CE100 Algorithms and Programming II

Dynamic Programming

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## Week-5 (Dynamic Programming)

#### Spring Semester, 2021-2022

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## Quicksort Sort

## Outline

* Convex Hull (Divide & Conquer)
* Dynamic Programming
  + Introduction
  + Divide-and-Conquer (DAC) vs Dynamic Programming (DP)
* Fibonacci Numbers
  + Recursive Solution
  + Bottom-Up Solution
* Optimization Problems
* Development of a DP Algorithms
* Matrix-Chain Multiplication
  + Matrix Multiplication and Row Columns Definitions
  + Cost of Multiplication Operations (pxqxr)
  + Counting the Number of Parenthesizations
* The Structure of Optimal Parenthesization
  + Characterize the structure of an optimal solution
  + A Recursive Solution
    - Direct Recursion Inefficiency.
  + Computing the optimal Cost of Matrix-Chain Multiplication
  + Bottom-up Computation
* Algorithm for Computing the Optimal Costs
  + MATRIX-CHAIN-ORDER
* Construction and Optimal Solution
  + MATRIX-CHAIN-MULTIPLY
* Summary

## References