

Lecture 23

CSE 331

Oct 25, 2017

Graded pitch

note ☆ stop following **36** views

Actions ▾

Mini project pitch grading done

Again, I apologize for the delay in getting the grading of the mini project report done. At the end of the post are the stats and grading rubric.

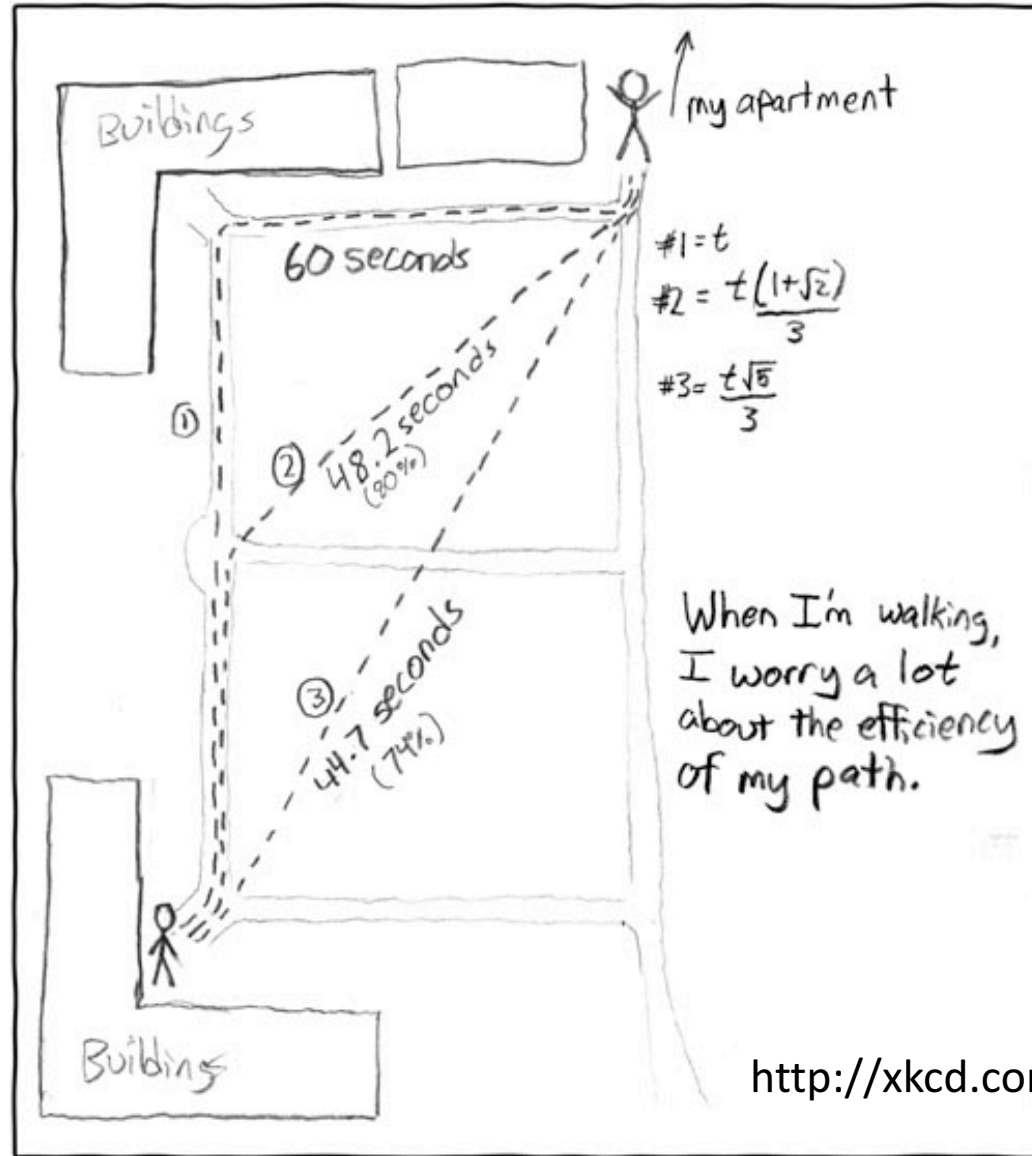
Some comments:

- The final list is here: <http://www-student.cse.buffalo.edu/~atri/cse331/fall17/mini-project/algos.html>
- Some of you had chosen a case study that was already taken: please read through the email that I sent you.
- A gentle reminder that the video is due by 11.59pm Mon, Nov 13
 - When you make your video, please make sure you go through all the requirements: <http://www-student.cse.buffalo.edu/~atri/cse331/fall17/mini-project/index.html>
 - Pay attention to my comments and make sure you incorporate them in your video. Here are the main reasons why groups lost point:
 - The individual impact did not focus on a specific individual but on a group
 - Claims were either speculative and/or not backed by references

Problem	Mean	Median	StdDev	Max
Case Study: Algorithm Idea	13.3	15.0	2.9	15.0

PAY ATTENTION TO THE COMMENTS

Shortest Path Problem



Another more important application

Is BGP a known acronym for you?



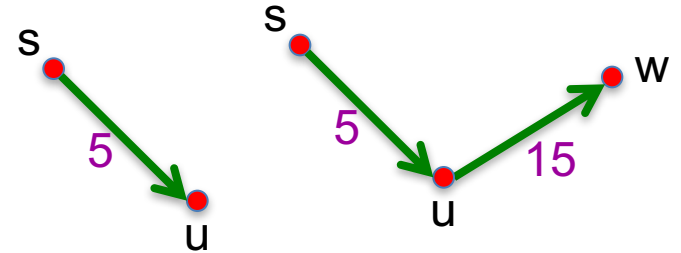
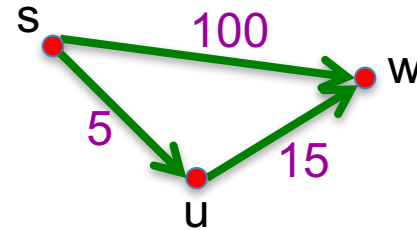
Routing uses shortest path algorithm

Shortest Path problem

Input: *Directed graph* $G=(V,E)$

Edge lengths, l_e for e in E

“start” vertex s in V

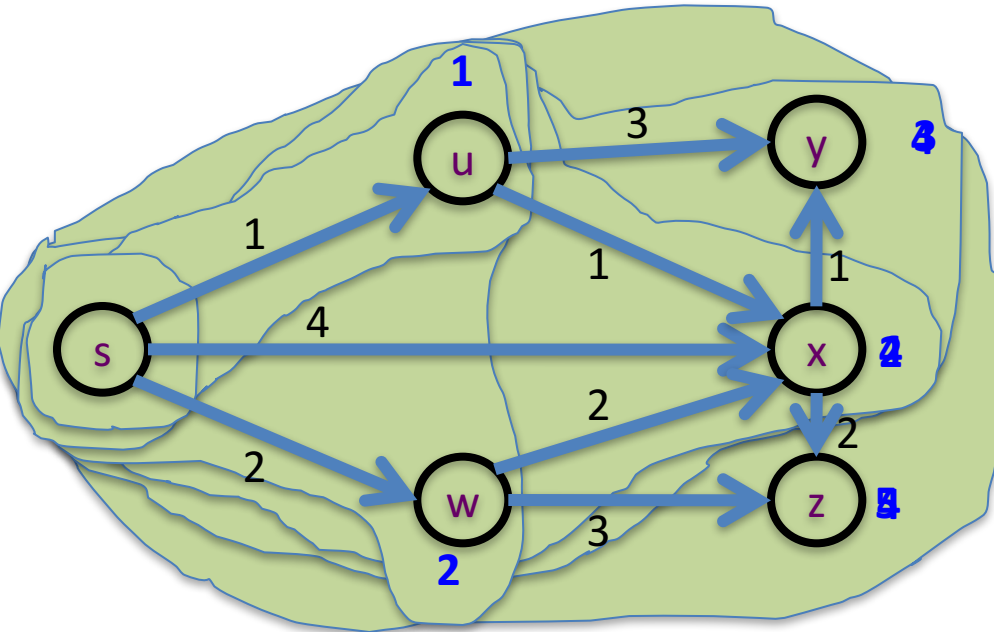


Output: All shortest paths from s to all nodes in V

Dijkstra's shortest path algorithm



Dijkstra's shortest path algorithm



$$d'(w) = \min_{e=(u,w) \in E, u \in R} d(u) + l_e$$

$d(s) = 0$ $d(u) = 1$
 $d(w) = 2$ $d(x) = 2$
 $d(y) = 3$ $d(z) = 4$

Input: Directed $G=(V,E)$, $l_e \geq 0$, $s \in V$

$R = \{s\}$, $d(s) = 0$

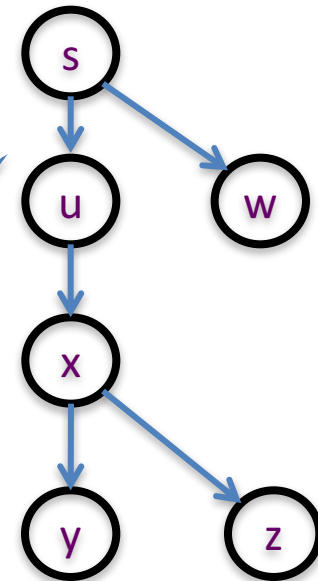
While there is a x not in R with $(u,x) \in E$, $u \in R$

Pick w that minimizes $d'(w)$

Add w to R

$d(w) = d'(w)$

Shortest paths



Couple of remarks

The Dijkstra's algo does not explicitly compute the shortest paths

Can maintain “shortest path tree” separately

Dijkstra's algorithm does not work with **negative** weights

Left as an exercise

Rest of Today's agenda

Prove the correctness of Dijkstra's Algorithm

Runtime analysis of Dijkstra's Algorithm

Reading Assignment

Sec 4.4 of [KT]

