

M13 - Algorithms and Data Structures

8 Dynamic Programming

general method for optimizing multistage decision processes

Typically, these subproblems arise from a recurrence relating a given problem's solution to solutions of its smaller subproblems

Dynamic programming is a technique for solving problems with overlapping subproblems.

8.4 Warshall's and Floyd's Algorithms

Warshall's Algorithm

Warshall's algorithm constructs the transitive closure through a series of $n \times n$ boolean matrices

its time efficiency is only $\Theta(n^3)$

Floyd's Algorithm

Given a weighted connected graph (undirected or directed), the all pairs shortest paths problem asks to find the distances —i.e., the lengths of the shortest paths— from each vertex to all other vertices.

It is convenient to record the lengths of shortest paths in an $n \times n$ matrix **D** called the **distance matrix**

The algorithm can be enhanced to find not only the lengths of the shortest paths for all vertex pairs but also the shortest paths themselves

the time efficiency of Floyd's algorithm is cubic