**Dominoes Assignment 3 – Testing**

Testing will be done by playing each intelligent player 3000 games against the hsdPlayer, for 4 different seeds, varying which player goes first. Then the intelligent players will be played against each other in the same way. The average win percentage will be taken to show which player is best and reasons for this will be given.

**Averages Win (%) for Every Player Versus Every Other Player**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | hsdPlayer | winPlayer | getClosePlayer | blockPlayer | superPlayer | blockOPWinPlayer | Over-all Average Win Percentage |
| wnPlayer | 59.14±1.90 | N/A | 50.68±1.55 | 51.34±1.28 | 50.95±1.57 | 48.89±0.98 | 52.20±7.98 |
| getClosePlayer | 60.04±1.67 | 49.32±1.54 | N/A | 52.07±0.85 | 51.39±1.73 | 49.73±1.54 | 52.51±8.72 |
| blockPlayer | 58.78±1.83 | 48.66±1.28 | 47.93±0.85 | N/A | 50.34±1.78 | 48.23±1.50 | 50.79±9.12 |
| superPlayer | 59.65±1.93 | 49.05±1.57 | 48.61±1.73 | 49.66±1.78 | N/A | 49.03±1.75 | 51.20±9.48 |
| blockOPWinPlayer | 61.60±2.81 | 51.11±0.98 | 50.27±1.54 | 51.77±1.50 | 50.97±1.75 | N/A | 53.14±9.52 |

The elements in this table represent the average percentage of wins from the player in a row against the player in a column, i.e. if the percentage is above 50% then (from the 12000 games played - 3000 games on 4 different seeds) the row player is more likely to win against the column player. This data has been obtained by taking averages from ‘Table 2’. The last column in this table ‘Over-all Average Win Percentage’ represents the average win percentage for the player in the row versus every other player, effectively showing the player’s likelihood to win against any other player. To visualise this data, it has been plotted on a graph below.

By observing the graphs, it may seem that the standard deviation errors are very high. This is because of two reasons: firstly, two standard deviations are taken to contain 95% of all data and secondly, the players were all played against the ‘hsdPlayer’ which they beat almost 10% more of the time than when playing one another, therefore increasing the standard deviation.

It can be seen that ‘blockPlayer’ won the least compared to other players. This can be explained by the fact that, after trying to find a domino that will win, this player will always try to block the opponent (when the opponent is knocking) and this takes priority over trying to get a higher score, so ‘blockPlayer’ doesn’t focus much on raising its own score, therefore winning less. As ‘superPlayer’ includes this blocking tactic, it makes the same mistake as the ‘blockPlayer’ and becomes the second worst player.

The best player is ‘blockOPWinPlayer’ as it wins an average of 53.14% of games played against any other player. Close behind is ‘getClosePlayer’ winning an average of 52.51% of games played, losing only 49.73% of games against the ‘blockOPWinPlayer’ (very close to 50/50). The reason that ‘blockOPWinPlayer’ wins the majority of the time is because it implements the most successful tactics, along with its main tactic of not playing dangerous dominoes after the opponent has hit a score greater than or equal to 53. It will still play to win or highest scoring domino, therefore winning the majority of the time.

*(Table 2 below)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 2**  **Every Player vs. Every Other Player (3000 games each)** | | | | |
| **Player 1** | **Player 2** | **Seed** | **Player 1 Games Won (%)** | **Player 2 Games Won (%)** |
| winPlayer | hsdPlayer | 1 | 60.13 | 39.87 |
| winPlayer | hsdPlayer | 12 | 58.03 | 41.97 |
| hsdPlayer | winPlayer | 123 | 41.30 | 58.70 |
| hsdPlayer | winPlayer | 1234 | 40.30 | 59.70 |
| getClosePlayer | hsdPlayer | 1 | 60.30 | 39.70 |
| getClosePlayer | hsdPlayer | 12 | 60.53 | 39.47 |
| hsdPlayer | getClosePlayer | 123 | 41.20 | 58.80 |
| hsdPlayer | getClosePlayer | 1234 | 39.47 | 60.53 |
| blockPlayer | hsdPlayer | 1 | 59.10 | 40.90 |
| blockPlayer | hsdPlayer | 12 | 57.53 | 42.47 |
| hsdPlayer | blockPlayer | 123 | 41.23 | 58.77 |
| hsdPlayer | blockPlayer | 1234 | 40.30 | 59.70 |
| superPlayer | hsdPlayer | 1 | 59.27 | 40.73 |
| superPlayer | hsdPlayer | 12 | 60.13 | 39.87 |
| hsdPlayer | superPlayer | 123 | 41.50 | 58.50 |
| hsdPlayer | superPlayer | 1234 | 39.30 | 60.70 |
| blockOPWinPlayer | hsdPlayer | 1 | 62.37 | 37.63 |
| blockOPWinPlayer | hsdPlayer | 12 | 59.90 | 40.10 |
| hsdPlayer | blockOPWinPlayer | 123 | 38.93 | 61.07 |
| hsdPlayer | blockOPWinPlayer | 1234 | 36.93 | 63.07 |
| winPlayer | getClosePlayer | 1 | 51.07 | 48.93 |
| winPlayer | getClosePlayer | 12 | 49.73 | 50.26 |
| getClosePlayer | winPlayer | 123 | 49.60 | 50.40 |
| getClosePlayer | winPlayer | 1234 | 48.50 | 51.50 |
| winPlayer | blockPlayer | 1 | 50.87 | 49.13 |
| winPlayer | blockPlayer | 12 | 50.83 | 49.17 |
| blockPlayer | winPlayer | 123 | 48.53 | 51.47 |
| blockPlayer | winPlayer | 1234 | 47.80 | 52.20 |
| winPlayer | superPlayer | 1 | 51.30 | 48.70 |
| winPlayer | superPlayer | 12 | 49.90 | 50.10 |
| superPlayer | winPlayer | 123 | 49.13 | 50.87 |
| superPlayer | winPlayer | 1234 | 48.27 | 51.73 |
| winPlayer | blockOPWinPlayer | 1 | 48.70 | 51.30 |
| winPlayer | blockOPWinPlayer | 12 | 48.80 | 51.20 |
| blockOPWinPlayer | winPlayer | 123 | 51.53 | 48.47 |
| blockOPWinPlayer | winPlayer | 1234 | 50.40 | 49.60 |
| getClosePlayer | blockPlayer | 1 | 51.93 | 48.07 |
| getClosePlayer | blockPlayer | 12 | 51.77 | 48.23 |
| blockPlayer | getClosePlayer | 123 | 48.13 | 51.87 |
| blockPlayer | getClosePlayer | 1234 | 47.30 | 52.70 |
| getClosePlayer | superPlayer | 1 | 52.13 | 47.87 |
| getClosePlayer | superPlayer | 12 | 50.47 | 49.53 |
| superPlayer | getClosePlayer | 123 | 49.16 | 50.83 |
| superPlayer | getClosePlayer | 1234 | 47.87 | 52.13 |
| getClosePlayer | blockOPWinPlayer | 1 | 49.90 | 50.10 |
| getClosePlayer | blockOPWinPlayer | 12 | 49.87 | 50.13 |
| blockOPWinPlayer | getClosePlayer | 123 | 51.33 | 48.67 |
| blockOPWinPlayer | getClosePlayer | 1234 | 49.50 | 50.50 |
| blockPlayer | superPlayer | 1 | 50.50 | 49.50 |
| blockPlayer | superPlayer | 12 | 49.20 | 50.80 |
| superPlayer | blockPlayer | 123 | 49.70 | 50.30 |
| superPlayer | blockPlayer | 1234 | 48.63 | 51.37 |
| blockPlayer | blockOPWinPlayer | 1 | 47.37 | 52.63 |
| blockPlayer | blockOPWinPlayer | 12 | 48.13 | 51.87 |
| blockOPWinPlayer | blockPlayer | 123 | 51.77 | 48.23 |
| blockOPWinPlayer | blockPlayer | 1234 | 50.80 | 49.20 |
| superPlayer | blockOPWinPlayer | 1 | 48.77 | 51.23 |
| superPlayer | blockOPWinPlayer | 12 | 48.90 | 51.10 |
| blockOPWinPlayer | superPlayer | 123 | 51.80 | 48.20 |
| blockOPWinPlayer | superPlayer | 1234 | 49.73 | 50.27 |