CSCD84: Artificial Intelligence

Problem Set 1: Search

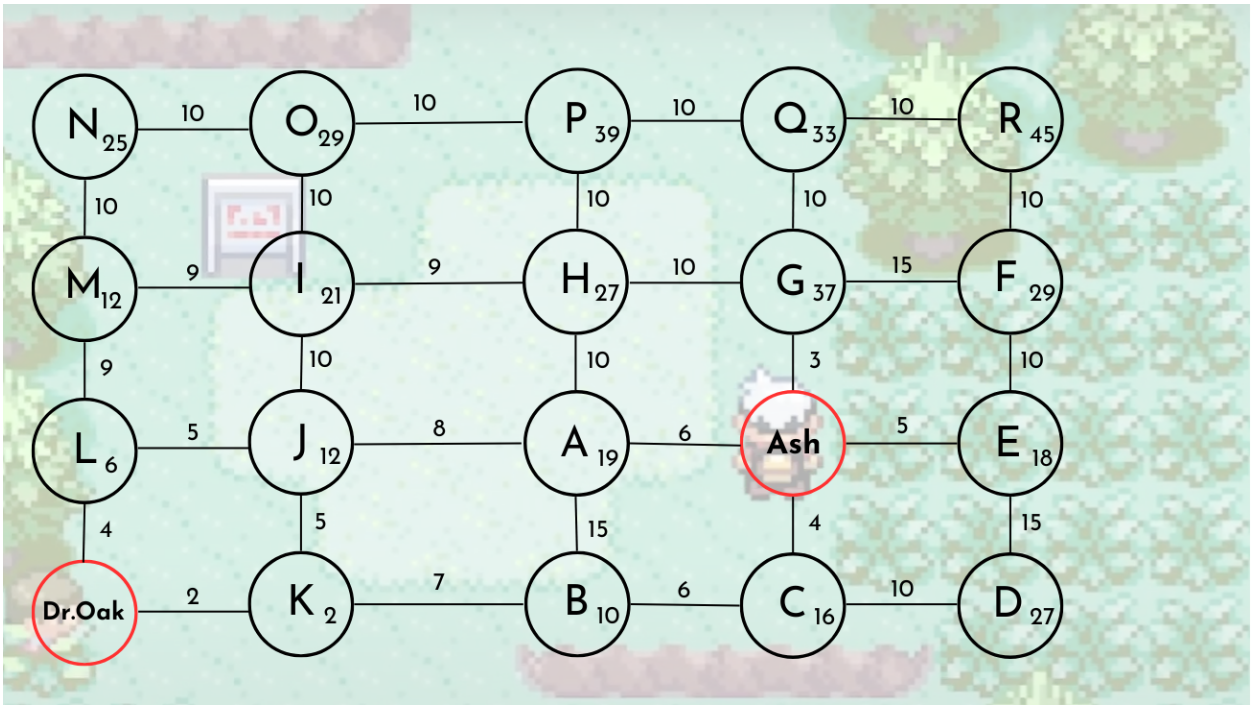

Figure 1: Pokemon state space

Q1: Saving Pikachu with Weighted A*

You are creating an AI for playing Pokemon Ruby on your Game Boy Advanced. At this stage of the game, Pikachu has low HP (health points) and Ash Ketchum needs to rush him to Dr.Oak. Each path Ash takes will cost his Pokemon more health points based on the number of wild Pokemon encounters he has. His Pokedex has provided you with a recommendation heuristic measure for the amount of health points his Pokemon will need to get from each node to the goal. Answer the following questions to help save Pikachu.

1. List the nodes *in the order they are expanded by weighted A**. Weighted A* is a method for finding the goal state faster at the cost of optimality. Weighted A* search uses the cost function $f(n) = g(n) + \epsilon h(n)$, where ϵ is a tunable parameter. Show the order of expansion with $\epsilon = 4$.

2. Compared to regular A* search, weighted A* search will often find a more costly path. Let C be the cost of the solution found by weighted A* and C^* be the cost of the optimal solution, and suppose the heuristic is admissible. Prove that $C \leq \epsilon C^*$.
   [**HINT:** Recall the definition of the cost for weighted A*. Consider the cost of the solution found by

weighted A*, and that of the next unexpanded node along the path toward the optimal solution which was added to the expansion list by weighted A*.]