CSE 101-01 3-14-23

- SETS: due Sun. 3/19 11:59 pm

- finals

  101-01 : Wed. 3/22 9-11 am
  101-02 : Tue 3/21 4-6 pm

- Pa8 : ext. 3 days to Fri.

SSSP in weighted graph

chap. 24 in CLRS.

<u>Defn</u>

- Given a graph $G=(V,E)$, a weight function on G is a function

$$w: E \to \mathbb{R}$$

We call (V,E,w) a <u>weighted graph</u>.

Given a Path P

$P: x_0, x_1, x_2, \dots, x_k$

- The <u>Path weight</u> of P is

$$w(P) = \sum_{i=1}^{k} w(x_{i-1}, x_i)$$

- The <u>weight of a subgraph</u> H

$$w(H) = \sum_{e \in E(H)} w(e)$$

- <u>Shortest Path Weight</u>

$$\delta(x,y) = \begin{cases} \min\{w(P) \mid P \text{ is an } x\text{-}y \text{ Path}\} \\ \infty \text{ if } y \text{ not reachable from } x \end{cases}$$

- <u>Shortest Path</u>

an $x-y$ Path P Such that

$$w(P) = \delta(x,y).$$

- SSSP in a weighted graph

Given $(V, E, w) = G$ and $s \in V$ (source)

(1) determine $\delta(s, x)$ for all $x \in V$

(2) for those x with $\delta(s,x) < \infty$, determine a shortest s-x path.

two algorithms

- Dijkstra { non-negative edge weights only
- BellmanFord { allows negative edge weights.