.331	1506.963	1498.67	1507.241	1502.536
Bot47	1500	1527.778	1555.556	1561.111	1547.659	1554.635	1514.635	1533.003	1548.912	1565.933	1538.699	1541.556	1514.89	1522.784	1506.189	1486.189	1508.689
Bot48	1500	1485	1487.941	1476.973	1468.204	1488.204	1504.483	1529.483	1505.273	1480.657	1500.102	1500.102	1481.531	1454.864	1470.489	1477.989	1497.989
Bot49	1500	1516.667	1494.848	1506.97	1497.117	1497.117	1507.373	1476.748	1496.193	1509.013	1508.144	1482.429	1465.685	1489.495	1489.495	1522.828	1509.495
Bot50	1500	1479.048	1451.814	1472.268	1489.701	1489.701	1489.701	1486.543	1486.543	1513.816	1529.605	1538.494	1501.827	1481.827	1481.827	1461.827	1448.143
Bot51	1500	1523.404	1509.72	1519.244	1514.043	1530.043	1503.201	1488.201	1488.201	1515.474	1541.789	1511.313	1507.027	1495.027	1495.027	1501.694	1515.98
Bot52	1500	1506.383	1484.988	1472.26	1459.244	1435.911	1466.523	1487.576	1487.576	1460.909	1492.159	1492.159	1502.159	1533.738	1549.81	1518.143	1511.476
Bot53	1500	1525.532	1533.532	1550.198	1571.352	1549.534	1522.868	1499.941	1514.834	1497.751	1505.859	1525.371	1540.371	1565.371	1533.064	1512.576	1529.719
Bot54	1500	1531.915	1507.47	1484.137	1475.804	1459.613	1451.192	1474.448	1456.187	1476.642	1484.975	1484.975	1469.975	1452.703	1473.073	1450.464	1429.819
Bot55	1500	1512.766	1503.069	1484.498	1489.33	1519.943	1543.02	1518.645	1515.487	1532.728	1508.284	1535.113	1550.113	1524.399	1545.827	1553.935	1535.364
Bot56	1500	1481.429	1505.918	1523.061	1538.65	1508.906	1481.809	1459.201	1455.786	1441.5	1428.423	1453.955	1424.669	1393.241	1385.594	1381.149	1407.236
Bot57	1500	1471.905	1445.698	1470.698	1492.442	1492.442	1452.442	1444.021	1424.476	1405.166	1385.166	1420.049	1449.837	1474.161	1489.786	1509.786	1521.214
Bot58	1500	1479.048	1495.048	1498.078	1491.411	1491.411	1491.411	1506.117	1478.312	1460.187	1481.021	1481.021	1501.533	1469.533	1500.783	1472.783	1499.099
Bot59	1500	1488.571	1453.449	1418.855	1393.182	1419.372	1463.817	1441.208	1470.995	1502.574	1467.336	1476.16	1491.544	1458.211	1432.497	1423.052	1464.357
Bot60	1500	1479.355	1491.6	1512.652	1489.103	1505.429	1491.235	1467.025	1482.58	1464.455	1475.567	1502.037	1515.195	1487.695	1487.695	1475.695	1490.695
Bot61	1500	1469.677	1460.712	1447.739	1393.059	1376.315	1398.537	1432.748	1415.475	1442.305	1424.305	1411.388	1394.465	1377.322	1398.534	1428.08	1451.889
Bot62	1500	1530	1541.111	1557.778	1508.571	1528.571	1514.887	1494.399	1494.399	1503.49	1480.882	1480.882	1459.486	1446.759	1467.129	1444.521	1410.972
Bot63	1500	1482.581	1498.907	1522.437	1520.841	1497.914	1513.299	1492.049	1492.049	1519.321	1533.047	1505.547	1476.261	1502.452	1477.086	1499.586	1463.933
Bot64	1500	1510	1529.608	1508.029	1542.195	1512.722	1496.406	1516.861	1535.042	1507.542	1476.238	1443.645	1435.788	1432.825	1415.552	1442.825	1444.761
Bot65	1500	1525	1492.895	1519.211	1540.221	1556.13	1516.13	1524.293	1535.657	1558.071	1543.071	1512.595	1528.384	1516.509	1493.582	1516.916	1483.582
Bot66	1500	1482.581	1491.404	1509.825	1523.272	1497.906	1474.035	1451.426	1462.537	1431.109	1470.582	1497.053	1504.948	1480.948	1480.948	1500.948	1513.448
Bot67	1500	1512.5	1522.304	1537.689	1505.403	1522.546	1532.802	1504.997	1477.192	1492.982	1506.495	1483.638	1451.971	1430.49	1462.99	1436.033	1459.843
Bot68	1500	1522.5	1500.921	1475.207	1490.705	1490.705	1450.705	1480.937	1458.329	1478.783	1465.45	1488.979	1457.313	1470.826	1452.255	1469.328	1490.38
Bot69	1500	1485.806	1487.473	1476.505	1487.912	1512.402	1522.658	1494.854	1494.854	1503.944	1485.684	1485.684	1493.684	1477.017	1498.892	1486.892	1459.935
Bot70	1500	1526.316	1504.094	1471.236	1436.821	1463.011	1449.327	1438.275	1451.041	1431.041	1433.348	1452.497	1479.326	1497.508	1508.829	1500.829	1469.525
Bot71	1500	1487.586	1496.475	1489.808	1505.625	1514.197	1487.354	1463.144	1447.534	1470.261	1503.595	1503.595	1474.309	1490.976	1490.976	1466.976	1485.397
Bot72	1500	1534.211	1518.655	1494.444	1463.711	1474.822	1500.404	1469.779	1447.17	1448.549	1467.299	1438.411	1460.362	1438.543	1457.062	1447.497	1420.4
Bot73	1500	1518.421	1526.992	1508.045	1492.849	1492.849	1552.849	1515.974	1526.612	1503.279	1516.437	1488.937	1500.937	1513.058	1531.926	1501.682	1467.564
Bot74	1500	1480.69	1453.19	1426.703	1422.374	1389.35	1380.929	1396.719	1426.951	1444.024	1454.441	1432.088	1420.934	1447.021	1441.112	1465.502	1446.555
Bot75	1500	1473.793	1485.793	1498.951	1509.949	1477.092	1484.068	1502.489	1519.51	1535.028	1554.635	1538.445	1549.809	1533.618	1506.384	1474.384	1444.911
Bot76	1500	1473.793	1485.793	1496.138	1450.229	1474.229	1494.229	1470.018	1483.907	1459.532	1427.532	1446.681	1424.538	1446.277	1417.641	1396.996	1389.349
Bot77	1500	1502.632	1477.266	1459.993	1443.629	1433.629	1405.394	1434.341	1426.16	1455.428	1474.178	1467.511	1448.442	1426.96	1441.96	1463.911	1455.49
Bot78	1500	1484.138	1452.471	1468.38	1468.38	1450.603	1462.847	1437.999	1450.765	1442.193	1455.351	1424.175	1445.451	1458.965	1474.59	1456.329	1470.615
Bot79	1500	1518.421	1529.85	1540.106	1558.644	1523.907	1536.727	1541.489	1520.72	1541.41	1513.91	1479.624	1448.926	1459.737	1441.166	1465.556	1478.714
Bot80	1500	1515.789	1522.172	1542.685	1516.435	1488.63	1474.344	1498.029	1504.412	1475.95	1445.95	1458.716	1433.002	1448.219	1424.128	1395.239	1378.769
Bot81	1500	1476	1440.255	1428.033	1458.843	1480.843	1460.843	1432.964	1408.873	1435.288	1406.827	1383.493	1405.716	1394.287	1414.287	1390.416	1368.063
Bot82	1500	1468	1476.889	1494.13	1511.06	1471.06	1441.587	1422.639	1439.661	1416.902	1432.691	1413.525	1398.525	1422.438	1405.967	1419.604	1430.473
Bot83	1500	1515.789	1517.917	1493.707	1472.866	1444.771	1463.138	1441.32	1410.411	1384.204	1406.426	1393.509	1423.297	1436.34	1453.007	1429.673	1409.028
Bot84	1500	1480	1450	1421.111	1374.765	1364.998	1348.682	1331.262	1359.169	1357.265	1371.154	1359.359	1352.692	1376.221	1394.403	1373.758	1353.27
Bot85	1500	1504	1482.605	1505.018	1442.047	1418.047	1424.714	1397.872	1402.609	1432.797	1404.336	1427.74	1393.51	1374.938	1352.585	1383.696	1403.261
Bot86	1500	1472	1440.511	1433.844	1376.12	1357.05	1332.839	1345.997	1324.418	1320.132	1345.132	1366.063	1396.618	1379.475	1403.718	1386.298	1399.342
Bot87	1500	1521.053	1481.053	1461.507	1456.507	1428.507	1444.063	1455.691	1460.135	1434.421	1447.579	1416.402	1393.71	1392.996	1405.496	1388.076	1365.724
Bot88	1500	1523.684	1537.684	1500.91	1476.062	1482.184	1456.47	1463.136	1476.47	1489.628	1459.151	1433.966	1458.356	1436.538	1412.447	1432.902	1444.807
Bot89	1500	1523.684	1531.684	1534.065	1476.351	1448.256	1462.542	1482.542	1482.542	1451.917	1423.917	1392.25	1398.633	1375.776	1393.957	1427.291	1396.114
Bot90	1500	1531.373	1548.039	1522.325	1491.849	1491.849	1491.849	1497.731	1465.048	1480.838	1455.123	1426.888	1439.654	1414.469	1434.469	1400.024	1421.763
Bot91	1500	1515.686	1493.868	1453.868	1437.708	1416.313	1394.734	1380.541	1396.82	1363.962	1348.962	1358.265	1383.265	1389.147	1357.971	1333.526	1346.57
Bot92	1500	1521.569	1492.68	1459.131	1446.631	1460.631	1469.203	1474.466	1447.509	1465.691	1435.691	1448.457	1460.652	1472.557	1453.986	1466.181	1436.707
Bot93	1500	1481.277	1448.777	1422.666	1455.941	1437.941	1462.431	1449.704	1421.899	1388.795	1373.795	1390.074	1361.185	1381.774	1359.421	1332.754	1350.146
Bot94	1500	1519.608	1501.83	1461.83	1420.845	1437.512	1406.335	1388.916	1407.521	1416.954	1435.375	1448.141	1433.141	1404.253	1381.9	1357.455	1334.528
Bot95	1500	1483.404	1451.738	1458.556	1466.889	1440.778	1406.661	1382.79	1353.316	1368.41	1348.41	1367.015	1380.904	1425.021	1402.669	1411.76	1424.803
Bot96	1500	1481.277	1456.277	1458.658	1439.491	1419.491	1390.017	1362.921	1369.897	1341.802	1364.024	1336.845	1302.4	1280.257	1263.787	1272.676	1296.589
Bot97	1500	1468.511	1477.4	1484.296	1420.887	1432.792	1443.903	1457.856	1422.734	1427.613	1395.305	1375.818	1384.151	1351.294	1369.476	1378.365	1365.194
Bot98	1500	1485.532	1488.473	1461.376	1443.176	1451.176	1411.176	1419.071	1389.597	1408.465	1378.465	1356.414	1338.636	1344.518	1322.165	1302.165	1286.555
Bot99	1500	1511.765	1474.09	1443.181	1431.532	1450.58	1428.227	1393.49	1369.28	1336.422	1353.089	1333.602	1321.38	1295.666	1279.195	1296.973	1269.168

BotID	Game 18	Game 19	Game 20	Game 21	Game 22	Game 23	Game 24	Game 25	Game 26	Game 27	Game 28	Game 29	Game 30	Game 31	Game 32	Game 33	Game 34
Bot0	1610.758	1640.17	1647.67	1633.757	1668.892	1693.337	1676.866	1657.379	1671.665	1647.574	1686.463	1695.351	1721.882	1709.382	1679.382	1697.803	1691.136
Bot1	1654.695	1672.195	1655.724	1666.251	1655.519	1635.519	1665.954	1641.338	1670.884	1655.884	1674.488	1646.988	1619.754	1637.612	1652.318	1677.899	1696.947
Bot2	1643.046	1620.995	1645.995	1664.416	1688.226	1665.726	1690.116	1670.629	1662.208	1684.208	1705.138	1697.638	1678.914	1656.414	1642.414	1658.693	1650.272
Bot3	1735.183	1723.388	1692.212	1715.896	1692.969	1712.969	1725.164	1741.073	1716.863	1740.863	1757.142	1792.697	1809.024	1830.3	1804.3	1784.99	1768.323
Bot4	1668.047	1648.56	1640.913	1638.122	1622.512	1648.828	1675.657	1653.606	1670.749	1680.749	1660.749	1633.249	1663.804	1646.304	1678.657	1655.899	1701.613
Bot5	1613.296	1594.864	1588.198	1622.24	1665.484	1642.984	1617.69	1647.235	1675.806	1663.079	1639.079	1633.365	1620.638	1623.775	1644.363	1686.224	1659.557
Bot6	1641.147	1671.147	1654.676	1627.72	1635.828	1664.775	1657.128	1673.037	1648.827	1676.827	1664.827	1642.327	1653.438	1672.587	1668.587	1651.167	1676.882
Bot7	1693.366	1676.443	1701.443	1730.391	1705.025	1725.025	1742.098	1758.007	1778.007	1758.462	1738.462	1754.017	1739.549	1750.187	1724.187	1715.222	1741.412
Bot8	1603.405	1594.778	1579.778	1604.102	1602.197	1591.364	1617.451	1605.451	1628.178	1657.965	1688.198	1714.865	1731.191	1713.691	1725.23	1695.574	1717.003
Bot9	1628.005	1640.505	1668.005	1686.427	1700.712	1685.712	1672.183	1699.456	1719.456	1690.819	1666.819	1651.819	1639.479	1662.693	1672.308	1688.098	1704.764
Bot10	1753.119	1723.375	1755.875	1746.31	1765.357	1789.802	1809.314	1834.314	1804.84	1820.84	1834.794	1848.127	1870.576	1896.108	1905.724	1932.039	1918.706
Bot11	1615.723	1589.448	1617.226	1642.758	1661.806	1641.806	1670.067	1655.708	1642.023	1638.387	1631.04	1653.767	1626.533	1649.748	1673.277	1702.224	1665.558
Bot12	1569.402	1559.837	1566.266	1612.212	1617.617	1581.784	1618.993	1604.993	1623.175	1638.068	1620.517	1640.972	1671.528	1641.528	1620.278	1599.632	1617.024
Bot13	1601.887	1627.377	1641.266	1614.309	1598.119	1608.645	1591.722	1567.722	1601.056	1630.843	1640.102	1617.245	1633.911	1655.34	1688.032	1668.722	1644.511
Bot14	1647.34	1674.84	1682.34	1659.731	1634.365	1615.199	1619.547	1637.728	1627.274	1598.637	1626.415	1651.415	1669.783	1693.187	1729.725	1740.252	1756.918
Bot15	1572.402	1598.717	1620.94	1631.578	1620.149	1641.202	1612.74	1630.922	1606.831	1582.74	1602.252	1624.98	1636.091	1615.699	1651.115	1620.793	1617.635
Bot16	1575.194	1612.036	1623.147	1640.169	1663.978	1675.089	1638.03	1614.03	1596.758	1614.536	1590.862	1589.324	1577.895	1617.895	1602.895	1616.784	1625.355
Bot17	1562.528	1539.919	1578.555	1586.664	1546.664	1568.615	1562.761	1554.837	1592.337	1614.559	1588.844	1616.117	1644.689	1618.414	1627.238	1622.721	1628.436
Bot18	1605.719	1577.483	1595.432	1569.385	1549.974	1539.385	1567.292	1549.934	1567.434	1546.302	1565.532	1590.532	1619.104	1586.947	1603.614	1625.836	1596.362
Bot19	1655.26	1667.76	1639.525	1618.129	1587.653	1621.696	1589.388	1624.17	1597.807	1575.989	1605.257	1621.166	1585.711	1601.267	1577.056	1599.278	1623.192
Bot20	1580.203	1561.772	1592.541	1571.146	1592.885	1586.218	1569.295	1588.86	1606.809	1584.991	1606.942	1622.851	1610.124	1585.81	1574.757	1557.834	1533.39
Bot21	1544.772	1575.206	1549.492	1536.765	1552.32	1530.32	1548.925	1541.278	1553.778	1587.111	1609.063	1577.634	1566.205	1541.205	1527.292	1542.107	1562.107
Bot22	1588.086	1605.733	1578.233	1586.341	1566.929	1583.95	1602.555	1618.464	1632.1	1646.994	1659.957	1637.1	1619.827	1634.113	1600.363	1579.594	1565.175
Bot23	1589.559	1607.207	1579.707	1551.471	1579.732	1561.732	1531.488	1547.704	1530.285	1506.501	1537.751	1525.658	1548.914	1568.914	1544.703	1566.926	1582.143
Bot24	1573.448	1578.711	1556.568	1534.215	1551.993	1571.505	1555.896	1571.113	1586.498	1572.913	1554.534	1592.034	1609.177	1629.177	1607.927	1614.904	1645.339
Bot25	1586.504	1596.308	1572.974	1550.621	1531.21	1526.504	1499.407	1535.304	1514.659	1505.612	1476.028	1497.081	1538.941	1516.441	1548.874	1569.244	1545.523
Bot26	1544.874	1523.742	1532.833	1548.623	1564.178	1548.178	1540.436	1578.274	1543.274	1538.409	1569.178	1540.717	1555.003	1575.003	1553.424	1581.202	1594.245
Bot27	1526.098	1543.489	1510.632	1529.781	1552.003	1524.003	1537.956	1524.427	1536.427	1523.454	1502.966	1527.966	1517.966	1546.855	1576.855	1587.966	1571.222
Bot28	1554.128	1577.813	1590.633	1603.399	1611.507	1624.665	1635.535	1609.535	1625.444	1636.082	1647.193	1630.05	1608.232	1615.732	1606.982	1579.885	1558.49
Bot29	1538.903	1517.771	1558.948	1560.124	1552.477	1536.477	1557.407	1572.625	1595.702	1609.035	1583.321	1566.398	1535.922	1564.811	1587.727	1618.283	1632.568
Bot30	1547.316	1529.055	1544.964	1526.177	1555.066	1578.47	1599.4	1617.582	1595.764	1580.292	1559.211	1530.749	1514.662	1532.44	1543.251	1530.524	1563.132
Bot31	1556.535	1538.274	1516.878	1537.931	1522.931	1496.264	1501.719	1526.109	1554.109	1531.09	1513.041	1544.291	1568.781	1538.781	1550.781	1542.599	1529.266
Bot32	1490.825	1490.825	1527.188	1545.609	1530.609	1502.374	1491.263	1496.391	1496.391	1516.799	1487.216	1518.795	1535.074	1507.574	1523.79	1544.198	1586.198
Bot33	1524.357	1539.574	1515.854	1493.501	1493.501	1462.196	1504.302	1531.131	1553.631	1584.583	1558.097	1534.376	1554.784	1552.284	1568.951	1552.027	1568.027
Bot34	1547.292	1575.552	1598.629	1570.257	1600.692	1573.192	1582.495	1557.589	1547.589	1583.303	1573.033	1548.417	1527.983	1550.205	1564.205	1535.743	1509.077
Bot35	1561.2	1569.095	1584.479	1556.244	1573.635	1590.656	1585.272	1564.14	1549.14	1511.843	1496.843	1492.843	1495.168	1474.216	1488.105	1494.533	1543.105
Bot36	1545.406	1533.708	1512.312	1497.803	1497.803	1488.914	1501.035	1501.035	1484.564	1523.453	1516.787	1533.453	1508.671	1480.575	1508.353	1534.884	1554.449
Bot37	1501.608	1527.14	1554.412	1567.926	1570.1	1578.61	1548.367	1564.583	1539.583	1558.63	1534.847	1511.126	1491.126	1504.459	1515.27	1497.009	1485.956
Bot38	1474.348	1465.927	1451.641	1435.45	1431.165	1446.165	1467.318	1443.447	1461.815	1479.315	1451.315	1481.315	1481.315	1542.853	1526.766	1495.857	1518.714
Bot39	1561.581	1530.276	1515.858	1503.13	1523.13	1550.214	1568.818	1540.139	1529.171	1505.838	1528.755	1543.755	1562.122	1537.122	1514.513	1526.758	1510.442
Bot40	1507.599	1531.004	1511.934	1487.62	1487.62	1491.098	1512.31	1526.945	1499.848	1481.276	1509.848	1483.737	1483.737	1491.429	1524.762	1500.671	1481.724
Bot41	1518.781	1494.69	1479.69	1510.246	1494.056	1520.722	1547.253	1516.076	1497.645	1509.89	1526.556	1545.306	1533.567	1544.678	1568.678	1551.755	1567.755
Bot42	1529.14	1511.781	1531.389	1562.968	1528.85	1558.118	1572.072	1587.289	1572.289	1545.497	1532.326	1513.256	1488.256	1448.256	1439.835	1467.613	1491.017
Bot43	1484.973	1484.973	1464.973	1495.742	1495.742	1473.52	1515.944	1498.166	1518.166	1532.452	1521.72	1530.054	1552.503	1525.003	1509.141	1484.358	1501.501
Bot44	1487.36	1487.36	1496.451	1470.737	1450.737	1471.25	1497.566	1515.514	1497.083	1476.131	1448.131	1474.131	1474.131	1494.131	1523.86	1540.187	1546.187
Bot45	1494.914	1494.914	1510.6	1500.012	1493.346	1470.737	1486.526	1514.731	1490.418	1480.418	1456.418	1441.418	1443.523	1479.078	1484.078	1499.868	1478.289
Bot46	1497.151	1497.151	1508.916	1538.703	1507.036	1523.703	1509.509	1495.435	1495.435	1526.047	1543.355	1550.855	1523.899	1510.089	1490.779	1517.094	1541.008
Bot47	1487.919	1487.919	1466.669	1484.618	1484.618	1475.053	1478.083	1458.083	1447.25	1462.25	1432.667	1444.571	1457.071	1477.071	1490.96	1483.569	1443.569
Bot48	1473.989	1488.275	1467.025	1467.934	1498.237	1508.653	1484.209	1464.209	1482.576	1482.576	1505.433	1482.1	1482.1	1463.529	1447.853	1428.783	1455.612
Bot49	1488.726	1488.726	1461.226	1486.867	1486.867	1506.867	1525.234	1496.999	1496.999	1468.903	1455.987	1434.168	1451.946	1438.613	1444.996	1468.4	1463.4
Bot50	1459.908	1435.697	1459.697	1433.333	1466.667	1443.333	1466.41	1477.221	1477.221	1451.507	1473.729	1492.15	1492.15	1509.928	1490.618	1511.67	1524.714
Bot51	1491.364	1491.364	1527.728	1540.886	1521.719	1548.803	1524.932	1530.337	1506.466	1528.915	1540.453	1557.953	1566.525	1573.192	1554.244	1569.059	1545.338
Bot52	1519.585	1497.766	1481.171	1500.615	1525.615	1535.371	1508.274	1501.608	1479.255	1462.112	1449.195	1463.195	1480.695	1462.124	1443.746	1436.304	1465.572
Bot53	1543.232	1551.928	1526.214	1498.335	1525.835	1503.482	1519.808	1487.216	1487.216	1509.438	1517.771	1513.882	1530.161	1550.161	1518.857	1498.422	1466.317
Bot54	1462.172	1490.743	1475.743	1495.188	1495.188	1513.938	1491.716	1466.001	1440.585	1468.585	1493.029	1461.029	1436.819	1457.273	1449.706	1466.727	1485.876
Bot55	1521.29	1499.472	1511.236	1528.257	1509.091	1491.313	1512.525	1522.281	1546.281	1558.186	1579.34	1595.249	1560.011	1540.011	1523.924	1548.414	1535.08
Bot56	1398.005	1378.005	1410.505	1435.505	1416.934	1439.434	1423.824	1412.396	1449.651	1435.365	1408.698	1425.025	1449.469	1462.803	1480.803	1444.374	1430.461
Bot57	1503.437	1516.203	1499.607	1495.321	1495.321	1470.877	1467.719	1459.977	1484.467	1444.467	1431.133	1419.338	1407.543	1403.099	1420.12	1453.454	1441.714
Bot58	1518.018	1500.745	1471.384	1489.333	1489.333	1515.999	1507.11	1478.221	1478.221	1505.721	1486.555	1470.555	1435.818	1415.818	1441.35	1455.239	1487.154
Bot59	1474.113	1452.534	1474.485	1452.342	1464.463	1464.463	1434.99	1414.99	1445.222	1465.222	1483	1501.421	1488.921	1463.207	1436.72	1432.014	1404.918
Bot60	1466.695	1492.885	1501.976	1521.125	1533.625	1499.508	1513.793	1538.184	1548.184	1550.565	1513.004	1492.448	1492.448	1478.639	1453.639	1429.918	1415.724
Bot61	1475.419	1475.419	1502.248	1474.012	1464.012	1476.833	1436.833	1465.404	1489.894	1449.894	1428.644	1401.465	1416.682	1432.591	1424.17	1401.817	1387.624
Bot62	1431.902	1464.045	1483.557	1454.272	1478.514	1506.719	1531.209	1555.533	1565.79	1579.123	1586.44	1595.531	1584.103	1601.88	1610.214	1619.516	1584.779
Bot63	1444.864	1464.506	1441.649	1469.427	1490.639	1450.639	1436.955	1419.812	1440.742	1412.106	1432.619	1439.762	1427.967	1448.421	1463.315	1432.617	1405.521
Bot64	1465.349	1435.875	1451.875	1445.209	1419.494	1434.494	1455.648	1485.378	1485.378	1496.489	1505.06	1478.949	1478.949	1486.642	1497.753	1468.622	1463.622
Bot65	1499.207	1528.995	1538.085	1510.207	1479.73	1446.397	1465.628	1492.655	1492.655	1482.655	1499.798	1471.798	1471.798	1458.464	1476.464	1450.75	1417.272
Bot66	1535.069	1506.39	1487.667	1498.778	1477.825	1461.159	1463.79	1482.709	1482.709	1504.931	1527.789	1506.393	1473.893	1457.227	1425.335	1400.041	1414.675
Bot67	1436.122	1408.622	1428.622	1454.548	1434.548	1404.548	1385.76	1370.25	1349.481	1381.556	1410.127	1445.842	1432.157	1454.885	1478.885	1497.306	1508.175
Bot68	1499.755	1508.266	1489.543	1508.987	1483.273	1503.273	1469.94	1452.52	1431.27	1420.816	1441.328	1457.328	1479.828	1495.213	1469.006	1449.936	1433.849
Bot69	1436.214	1457.643	1472.277	1479.969	1479.969	1453.303	1423.829	1403.829	1435.202	1411.111	1431.624	1457.814	1477.814	1480.671	1445.671	1473.331	1479.045
Bot70	1476.842	1476.842	1456.842	1425.933	1439.822	1462.322	1438.111	1466.682	1480.968	1455.254	1477.476	1488.002	1488.002	1495.695	1476.384	1454.242	1477.646
Bot71	1507.272	1492.272	1501.363	1516.256	1531.256	1550.768	1532.72	1513.308	1529.308	1508.227	1529.06	1551.56	1568.703	1541.203	1561.203	1537.112	1514.89
Bot72	1400.913	1428.572	1401.072	1408.572	1434.287	1459.287	1472.444	1485.265	1485.265	1490.821	1494.821	1474.821	1474.821	1454.821	1470.821	1487.842	1462.842
Bot73	1448.495	1467.542	1484.615	1466.044	1446.044	1446.044	1461.428	1474.942	1457.859	1440.716	1434.049	1425.867	1454.756	1465.867	1455.867	1470.761	1476.475
Bot74	1437.805	1420.722	1411.972	1383.876	1403.876	1431.654	1418.484	1428.007	1403.916	1433.916	1413.916	1396.993	1373.272	1368.407	1386.356	1380.399	1371.168
Bot75	1423.661	1402.411	1376.047	1355.402	1331.191	1331.191	1376.191	1362.722	1357.337	1353.701	1370.027	1390.436	1405.653	1438.306	1474.476	1452.333	1454.461
Bot76	1364.734	1368.212	1368.212	1382.498	1408.212	1390.163	1416.992	1438.421	1461.677	1481.677	1457.677	1471.677	1499.177	1475.843	1440.843	1412.608	1429.681
Bot77	1441.072	1451.786	1473.786	1451.968	1468.634	1484.019	1489.474	1455.188	1429.771	1412.498	1433.011	1452.059	1422.585	1407.03	1380.188	1423.045	1405.625
Bot78	1438.615	1423.615	1400.281	1425.281	1455.837	1478.914	1438.914	1415.043	1388.679	1400.801	1394.134	1412.501	1385.322	1399.608	1438.069	1449.18	1424.398
Bot79	1466.714	1478.619	1455.761	1472.428	1484.549	1491.216	1460.307	1433.21	1429.574	1447.574	1460.907	1436.816	1419.893	1393.226	1363.226	1344.503	1373.392
Bot80	1351.589	1371.155	1371.155	1350.509	1336.825	1336.825	1296.825	1326.237	1305.681	1288.409	1319.52	1299.032	1285.119	1316.369	1326.125	1327.504	1321.547
Bot81	1352.508	1365.551	1365.551	1408.408	1389.62	1406.287	1420.921	1389.493	1362.954	1402.348	1422.756	1398.141	1430.75	1451.204	1475.204	1493.625	1468.625
Bot82	1442.238	1423.071	1412.238	1384.142	1401.285	1378.358	1353.51	1339.925	1360.978	1342.406	1362.406	1342.406	1365.133	1344.052	1330.719	1297.616	1318.024
Bot83	1420.656	1437.677	1459.677	1437.859	1415.716	1436.087	1413.16	1425.064	1405.519	1415.519	1382.186	1398.512	1377.117	1407.729	1383.518	1397.804	1375.753
Bot84	1328.826	1363.608	1363.608	1343.608	1380.451	1402.673	1389.945	1414.945	1388.582	1373.582	1393.99	1366.49	1345.095	1318.252	1294.919	1268.712	1289.12
Bot85	1383.774	1405.051	1420.051	1433.014	1403.728	1383.24	1410.07	1428.82	1438.122	1418.577	1436.525	1405.616	1421.172	1387.838	1400.659	1381.247	1405.692
Bot86	1420.272	1400.272	1392.09	1368.219	1358.522	1371.485	1393.436	1416.353	1432.632	1446.632	1423.299	1403.812	1371.504	1387.83	1364.497	1341.518	1319.467
Bot87	1395.511	1375.511	1388.011	1370.591	1348.773	1348.773	1353.773	1343.962	1380.804	1398.986	1366.129	1356.129	1380.042	1386.164	1401.549	1415.438	1427.633
Bot88	1417.307	1394.449	1386.268	1368.848	1344	1344	1359	1363.167	1330.859	1351.614	1342.648	1360.426	1343.682	1356.182	1371.566	1383.811	1397.145
Bot89	1417.044	1399.902	1378.083	1398.083	1373.235	1360.064	1332.185	1311.053	1304.387	1321.368	1334.701	1363.59	1376.633	1355.552	1345.552	1318.318	1340.767
Bot90	1447.345	1431.029	1447.029	1463.696	1433.696	1418.696	1388.452	1368.86	1376.703	1358.132	1334.798	1331.384	1315.297	1334.047	1323.213	1350.713	1323.534
Bot91	1380.612	1408.272	1428.272	1407.319	1418.748	1388.748	1398.504	1368.708	1380.473	1389.564	1403.849	1432.421	1445.754	1409.088	1376.982	1351.876	1362.987
Bot92	1421.707	1437.778	1408.195	1430.695	1436.251	1411.251	1393.202	1371.569	1383.334	1404.546	1388.355	1368.355	1351.611	1327.828	1352.218	1374.667	1396.889
Bot93	1377.805	1359.544	1359.544	1339.544	1344.807	1344.807	1369.807	1398.974	1383.974	1365.403	1344.45	1321.95	1299.342	1277.763	1294.836	1327.336	1300.102
Bot94	1325.639	1294.335	1294.335	1322.906	1293.433	1293.433	1280.099	1297.747	1271.635	1298.051	1318.051	1297.563	1318.017	1334.684	1363.952	1372.115	1352.628
Bot95	1397.303	1403.686	1368.231	1348.231	1374.547	1349.181	1333.424	1349.11	1331.332	1314.059	1329.615	1347.393	1370.12	1340.931	1317.598	1305.184	1277.95
Bot96	1298.717	1271.76	1271.76	1271.76	1295.444	1295.444	1282.111	1307.601	1323.391	1292.481	1273.171	1240.488	1254.125	1245.703	1226.537	1236.537	1250.823
Bot97	1340.749	1362.488	1362.488	1362.488	1348.804	1348.804	1335.471	1347.235	1365.656	1336.371	1313.612	1290.685	1263.729	1284.562	1304.074	1314.074	1295.351
Bot98	1292.938	1303.808	1303.808	1263.808	1271.703	1271.703	1251.703	1224.91	1196.021	1199.795	1173.588	1191.366	1170.931	1141.457	1122.291	1142.291	1164.74
Bot99	1242.501	1215.545	1215.545	1229.83	1210.883	1210.883	1220.883	1192.204	1200.099	1169.19	1146.431	1164.209	1184.663	1170.979	1143.479	1113.824	1092.973

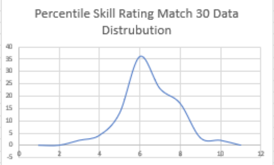
BotID	Game 35	Game 36	Game 37	Game 38	Game 39	Game 40	Game 41	Game 42	Game 43	Game 44	Game 45	Game 46	Game 47	Game 48	Game 49	Game 50
Bot0	1716.136	1696.545	1684.75	1675.519	1704.09	1723.239	1741.66	1727.851	1714.517	1688.803	1713.803	1733.315	1758.956	1792.29	1815.546	1785.546
Bot1	1690.28	1656.402	1664.021	1684.476	1662.658	1692.658	1732.193	1706.478	1686.478	1722.193	1697.818	1701.568	1722.08	1745.157	1766.088	1741.088
Bot2	1675.272	1662.299	1691.711	1705.6	1734.172	1763.959	1741.606	1765.519	1745.519	1758.019	1733.644	1715.073	1743.278	1717.984	1751.317	1788.159
Bot3	1750.546	1781.657	1802.111	1818.778	1796.96	1772.177	1801.125	1775.41	1791.2	1754.771	1736.646	1761.646	1753.904	1737.434	1760.689	1776.479
Bot4	1678.279	1666.851	1684.498	1663.729	1686.806	1703.472	1721.893	1743.632	1767.317	1745.174	1727.049	1715.62	1741.261	1710.085	1703.418	1730.085
Bot5	1658.018	1650.451	1679.863	1669.863	1710.888	1732.165	1721.577	1732.446	1753.499	1770.999	1790.148	1762.052	1782.565	1754.33	1727.843	1754.51
Bot6	1707.437	1691.927	1712.381	1731.826	1700.917	1678.308	1668.611	1661.945	1689.604	1693.722	1675.343	1716.807	1742.448	1755.268	1766.896	1777.423
Bot7	1712.523	1725.857	1739.493	1764.493	1742.675	1759.696	1731.461	1748.852	1762.01	1761.296	1746.296	1765.046	1747.626	1731.156	1712.777	1701.349
Bot8	1693.67	1704.781	1722.963	1706.039	1723.182	1735.948	1757.001	1745.572	1712.239	1744.739	1768.143	1784.81	1800.194	1813.015	1797.339	1821.024
Bot9	1729.764	1756.431	1726.688	1705.918	1702.282	1686.195	1695.497	1665.914	1663.752	1650.222	1673.299	1697.69	1713.074	1702.486	1695.819	1713.597
Bot10	1927.039	1907.448	1934.72	1959.72	1971.149	1952.888	1936.417	1913.084	1939.4	1961.9	1976.793	1948.698	1915.15	1943.355	1964.285	1949.285
Bot11	1648.635	1679.746	1667.951	1649.951	1631.69	1613.429	1632.034	1651.265	1681.052	1704.861	1727.938	1748.772	1724.901	1720.195	1734.48	1724.48
Bot12	1608.135	1628.135	1642.841	1667.841	1658.276	1701.609	1679.256	1694.641	1707.407	1719.312	1749.099	1767.849	1780.669	1767.14	1748.761	1728.761
Bot13	1664.511	1691.178	1671.691	1651.691	1642.126	1645.459	1666.389	1689.466	1710.743	1695.743	1713.051	1694.926	1678.455	1706.66	1686.104	1701.66
Bot14	1768.029	1785.807	1758.628	1726.32	1740.606	1722.345	1735.503	1761.59	1748.256	1763.256	1776.022	1762.213	1744.793	1757.614	1736.533	1749.691
Bot15	1593.019	1581.591	1588.65	1615.18	1630.565	1616.652	1597.864	1613.864	1600.891	1598.729	1623.173	1628.051	1611.581	1637.222	1651.508	1640.079
Bot16	1645.355	1660.911	1644.72	1674.266	1692.215	1686.997	1668.209	1649.043	1622.556	1591.38	1604.713	1591.38	1570.13	1601.082	1625.572	1644.721
Bot17	1648.436	1655.102	1619.864	1638.046	1602.394	1594.309	1608.262	1630.262	1606.478	1638.978	1626.005	1635.761	1619.291	1593.997	1568.58	1596.358
Bot18	1634.14	1613.059	1621.882	1595.882	1626.24	1594.935	1567.435	1555.095	1583.356	1605.856	1582.072	1555.405	1547.32	1525.839	1563.934	1583.378
Bot19	1590.884	1609.803	1634.193	1641.011	1614.055	1601.714	1599.214	1571.98	1551.98	1525.773	1517.773	1541.458	1564.713	1581.38	1595.666	1623.325
Bot20	1557.074	1574.147	1615.61	1589.61	1570.019	1551.295	1542.545	1524.767	1560.938	1583.795	1562.313	1586.387	1598.292	1625.792	1656.745	1670.078
Bot21	1560.202	1572.397	1604.397	1583.91	1564.318	1556.136	1538.011	1549.122	1543.333	1566.19	1572.19	1600.395	1582.27	1579.413	1564.413	1575.524
Bot22	1585.175	1604.094	1584.682	1603.05	1617.335	1636.383	1605.474	1573.985	1580.803	1600.803	1587.83	1626.291	1636.548	1651.932	1620.266	1641.542
Bot23	1602.143	1626.467	1600.753	1629.325	1631.889	1638.555	1650.183	1671.337	1679.848	1694.133	1662.242	1634.742	1606.506	1636.506	1643.649	1621.506
Bot24	1660.339	1631.149	1600.673	1594.819	1605.534	1629.343	1607.525	1599.44	1573.726	1554.415	1529.309	1520.559	1550.792	1567.458	1580.792	1565.792
Bot25	1529.333	1500.444	1521.656	1557.553	1545.213	1530.213	1558.12	1535.898	1524.103	1547.18	1577.18	1587.436	1611.246	1623.746	1633.95	1608.236
Bot26	1572.023	1596.347	1608.542	1585.615	1563.983	1590.906	1570.906	1588.906	1616.178	1585.002	1578.335	1601.412	1622.841	1594.605	1627.259	1597.973
Bot27	1551.222	1530.666	1514.071	1543.018	1522.167	1494.933	1534.327	1552.694	1570.086	1598.657	1625.324	1597.824	1567.199	1581.484	1553.984	1537.061
Bot28	1576.672	1554.529	1582.529	1552.285	1573.118	1601.69	1624.945	1601.612	1624.339	1596.104	1613.882	1603.882	1582.632	1556.918	1576.918	1610.251
Bot29	1607.953	1578.764	1593.398	1572.91	1588.982	1559.62	1544.62	1569.064	1557.636	1574.779	1556.055	1578.277	1597.325	1604.825	1589.825	1588.714
Bot30	1584.344	1558.63	1548.417	1563.802	1586.719	1603.385	1621.99	1600.74	1586.454	1570.779	1558.438	1534.717	1516.146	1535.065	1550.62	1526.005
Bot31	1503.552	1487.361	1490.219	1532.154	1548.821	1571.897	1590.502	1608.502	1631.229	1645.515	1657.054	1626.429	1604.076	1581.219	1599.586	1620.862
Bot32	1603.976	1578.262	1585.579	1601.906	1630.477	1599.173	1579.173	1605.173	1576.601	1544.709	1523.858	1544.911	1572.818	1595.318	1578.235	1546.568
Bot33	1572.472	1557.472	1581.472	1591.676	1574.125	1542.636	1563.566	1548.01	1529.063	1506.304	1478.304	1478.304	1517.193	1497.193	1518.622	1533.205
Bot34	1551.182	1568.255	1547.404	1535.404	1508.17	1487.319	1459.083	1480.512	1480.512	1547.179	1567.179	1557.411	1534.432	1569.568	1591.79	1568.456
Bot35	1570.377	1592.328	1564.093	1544.093	1564.927	1578.388	1615.597	1636.751	1602.157	1581.076	1555.89	1527.518	1548.448	1569.877	1552.604	1527.989
Bot36	1581.722	1595.235	1564.059	1552.059	1577.059	1588.964	1558.964	1585.63	1606.085	1576.896	1559.118	1586.896	1578.146	1549.574	1578.463	1549.574
Bot37	1519.29	1537.711	1549.711	1572.788	1551.155	1576.155	1583.132	1562.281	1579.672	1589.672	1560.783	1541.713	1562.643	1552.273	1523.637	1496.457
Bot38	1493	1493	1508.152	1534.467	1544.884	1556.422	1565.725	1541.28	1560.846	1538.087	1569.516	1569.516	1590.446	1570.446	1546.355	1529.432
Bot39	1523.6	1500.267	1521.479	1534.3	1507.066	1527.52	1550.776	1568.554	1544.343	1535.378	1558.235	1539.165	1509.879	1528.798	1497.889	1522.889
Bot40	1476.724	1476.724	1458.153	1478.607	1478.607	1504.923	1499.298	1475.207	1475.207	1508.54	1517.112	1532.901	1521.473	1534.986	1519.986	1510.755
Bot41	1541.089	1528.866	1500.631	1513.789	1491.971	1512.425	1540.332	1560.332	1577.724	1592.724	1610.501	1593.835	1617.644	1625.337	1590.892	1601.531
Bot42	1504.175	1522.596	1512.008	1533.061	1511.242	1536.242	1505.617	1488.345	1488.345	1548.345	1525.366	1559.576	1545.108	1519.923	1529.447	1552.364
Bot43	1509.396	1538.343	1513.237	1499.163	1524.163	1503.312	1475.812	1492.478	1507.372	1497.372	1520.229	1495.854	1477.283	1462.283	1462.283	1483.335
Bot44	1515.711	1501.901	1535.234	1503.234	1528.234	1515.894	1494.644	1470.269	1470.269	1470.269	1497.192	1482.192	1493.303	1532.838	1538.293	1546.626
Bot45	1453.289	1469.568	1502.901	1513.428	1534.261	1501.079	1512.707	1543.32	1519.109	1492.442	1470.81	1470.81	1430.81	1418.082	1439.135	1428.167
Bot46	1547.068	1578.775	1550.54	1526.54	1510.782	1492.059	1475.589	1508.922	1521.688	1547.329	1573.329	1539.995	1510.634	1487.3	1487.3	1510.83
Bot47	1450.235	1433.312	1430.047	1415.047	1405.28	1422.78	1397.414	1429.914	1418.485	1445.758	1414.091	1429.091	1463.134	1481.739	1481.739	1470.31
Bot48	1415.612	1445.801	1421.186	1444.263	1466.214	1433.906	1464.139	1442.889	1425.111	1392.254	1416.644	1412.128	1391.277	1410.027	1441.606	1414.509
Bot49	1486.257	1486.257	1506.257	1477.368	1477.368	1446.064	1464.669	1459.044	1477.794	1437.794	1422.794	1446.05	1465.198	1450.198	1430.198	1451.251
Bot50	1503.761	1487.571	1496.662	1528.92	1541.42	1521.875	1494.375	1519.375	1492.195	1465.528	1494.375	1494.375	1515.305	1508.638	1532.448	1515.525
Bot51	1519.624	1535.413	1539.413	1552.234	1539.893	1515.802	1500.802	1488.075	1488.075	1448.075	1455.575	1469.529	1439.529	1458.133	1485.16	1514.572
Bot52	1445.572	1461.851	1491.263	1494.489	1494.489	1505.852	1524.457	1502.639	1517.532	1480.866	1455.151	1425.151	1401.478	1403.583	1378.289	1368.019
Bot53	1484.836	1484.836	1498.169	1481.979	1481.979	1472.413	1432.413	1460.985	1437.651	1411.937	1443.645	1466.9	1447.309	1477.541	1477.541	1506.953
Bot54	1496.987	1496.987	1474.634	1453.682	1437.82	1423.461	1456.019	1441.733	1462.566	1492.869	1502.485	1478.11	1478.11	1458.11	1458.11	1473.899
Bot55	1509.366	1527.787	1505.434	1491.36	1491.36	1507.15	1535.057	1515.057	1536.333	1544.905	1562.905	1575.868	1550.761	1521.872	1504.6	1519.183
Bot56	1456.175	1437.329	1412.714	1440.919	1414.712	1439.712	1455.991	1444.562	1424.007	1445.219	1409.385	1434.385	1453.534	1465.162	1465.162	1439.448
Bot57	1458.857	1436.165	1447.93	1440.188	1424.326	1444.326	1421.469	1395.754	1390.04	1365.425	1347.046	1359.546	1350.316	1333.845	1362.147	1392.759
Bot58	1501.968	1481.016	1441.016	1477.38	1477.38	1459.119	1473.072	1491.822	1491.822	1514.899	1494.899	1494.899	1472.756	1484.384	1484.384	1490.267
Bot59	1373.428	1399.515	1387.72	1379.299	1362.026	1385.94	1426.48	1446.48	1475.647	1475.647	1498.724	1503.987	1513.289	1486.623	1486.623	1498.387
Bot60	1442.391	1474.949	1449.234	1469.689	1469.689	1490.742	1511.954	1532.362	1505.183	1518.003	1532.289	1545.252	1552.229	1538.155	1523.155	1506.231
Bot61	1415.075	1433.943	1416.391	1391.391	1360.694	1384.607	1368.417	1354.342	1374.342	1392.947	1407.581	1390.162	1369.311	1402.644	1383.232	1397.518
Bot62	1562.557	1547.557	1520.323	1502.545	1486.788	1497.314	1503.375	1479.284	1479.284	1479.284	1453.569	1481.476	1451.476	1426.628	1456.358	1472.147
Bot63	1423.298	1416.632	1390.917	1408.866	1441.475	1464.116	1447.646	1430.503	1460.938	1485.18	1461.507	1461.507	1478.528	1492.481	1457.027	1439.608
Bot64	1430.289	1452.93	1446.264	1457.627	1427.972	1435.519	1415.519	1430.519	1418.297	1441.933	1464.433	1464.433	1453.005	1473.935	1473.935	1462.506
Bot65	1435.05	1460.631	1433.452	1410.952	1396.533	1416.533	1428.161	1399.589	1419.155	1402.232	1421.744	1394.647	1414.647	1379.91	1400.665	1435.549
Bot66	1436.897	1446.199	1463.846	1438.132	1464.961	1485.716	1503.898	1520.224	1510.994	1510.994	1478.994	1478.994	1495.66	1511.939	1490.121	1473.198
Bot67	1487.223	1487.223	1507.223	1482.038	1482.038	1508.354	1522.307	1536.593	1509.751	1525.135	1513.135	1485.635	1513.413	1490.08	1490.08	1512.996
Bot68	1450.992	1430.223	1446.294	1425.649	1401.928	1373.039	1394.661	1397.518	1423.605	1439.969	1433.302	1416.635	1404.295	1416.795	1435.216	1461.532
Bot69	1501.267	1501.267	1484.797	1463.844	1483.356	1452.052	1472.982	1448.607	1463.191	1430.333	1440.09	1420.09	1442.312	1426.554	1409.888	1399.299
Bot70	1462.646	1462.646	1482.254	1466.063	1466.063	1449.14	1434.854	1441.997	1415.886	1432.25	1459.75	1471.378	1476.933	1451.933	1468.149	1428.149
Bot71	1508.223	1475.366	1456.795	1426.472	1405.077	1422.577	1404.528	1393.099	1358.813	1391.372	1367.501	1350.834	1370.834	1389.882	1385.176	1396.804
Bot72	1449.508	1428.739	1459.096	1448.129	1467.641	1453.282	1438.996	1465.186	1465.186	1480.338	1491.876	1491.876	1510.481	1523.995	1531.137	1501.394
Bot73	1461.475	1461.475	1483.044	1495.947	1471.099	1461.533	1462.71	1479.377	1479.377	1439.377	1451.877	1438.543	1412.829	1440.954	1417.621	1404.091
Bot74	1359.74	1383.653	1405.081	1390.081	1409.129	1391.351	1370.863	1388.255	1366.203	1389.459	1384.594	1377.928	1400.15	1396.992	1374.639	1356.261
Bot75	1471.604	1471.604	1484.937	1494.615	1494.615	1517.342	1486.717	1462.342	1462.342	1471.433	1468.168	1468.168	1468.168	1443.168	1403.168	1371.991
Bot76	1421.596	1414.929	1438.144	1407.821	1425.212	1407.434	1386.947	1372.873	1390.65	1366.035	1350.359	1375.359	1354.59	1371.257	1390.125	1413.38
Bot77	1421.181	1438.162	1421.239	1436.624	1448.819	1477.12	1492.272	1498.522	1473.907	1433.907	1463.907	1463.907	1444.315	1462.919	1462.919	1451.491
Bot78	1407.802	1419.123	1435.194	1446.558	1434.144	1454.899	1426.327	1395.851	1367.28	1360.613	1390.846	1366.975	1399.475	1370.001	1392.642	1373.231
Bot79	1393	1414.739	1384.943	1404.508	1426.247	1412.173	1396.563	1361.325	1385.77	1404.374	1399.858	1434.858	1445.497	1426.709	1442.925	1419.054
Bot80	1345.076	1332.854	1352.366	1336.051	1316.505	1347.061	1360.574	1377.966	1393.521	1409.885	1386.014	1356.014	1376.014	1356.602	1366.036	1392.567
Bot81	1428.625	1403.208	1417.494	1432.879	1443.748	1421.697	1451.93	1423.358	1438.576	1448.576	1437.742	1417.742	1392.636	1414.511	1386.276	1400.229
Bot82	1301.101	1278.174	1267.121	1296.533	1331.95	1316.439	1338.888	1309.999	1331.568	1306.719	1306.719	1333.992	1313.223	1301.794	1322.847	1304.469
Bot83	1397.322	1369.822	1396.012	1373.512	1387.798	1370.247	1378.355	1408.79	1417.485	1403.126	1385.707	1400.707	1414.04	1379.304	1350.415	1370.823
Bot84	1315.591	1297.542	1326.81	1344.458	1368.267	1348.675	1364.891	1339.706	1322.783	1322.783	1341.388	1368.888	1344.272	1318.978	1301.201	1301.201
Bot85	1382.713	1402.278	1378.605	1400.344	1417.735	1396.254	1410.207	1430.207	1410.207	1390.72	1404.673	1377.577	1400.077	1418.827	1429.637	1408.992
Bot86	1306.39	1330.303	1311.356	1320.179	1341.013	1362.752	1346.561	1372.648	1368.546	1346.727	1312.133	1310.228	1310.228	1331.657	1311.657	1311.657
Bot87	1406.782	1373.032	1389.698	1362.856	1389.047	1369.455	1334.217	1344.421	1317.241	1317.241	1329.741	1349.741	1354.741	1376.17	1369.503	1377.667
Bot88	1367.349	1344.015	1316.836	1285.927	1276.539	1304.317	1334.929	1365.542	1387.764	1365.945	1389.201	1399.201	1378.35	1387.874	1401.032	1375.738
Bot89	1362.336	1347.336	1361.622	1376.839	1393.506	1406.549	1418.177	1430.677	1447.344	1428.772	1398.45	1413.45	1435.672	1407.793	1423.583	1439.862
Bot90	1308.024	1334.111	1355.539	1381.626	1362.081	1334.326	1356.775	1338.997	1358.604	1333.756	1307.27	1321.815	1321.815	1311.227	1289.084	1289.084
Bot91	1345.436	1313.769	1302.717	1326.246	1304.428	1303.558	1317.844	1309.552	1289.96	1289.96	1249.96	1271.778	1271.778	1267.492	1296.44	1296.44
Bot92	1371.175	1353.397	1328.781	1312.466	1292.874	1265.917	1256.352	1286.964	1306.572	1306.572	1266.572	1245.62	1245.62	1267.048	1285.469	1285.469
Bot93	1326.572	1354.833	1332.782	1350.173	1328.355	1301.398	1276.616	1256.128	1244.699	1244.699	1294.699	1320.154	1320.154	1348.725	1322.059	1292.87
Bot94	1362.432	1371.128	1356.769	1324.664	1332.997	1350.388	1338.96	1347.656	1317.912	1317.912	1342.912	1319.579	1319.579	1301.007	1286.007	1286.007
Bot95	1268.719	1257.987	1275.06	1295.649	1316.482	1335.927	1314.974	1333.341	1358.832	1365.808	1379.762	1356.428	1331.813	1303.578	1324.63	1300.847
Bot96	1262.587	1237.221	1256.734	1234.915	1249.499	1260.61	1244.523	1221.596	1204.045	1204.045	1216.545	1193.212	1193.212	1153.212	1123.926	1123.926
Bot97	1266.889	1277.759	1240.39	1209.481	1187.849	1198.96	1180.699	1155.333	1125.537	1125.537	1128.394	1139.303	1139.303	1113.589	1102.161	1102.161
Bot98	1176.504	1187.374	1165.795	1162.158	1140.526	1117.917	1128.121	1105.194	1118.92	1118.92	1093.206	1065.11	1065.11	1079.396	1089.922	1089.922
Bot99	1060.665	1037.738	1052.372	1039.645	1011.89	989.2813	957.977	968.1811	946.5485	946.5485	949.4056	923.6913	923.6913	937.977	915.8341	915.8341

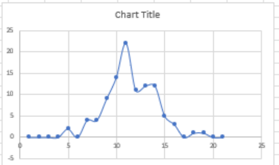
Normality Test

BotID	Game 30
Bot98	1170.9
Bot99	1184.7
Bot96	1254.1
Bot97	1263.7
Bot80	1285.1
Bot93	1299.3
Bot90	1315.3
Bot94	1318
Bot88	1343.7
Bot84	1345.1
Bot92	1351.6
Bot82	1365.1
Bot95	1370.1
Bot86	1371.5
Bot74	1373.3
Bot89	1376.6
Bot83	1377.1
Bot87	1380
Bot78	1385.3
Bot75	1405.7
Bot57	1407.5
Bot61	1416.7
Bot79	1419.9
Bot85	1421.2
Bot77	1422.6
Bot63	1428
Bot81	1430.7
Bot67	1432.2
Bot58	1435.8
Bot54	1436.8
Bot45	1443.5
Bot91	1445.8
Bot56	1449.5
Bot49	1451.9
Bot73	1454.8
Bot47	1457.1
Bot65	1471.8
Bot66	1473.9
Bot44	1474.1
Bot72	1474.8
Bot69	1477.8
Bot64	1478.9
Bot68	1479.8
Bot52	1480.7
Bot38	1481.3
Bot48	1482.1
Bot40	1483.7
Bot70	1488
Bot42	1488.3
Bot59	1488.9
Bot37	1491.1
Bot50	1492.2
Bot60	1492.4
Bot35	1495.2
Bot76	1499.2
Bot36	1508.7
Bot30	1514.7

Bin	*Frequency*
1000	0
1100	0
1200	2
1300	4
1400	13
1500	36
1600	23
1700	17
1800	3
1900	2
More	0

Bin	*Frequency*
1000	0
1050	0
1100	0
1150	0
1200	2
1250	0
1300	4
1350	4
1400	9
1450	14
1500	22
1550	11
1600	12
1650	12
1700	5
1750	3
1800	0
1850	1
1900	1
1950	0
More	0





Distribution Summary

Count : 100

Mean: 1499.99995

Median: 1490.023316

Standard Deviation: 124.934872

Skewness: 0.056977

Kurtosis: 0.53368

Result: The value of the K-S test statistic (D) is .0555.

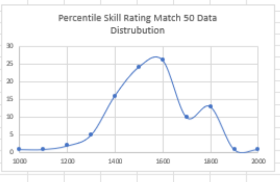
The *p*-value is .9006. Your data does *not* differ significantly from that which is normally distributed.

Bin	*Frequency*
1000	0
1100	0
1200	2
1300	4
1400	13
1500	36
1600	23
1700	17
1800	3
1900	2
More	0

Game 50
1785.5
1741.1
1788.2
1776.5
1730.1
1754.5
1777.4
1701.3
1821
1713.6
1949.3
1724.5
1728.8
1701.7
1749.7
1640.1
1644.7
1596.4
1583.4
1623.3
1670.1
1575.5
1641.5
1621.5
1565.8
1608.2
1598
1537.1
1610.3
1588.7
1526
1620.9
1546.6
1533.2
1568.5
1528
1549.6
1496.5
1529.4
1522.9
1510.8
1601.5
1552.4
1483.3
1546.6
1428.2
1510.8
1470.3
1414.5
1451.3
1515.5
1514.6
1368
1507
1473.9
1519.2
1439.4

1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000

Bin	*Frequency*
1000	1
1100	1
1200	2
1300	5
1400	16
1500	24
1600	26
1700	10
1800	13
1900	1
2000	1
More	0



Result: The value of the K-S test statistic (D) is .07361.

The *p*-value is .6237. Your data does *not* differ significantly from that which is normally distributed.

Distribution Summary

Count : 100

Mean: 1499.99994

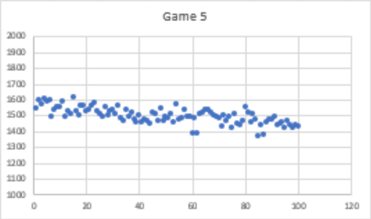
Median: 1503.812622

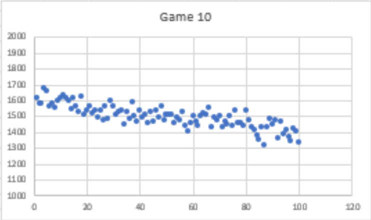
Standard Deviation: 167.072266

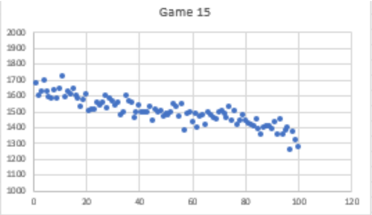
Skewness: -0.308827

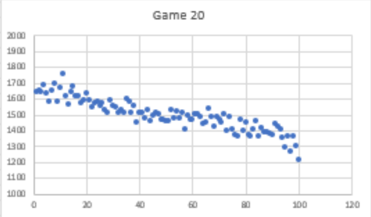
Kurtosis: 1.226777

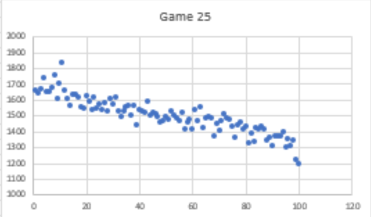
Scatter Graphs

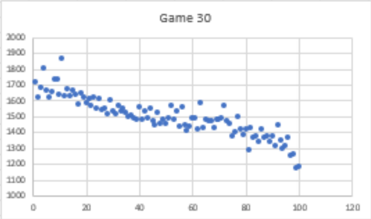


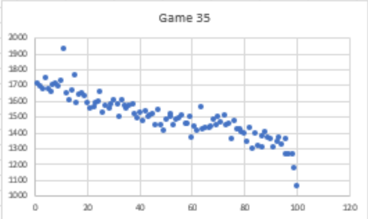


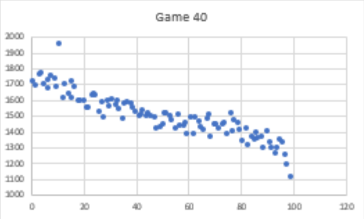


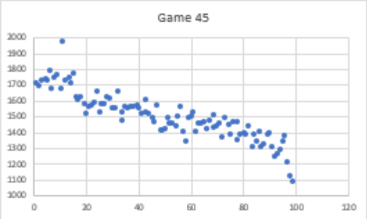


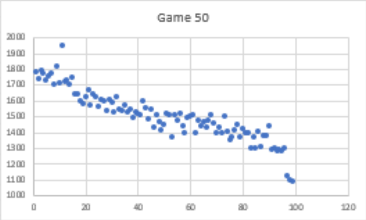












Bibliography

Chess.com, 2020. *Elo Rating System.* [Online]
Available at: https://www.chess.com/terms/elo-rating-chess
[Accessed 28 10 2022].

Dehpanah, A., Ghori, M. F., Gemmell, J. & Mobasher, B., 2020. *The Evaluation of Rating Systems.* [Online]
Available at: https://arxiv.org/pdf/2008.06787.pdf
[Accessed 02 12 2022].

Dyer, P., 2015. *Basic CS:GO Tutorial - Beginners Guide.* [Online]
Available at: https://www.youtube.com/watch?v=a1lK2CKKGzI
[Accessed 09 05 2023].

Ebtekar, A. & Liu, P., 2021. *Elo-MMR: A Rating System for Massive Multiplayer Competitions.* [Online]
Available at: https://cs.stanford.edu/people/paulliu/files/www-2021-elor.pdf
[Accessed 09 05 2023].

Edelkamp, S., 2021. *ELO System for Skat and Other Games of Chance.* [Online]
Available at: https://arxiv.org/pdf/2104.05422.pdf
[Accessed 28 10 2022].

Elo, A. E., 1986. The Rating Of Chessplayers Past and Present. In: New York: ARCO PUBLISHING , pp. 3 - 5 .

Ghasemi, A. & Zahediasl, S., 2012. *Normality Tests for Statistical Analysis: A Guide for Non-Statisticians.* [Online]
Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3693611/
[Accessed 09 05 2023].

Glickman, M. E., 1998. *The Glicko System.* [Online]
Available at: https://hughchristensen.com/papers/academic_papers/glickman1998b.pdf
[Accessed 04 11 2022].

Glickman, M. E., 2022. *Example Of The Glicko-2 System.* [Online]
Available at: http://glicko.net/glicko/glicko2.pdf
[Accessed 02 12 2022].

Guo, S., 2012. *Score-Based Bayesian Skill Learning.* [Online]
Available at: https://link.springer.com/content/pdf/10.1007/978-3-642-33460-3_12.pdf
[Accessed 03 11 2022].

Herbrich, R., Danguthier, P. & Minka, T., 2007. *TrueSkill Through Time : Revisiting the History of Chess.* [Online]
Available at: https://papers.nips.cc/paper/2007/file/9f53d83ec0691550f7d2507d57f4f5a2-Paper.pdf
[Accessed 08 11 2022].

Herbrich, R., Minka, T. & Graepel, T., 2006. *Trueskill : A Bayesian Skill Rating System.* [Online]
Available at:

https://proceedings.neurips.cc/paper/2006/file/f44ee263952e65b3610b8ba51229d1f9-Paper.pdf
[Accessed 02 12 2022].

HLTV, 2017. *INTRODUCING RATING 2.0.* [Online]
Available at: https://www.hltv.org/news/20695/introducing-rating-20
[Accessed 09 05 2023].

HLTV, 2022. *How does HLTV rating work? Rating 2.0 explained.* [Online]
Available at: https://www.youtube.com/watch?v=mymBWc62TcY
[Accessed 09 05 2023].

HLTV, 2023. *HLTV, Teams, FTU, Bothsides.* [Online]
Available at: https://www.hltv.org/stats/teams/ftu
[Accessed 11 01 2023].

Izquierdo, M., 2019. *Ranking Systems: Elo, TrueSkill and Your Own.* [Online]
Available at: https://www.youtube.com/watch?v=VnOVLBbYlU0&t=1719s
[Accessed 28 04 2022].

Kim, Y. et al., 2017. *What Makes a Strong Team? Using Collective Intelligence.* [Online]
Available at: https://dl.acm.org/doi/pdf/10.1145/2998181.2998185
[Accessed 11 01 2023].

KRAFTON. Inc, 2017. *PUBG: BATTLEGROUNDS.* [Online]
Available at: https://store.steampowered.com/app/578080/PUBG_BATTLEGROUNDS/
[Accessed 02 12 2022].

Menke, J., 2017. *Skill, Matchmaking, and Ranking Systems Design.* [Online]
Available at: https://www.youtube.com/watch?v=-pglxege-gU
[Accessed 24 02 2023].

Menke, J., 2020. *Matchmaking for Engagement: Lessons from Halo 5.* [Online]
Available at: https://www.youtube.com/watch?v=0FoG4Jtpebs
[Accessed 11 01 2023].

Minka, T., Cleven, R. & Zaykov, Y., 2018. *TrueSkill 2: An improved Bayesian skill rating system.* [Online]
Available at: https://www.microsoft.com/en-us/research/uploads/prod/2018/03/trueskill2.pdf
[Accessed 11 01 2023].

Morrison, B., 2019. *Comparing Elo, Glicko, IR Comparing Elo, Glicko, IRT, and Ba , and Bayesian IR esian IRT Statistical Models T Statistical Models.* [Online]
Available at: https://scholarworks.uark.edu/cgi/viewcontent.cgi?article=4751&context=etd
[Accessed 08 11 2022].

Rotou, O., Qian, X. & Davier, M. v., 2015. *Ranking Systems Used in Gaming Assessments and or Competitive Games.* [Online]
Available at: https://www.ets.org/Media/Research/pdf/RM-15-03.pdf
[Accessed 02 12 2022].

Sardegna, C., 2017. *Exploring Problems with Counter-Strike Rating Systems.* [Online]
Available at: https://chrissardegna.com/blog/problems-with-csgo-rating-systems/
[Accessed 09 05 2023].

US Chess Federation, 2013. *K-Factor Change.* [Online]
Available at: http://www.uschess.org/index.php/Announcements/K-Factor-Change-May-2013.html
[Accessed 03 11 2022].