AI COURSE TUTORIALS: August 28 2021

Instructions: Solve the problems given below using pen and paper. Write your name and roll number clearly on every page. Take a scan or picture and post in chat box

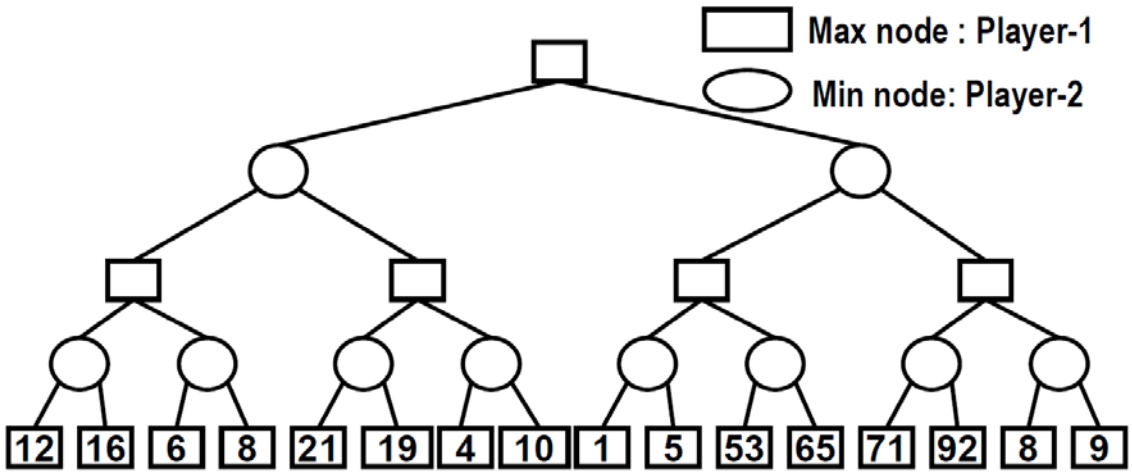
1. Consider the COIN SELECTION problem defined as follows: Given a set S of n possible coins of value s1, s2, …, respectively. Given a total value C, find the minimum number of coins whose total value is exactly C. Solve this problem using state space heuristic search as follows:

    a. Give a state space definition of problem with definition of state, state transformation rules, start and goal states and lower bound heuristic estimate. Give examples to explain your definition clearly.

    b. Show the execution of algorithm A* on the example of S = {1,8,6,7,4,2) and C = 13 clearly highlighting the state of OPEN and CLOSED lists along with g, h and f values and parent pointers at every stage.

    c. Suppose we were to find the maximum number of coins whose total value is exactly C, how would you modify your earlier solution?

2. Consider the Game Tree given below



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Present the working of the alpha-beta pruning algorithm under two situations: (a) When we order successors from left to right and (b) When we order successors from right to left.

3. Give an example of a two-player min-max Game Tree, having 2 options per move for each player for a total of 4 moves (2 per player) and evaluation values at the leaf nodes (as in problem 2 above) such that there is no pruning when we apply DFS (alpha-beta pruning) from left to right, but there is no pruning when we order the DFS from right to left.