Lecture-01-CMSC351

Coin Change Problem:

- The type of algorithm sorting/ranking and picking the best to worst in order is called a greedy algorithm.
- Write proof to show an algorithm is optimal, make counterexample to show algorithm is not optimal.
- Greedy algorithm is not optimal for all currencies.
- Depending on the currency, greedy does not return the optimal solution but it is fast.

Dynamic Programming:

- To solve the coin change problem for x=30, we solve all the problems leading to it starting at x=1. As we solve each problem, we reuse the results of the problems that have already been solved.
- Dynamic programming returns the optimal solution for the coin problem no matter the currency.
- We are looping from 1 penny to n pennies, therefore total running time is O(c * n), or O(n). The algorithm is still very fast, even though it requires reusing the results from previous problems. We can prove it is optimal by strong induction.