Lec 9/14

Thursday, September 14, 2017 12:55

Shortest path (Dyn. prog)

(d_{ij}) where $d_{ij} = \begin{cases} \text{length of edge } (i,j) & \text{if } (i,j) \text{ is an edge} \\ 0 & \text{if } i = j \\ \infty & \text{if } (i,j) \text{ not an edge, } i \neq j \end{cases}$

Problem is to construct a sequence of vertices

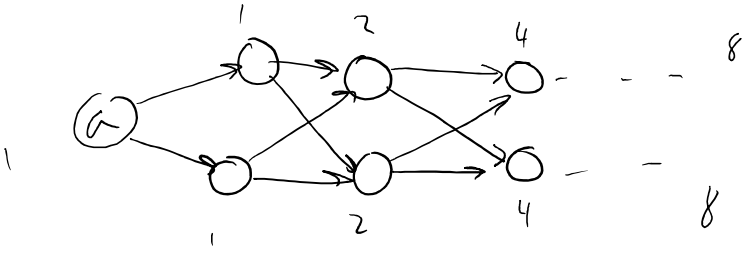
$X_0, X_1, X_2, \ldots, X_k, X_{k+1}$ s.t. $\sum_{i=0}^{k} x_{i,} x_{i+1}$ is minimal.

options for X_i are nodes which have an edge from starting node

Let $P(X)$ denote the problem of finding shortest distance from X to V, $f(X)$ distance from X to v.

$$f(X) = \min \{ d(x,y) + f(y) : (x,y) \in E \} \quad \text{if } X \neq V \text{ and } \text{out-deg}(X) \neq 0.$$

$$f(X) = \begin{cases} 0 & \text{if } X = v \\ \infty & \text{if } V \neq X \text{ and out-deg}(x) = 0. \end{cases}$$



how to eliminate redundancy

'Shortest' is called $O(|E|)$ times.