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A game can provide a relatively comfortable environment to test out AI strategies. This is because it can be limited to a set of possible rules and positions. However, some games are still more challenging to program an AI that is capable of beating human players. Some of the challenges present when creating an AI are speed limitations of current hardware and available memory space. Still, a technique that has been used consists of storing high volumes of data. For example, to program the Chinook AI to play checkers, it had 80,000 opening positions saved along with 10-gigabytes of closing positions data to fit in all the possibilities to the game's beginning and ending strategies. Nonetheless, the information being stored is used in an evaluation to produce the best move. The evaluation is performed through a function that is responsible for connecting positions to scores to choose the action that will be performed. That is what helped the Deep Blue AI beat the chess world champion Garry Kasparov. It failed to beat Kasparov in 1996, but won a game against him a year later through improvements to its function. In "Game Playing: The Next Moves", a distinction is made between games that have imperfect or perfect information. The games with perfect information are easier to handle and can be programmed using exhaustive search algorithms or brute force, due to its possible set of moves. On the other hand, imperfect games have ongoing amounts of information coming from complicated moves allowed in the game. Some examples of games with imperfect information are bridge and poker. Based on the experience from perfect information games, for these card games it would not be feasible to create an effective AI by using heuristics or rely solely on the amount of data that has been given it. Since, huge amounts of data are inconvenient and the methods used for perfect information games are not applicable to other types of games, researchers have looked into how cognitive science could help solve the problem. Even though the AI has a lot of information, it is not able to learn from its mistakes as well as humans do. Researchers have attempted to introduce part of the thinking process a human player would have during the game. The way they have attempted to do so is by observing experts play games to capture what parts of it they look and focus on more while they think about their next move. This could lead to a better use of the information the computer already has available.

Even though Rummy is a card game and can slightly be in the category of imperfect rule games, it seems like heuristics or the implementation of the minimax algorithm could greatly improve its computer opponent game performance. To implement heuristics it would be good to have a rule that could count how many cards of the same rank or suit have been laid on the stack and how many of them are currently held in the computer's hand. This could enable the computer to look out for what cards the player is not too keen on keeping, since they are willing to constantly leave those values on the stack. The ones that are not being placed on the stack are the rank values likely to be used to create a set. This could prompt the computer to check the stack to see if one of the common values has just been discarded and proceed to draw a card from the deck. This increases the chances that the computer will get hold of a card with the rank value the player wishes to use. Therefore, the card will not be discarded by the computer. Eventually, when the player realizes that they do not have enough cards of the desired rank to create a set with, they will just lay them on the stack and try to make a set with other values. Then, the computer will look for new values to retain. Another way to improve the computer opponent is for it to be aware of how many times the player takes a card from the deck. This could be compared to the approach mentioned in the paper of noticing what positions the experts are looking at to gain insight into what they are planning to do. By doing so, it can be aware of how many cards are left on the deck and subsequently, an approximation of how much time could be left before the game ends due to an empty stock.

References:

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