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Team Description:

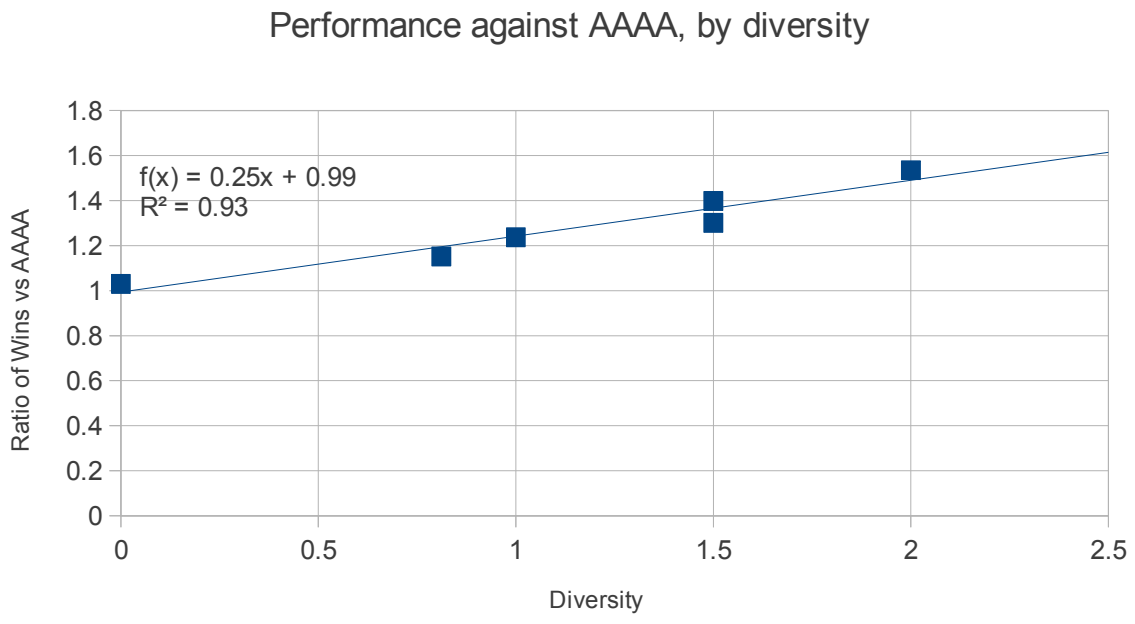
Player A is the same as my homogeneous team player. It prefers to travel diagonally, even when the ball is on a N-S-E-W axis. When it finds the ball, it will obstruct the E-W direction if an opponent is nearby. If it incidentally ends up in front of the ball (on the West side if the EAST team), it will stay there to obstruct. Before it tries to make a move, it checks for an obstruction and falls back to another move. This prevents it from wasting turns.

I made the remaining 3 teams by varying small aspects of Player A. When Player A wants to move diagonally (e.g. NW) to pursue the ball but cannot due to an obstruction, it could move in either sub-direction of the diagonal (e.g. N or W). I varied the 4 players by toggling whether they obstructed the front of the ball and which direction of a diagonal they try first. A and B try one direction of the diagonal, while C and D try the other. A and C will obstruct and B and D will not.

Diversity and Performance

The table below shows the information-theory based diversity metric for each team and its ratio of wins when played against the homogeneous AAAA team from both sides of the field. (Higher numbers are better.)

vs AAAA	Example	AAAA	AAAB	AABB	AABC	ABCC	ABCD
Ratio	0.076	1.031	1.152	1.237	1.301	1.399	1.535
Diversity	0	0	0.811	1	1.5	1.5	2



Discussion:

As the plot above shows, when playing against my homogeneous team, performance increased as diversity increased. I believe that this benefit is chiefly caused by the variation in diagonal movement. The Player A and B diagonal movement was chosen such that the likelihood in being behind the ball when it is found is maximized. While this makes sense, it leads to players that spend many moves chasing a ball horizontally without moving vertically towards the ball. Without this vertical movement, some players occasionally chase the ball outside of the pack. In some situations, this allows the player to move towards the ball without obstruction. In other situations, the player moves towards the ball without obstructing the other players! The two strategies are valuable in different situations. By mixing the two strategies, it allows some players to obstruct while other plays move around the pack towards the ball, which allows the team to take advantage of more situations.

What isn't shown by these contests is whether a single player type plays better than the other types. Additional work could be done comparing the heterogeneous teams to the BBBB, CCCC, and DDDD teams. Also, the comparisons in this report are against a single team, the AAAA team. The comparison in this report do not highlight the versatility that diversity might offer across a range of opponents. It could be that a more diverse team performs slightly worse against AAAA than another less-diverse heterogeneous team, but plays better against several other teams.

One interesting aspect not captured by these scores is that, with all team combinations, there are several individual matches which were called a tie due to a TIME_OUT. This shows that the teams are still fairly similar and can only win when they 'break away' from the other team, so to speak.