EECS 592 XIURUI ZHANG Project 1

1. R&N P 3.16

a. states: The current combination of wooden pieces with orders, flippings and choices of connectors.

Initial state: A empty board without any pieces.

Actions: Add a piece to previous connectable ~~connector~~ pieces

Transition model: The ~~red~~ resulting state after adding a new piece.

Goal test: A railway has no overlapping tracks and no loose ends without pieces left.

cost: The number of wooden pieces.

b. I will choose DFS. ~~This~~ This problem has a big state space, only when depth reach 32, the problem will be solved. BFS or iterative deeping will take too much memory or step cost.

c. The function of a 'fork' is to create or merge splits. The 4 forks are 2 by 2 matched. Without any fork, these tracks will not have a no loose end.

d. Assume every pieces is unique. There will be $12 + 16\times2 + 2\times2 + 2\times2\times2$ selections of pieces and filppings. On top of this, there will be at most 3 choices of connectors. Max branching factor $= 3\times(12 + 16\times2 + 2\times2 + 2\times2\times2\times1) = 168$

maximum depth will be 32 total size $= 168^{32}$

If pieces are not unique total size $= \dfrac{168^{32}}{12!\,16!\,2!\,2!}$

EECS 592 XINRUI ZHANG Project 1

2. R&N Problem 3.8

a. If actions can have arbitrarily large negative cost, we need to explore all state space because left actions could lead to lower cost.

b. It helps for tree because it will provide a upper bound cn. C is the best case. However, It can not guarantee no loop for graph, which doesn't help.

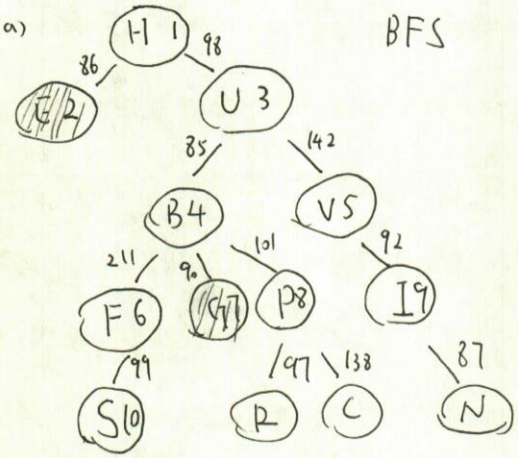
c. The agent will go into a continuous loop.

d. Humans are not willing to visit a place several times, which means the cost to visit the same place will be higher than first visit. We can add a function that the cost is relative to the times visited to avoid looping.

e. people drink alcohol and alcohol addict people to drink.

EECS 592 XINRUI ZHONG Project 1

(a) BFS

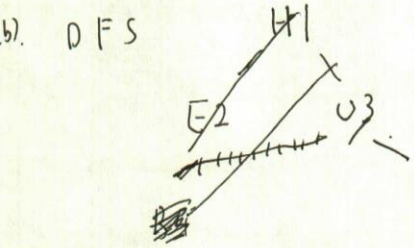


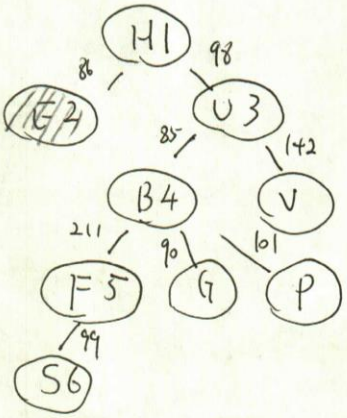
H → U → B → F → S

Cost = 493

not optimal

(b). DFS

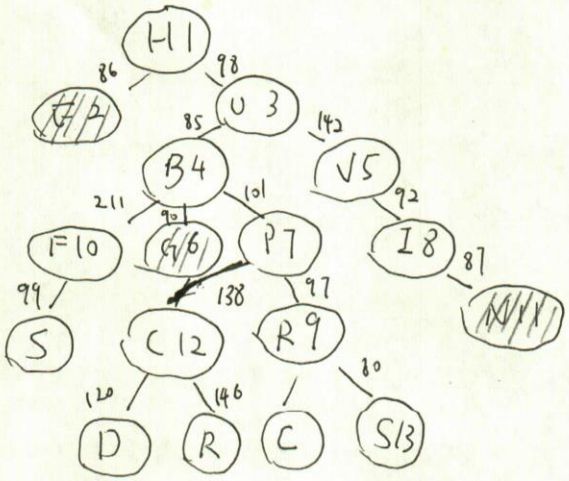




H → U → B → F → S

cost = 493 not optimal

(c).



H → U → B → P → R → S

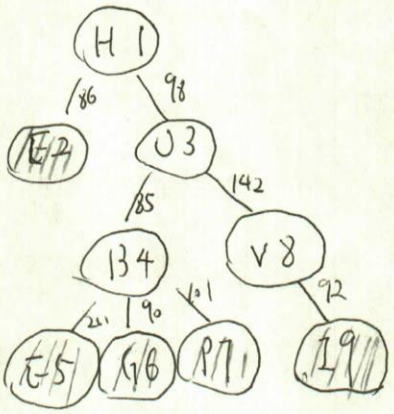
cost = 461

optimal

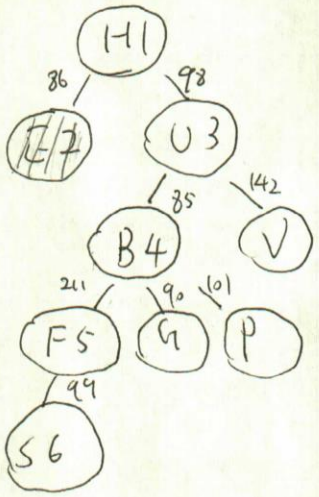
EECS 592 XINRUI ZHANG Project 1

(d). IDS

depth = 3



depth = 4



H → U → B → F → S

cost = 493

not optimal