

- States generated by BFS from start -> mission_complete
 - No closed_list: 1602
 - Using closed_list: 28
- States generated by DFS from start -> mission_complete
 - No closed_list: DNF
 - Using closed_list: 23
- States generated by DLS from start -> mission_complete
 - Using limit == 7: 19

- I used mission_complete as a goal instead of return_to_charger as they would have been the same goal.
- BFS
 - States generated from start -> move_to_sample
 - No closed_list: 13
 - Using closed_list: 5
 - States generated from move_to_sample -> remove_sample
 - No closed_list: 3
 - Using closed_list: 3
 - States generated from remove_sample -> mission_complete
 - No closed_list: 175
 - Using closed_list: 22
- DFS
 - States generated from start -> move_to_sample
 - No closed_list: No goal found
 - Using closed_list: 5
 - States generated from move_to_sample -> remove_sample
 - No closed_list: No goal found
 - Using closed_list: 6
 - States generated from remove_sample -> mission_complete
 - No closed_list: No goal found
 - Using closed_list: 17
- DLS
 - States generated from start -> move_to_sample
 - Using limit == 7: 5
 - States generated from move_to_sample -> remove_sample
 - Using limit == 7: 6
 - States generated from remove_sample -> mission_complete
 - Using limit == 7: 13

- A* states generated: 28
- Uniform Cost Search states generated: 33

- Frequencies found
 - Antenna 1: f2
 - Antenna 2: f3
 - Antenna 3: f1
 - Antenna 4: f1
 - Antenna 5: f2
 - Antenna 6: f2
 - Antenna 7: f1
 - Antenna 8: f3
 - Antenna 9: f2

- a) More efficient chips, better algorithms, a better evaluation function, the benefit of input and teachings from a Grandmaster, and so many more changes all helped make Deep Blue a much more effective chess player than its predecessors. What its creators learned from these changes can all be transferred to other problems, specifically when looking at it from a high-level perspective. However, something as specific as what moves a Grandmaster might use in a specific chessboard configuration would not be as useful in non-chess-related problems.
- b) While Stockfish and Deep Blue were developed as traditional search engines, AlphaZero is a Convolutional Neural Network. The former are developed in a more rigid way, as their purpose is to search for the most optimal move out of millions of possibilities. They evaluate every move against an evaluation function, they generate trees of possibilities, and they try to look into the future to see which move would be the most advantageous. On the other hand, CNNs like AlphaZero are trained from scratch, with no knowledge of the game they're playing. These CNNs aren't made to follow a rigid structure of gameplay, and instead are trained to "feel" what the best move is. More akin to a person immediately "thinking" of an appropriate next move, the CNN doesn't spend its time thinking about millions of possibilities and will simply analyze the chessboard and use its vast training to "come up" with what it thinks is the best solution. This is why chess engines take so much longer, they spend their time searching through and generating millions of nodes whereas a CNN will probabilistically think of the

(possibly) best node, so it becomes a one-node-search versus a million-node-search.