AIND Planning Search Research Review

This research introduce the way of solving the planning problem which is problem-solving algorithms that convert the problem into propositional or relational representations of states and actions and search with domain independent heuristic. It is powerful and flexible algorithm for solving large scale of problem.
In the first part, we learned how to break down the problem into PDDA. The PDDA is a language representation problem language which a state of the world is represented by a collection of variable . A problem consists three parts. Each part in the problem consists with a series of conjunction literal expression, it all have positive state and negative state.

- Init state : initial state when you defined the problem
- Actions: Actions you can take
    - Each action have precondition and effect
    - It can be execute when meet the precondition
    - It will change the fluent state after take this action
- Goal: this is the goal we want to archive.

After defined the problem, we are still able to use the searching to archive the goal:

- Common searching without heuristic function
    - Forward
    - Backward
    - BFS
    - DFS
    - Uniform
- Searching with Heuristic
    - A* search with following heuristic
        - ignore preconditions
        - planning graph level sum

In the second part, we implement the core part of the planning graph and ignore precondition heuristic.
The benefit of the planning graph is able to apply to any of the search techniques we have seen so far. In this project, we combine with A* search. The biggest benefit is polynomial size approximation instead of exponential size like tree.

- We implement the code of adding level for state and action.
- Implement 3 mutex for action and 2 mutex for state
- Implement the level sum heuristic function for cost estimation

Finally, we comparing the search algorithm and heuristic and write an analysis.