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Dynamic Programming Patterns



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Before starting the topic let me introduce myself. I am a Mobile Developer currently working in Warsaw interview preparations. I started to prepare for interviews two years ago. At that time I should say I could problems seemed to me like hard ones so most of the time I had to look at editorials and discuss section problems and time to time participate in contests. I usually solve 3 problems in a contest and sometime topic.

Recently I have concentrated my attention on Dynamic Programming cause its one of the hardest topics ~140 problems in DP I have noticed that there are few patterns that can be found in different problems the following topics. I will not give complete ways how to solve problems but these patterns may be helpful.

Patterns

Minimum (Maximum) Path to Reach a Target

Distinct Ways

Merging Intervals

DP on Strings

Decision Making

Minimum (Maximum) Path to Reach a Target

Problem list: <https://leetcode.com/list/55ac4kuc>

Generate problem statement for this pattern

Statement

Given a target find minimum (maximum) cost / path / sum to reach the target.

Approach

Choose minimum (maximum) path among all possible paths before the current state, then add value

$$\text{routes}[i] = \min(\text{routes}[i-1], \text{routes}[i-2], \dots, \text{routes}[i-k]) + \text{cost}[i]$$