"Iota Balls" - Player report

To better understand how we reached the destination, let's look back on the journey.

Very quickly we realised that working as a single, cohesive group was an ineffective method of getting anything done. While the task is designed to encourage collaboration and iteration from the get-go, our team philosophy was to put forth multiple implementations, and go from there to determine which one we would adopt as our solution. As a result the organizational and workflow structure was fairly horizontal. This saved us a lot of time in the long run as collaboration in a vertically-structured workflow; where all of us work and iterate on a single player class, makes the group as slow as the slowest member.

It began with *BetterDave*; an attempt at a Player class whose primary (and only) strategy is to make the play which generates him the best score possible on the current turn. Obviously this is a very naive way to play the game. Voiding any and all foresight into what the board will yield him in the future is certainly not an intelligent path to winning iota (unless everyone else also plays like BetterDave!). What is important about this implementation, and what we as a group got out of it after deliberation, is that greedy algorithmic approaches work to a certain extent. Knowing this we can develop a base strategy for our future implementations; if any intelligent plays don't exist, take the greediest approach of making a play using the immediate state of the board.

Next is *Senpai*; a class employing a similar style of play to BetterDave, but with a board state check in place which propels it much higher in game performance than its counterpart. In essence Senpai utilizes the *BetterDave* approach of still making the greediest play possible on the turn however it is much smarter about finding plays to be greedy for. Where BetterDave falls apart at is optimality - he will always make the play getting him the highest amount of points but he fails to consider the context of the board and subsequently has the inability to find lots he could complete to push his score farther. *Senpai* is a workaround to this issue where the player will seek for completable lots before resorting to naive evaluations. If there is a completable lot on the board then nine times out of ten it is the most high-scoring play possible. It gets pushed up the chain of evaluation and picked as the play for that turn. Functionally this only works for incomplete sets of three, therefore Senpai may still be missing out on lesser sets which may generate greater scores or finish multiple runs in a single turn. Still though, we expect it will perform better than BetterDave almost all the time (which it did during

testing). One thing it does exceptionally well is disrupting opponents moves, because evidently it removes possible completable lots.

Gilbert is the implementation the entire group got behind, as it does many things right and generates satisfactory scoring across multiple instances of iota. Gilbert is a maniacally brute force method which checks any and every possible play using all available hands and every available positioning. The issue which arises when creating these kinds of implementations is the computing cost; especially when the game board gets excessively large and there becomes many more avenues the player is able to take. Thankfully *Gilbert* is designed for efficiency in this regard, at least as efficient as a brute force approach can take. As a consequence of the brute force approach *Gilbert* adopts the strategy of making the absolute best play possible every turn. Since it still lies in the pure greedy approach to strategy (decided on by the team) it still fails to explore the implications its play has on the strategy of its opponents. This means it may make a play which puts its opponents in an opportunistic position to go even farther. This was something our overall strategy chose not to explore. All implementations remain as fully greedy approaches to iota, with *Gilbert* being the most marked success of them all.