Name: Jonas de Deus Guterres
Class: IF-42-INT
Subject: Design Analysis Algorithm

Date 20 April 2020
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Class : IF-42-INT

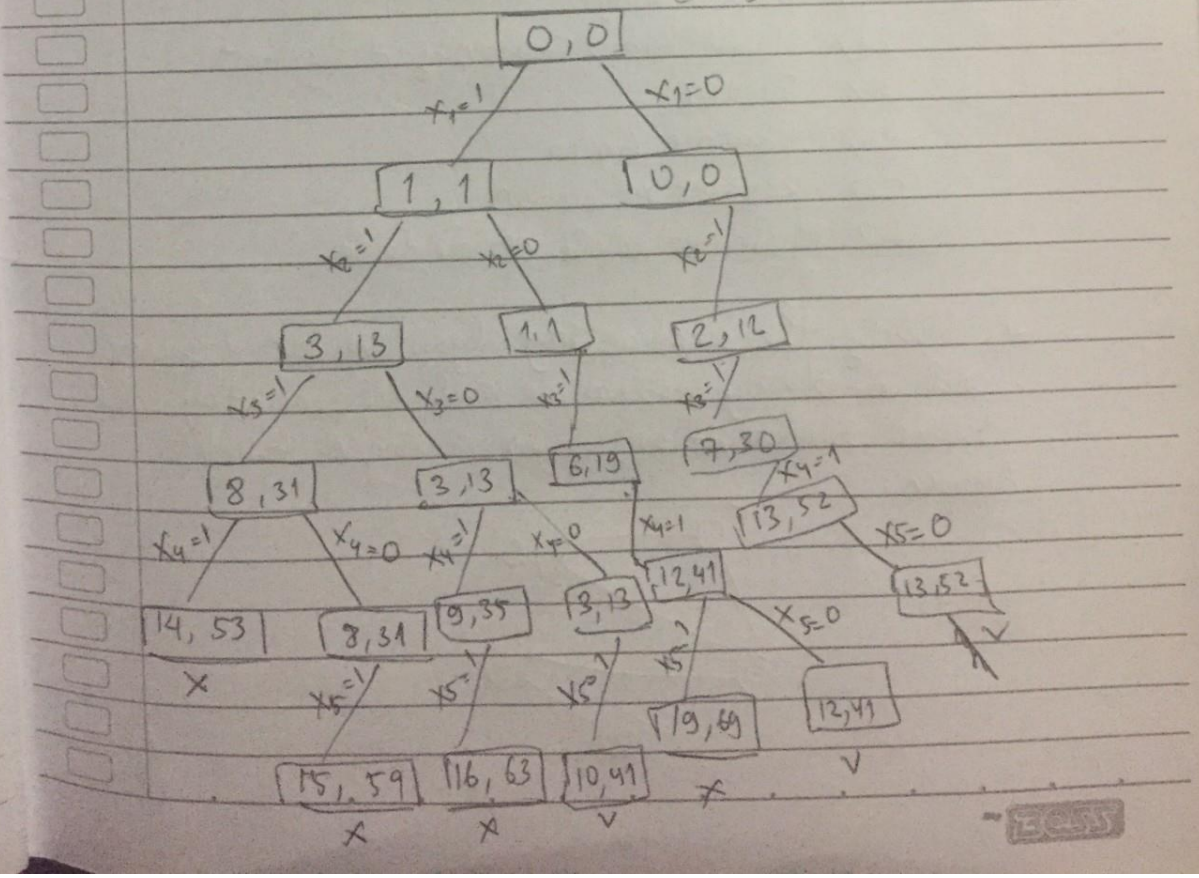
1. Use the baektracking algorithm for the 0/1 knapsaek problem. Compare the result with that of dynamic programming.

Answer:

Capacity = 13

| Index | Weight | Profit |
|---|---|---|
| 1 | 1 | 1 |
| 2 | 2 | 12 |
| 3 | 5 | 18 |
| 4 | 6 | 22 |
| 5 | 7 | 28 |

Answer : As we se it got optimal solution as well as Dynamic Programming. But Dynamic Programming takes advantages of overlapping of the recursive calls.



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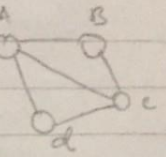
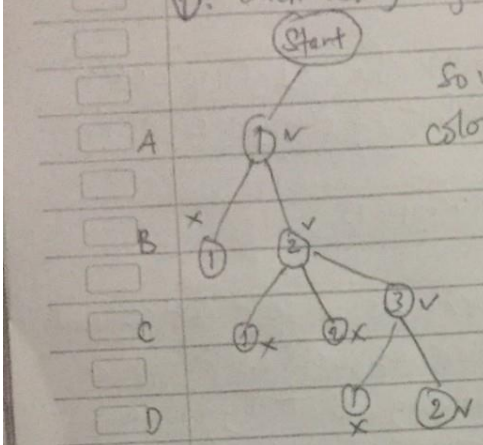
2. Compare the performance of the backtracking algorithm and greedy algorithm for the m-coloring problem.

① Backtracing Algorithm




So we have
color = {1, 2, 3}

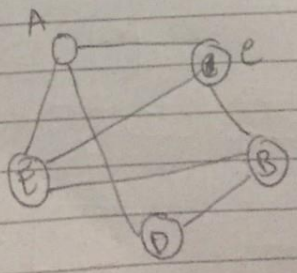
② Greedy Algorithm
Visit A = color 1, Visit B = color 2
Visit C = color 3, Visit D = color 2
So H also 3 colors.

Conclusion: They are same and get optimal solution but Greedy faster than Backtracking Algorithm.

3. Application of m-coloring problem
1.> Map coloring
2.> Mobile Radio Frequency Assignment
3.> Sudoku
4.> Bipartite Graph
5.> Resister Allocation
6.> Making schedule of time table.

4. Modify the backtracking algorithm for N-queens and m-coloring problem, instead of generating all possible solution, it only finds a single solution

Answer:



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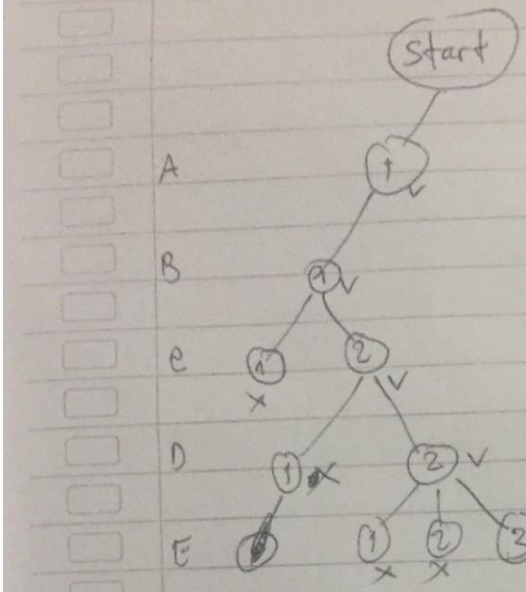
a). Backtracking algorithm for m-coloring problem




: So, if only see the one solution, it get two colors (1, 2), but with many possible solution, it get three colors (1, 2, 3).

b.) Backtracking Algorithm for N-Queens. ⇒ N = 5

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | $Q_1$ | | | | |
| 2 | | | $Q_2$ | | |
| 3 | | | | | $Q_3$ |
| 4 | | $Q_4$ | | | |
| 5 | | | | $Q_5$ | |