Project 2

CS325 — Spring 2015

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by Group 2
Vedanth Narayanan
Jonathan Merrill
Tracie Lee

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Dynamic Programming Table

Algorithm Pseudocode

Dynamic Programming Induction Proof

Questions

1. Suppose V = [1, 5, 10, 25, 50]. For each integer value of A in [2010, 2015, 2020, , 2200] determine the number of coins that changegreedy and changedp requires. You can attempt to run changeslow however if it takes too long you can select smaller values of A and also run the other algorithms on the values. Plot the number of coins as a function of A for each algorithm. How do the approaches compare?

2. Suppose V1 = [1, 2, 6, 12, 24, 48, 60] and V2 = [1, 6, 13, 37, 150]. For each integer value of A in [2000, 2001, 2002, , 2200] determine the number of coins that changegreedy and changedp requires. If your algorithms run too fast try [10000, 10001, 10003, , 10100]. You can attempt to run changeslow however if it takes too long you can select smaller values of A and also run all three algorithms on the values. Plot the number of coins as a function of A for each algorithm. How do the approaches compare?

3. Suppose V = [1, 2, 4, 6, 8, 10, 12, , 30]. For each integer value of A in [2000, 2001, 2002, , 2200] determine the number of coins that changegreedy and changedp requires. You can attempt to run changeslow however if it takes too long you can select smaller values of A and also run all three algorithms on the values. Plot the number of coins as a function of A for each algorithm.

4. For the above situations, determine (experimentally) the running times of the algorithms by fitting trend lines to the data or analyzing the log-log plot. Graph the running time as a function of A. Compare the running times of the different algorithms.

5. Use the data from questions 4-6 and any new data you have generated. Plot running times as a function of number of denominations (i.e. V=[1, 10, 25, 50] has four different denominations so n=4). Does the size of n influence the running times of any of the algorithms?

6. Suppose you are living in a country where coins have values that are powers of p, V = [p^0, p^1, p^2, ... , p^n]. How do you think the dynamic programming and greedy approaches would compare? Explain.