

Lecture 13

CSE 331

Sep 27, 2017

Mini Project Pitch due in a week

note ☆ stop following **157** views

Actions ▾

You can submit mini project reports now

You can now submit your mini project reports now. It is due in a bit over 2 weeks: by 11:59pm on Wed, Oct 4.

The [mini-project page](#) has all the details on what is needed in the report.

Some important points:

- If you do not register your group by 11:59pm on Monday, you will get an automatic 0 on the entire mini-project.
- The case-studies will be assigned in the order in which I grade your reports.
 - If while grading it turns out another group has already taken your case study I will ask you to choose another case study.
 - If you want to "book" your topic sooner, I would recommend that you submit your report as soon as it is ready and send me email saying it is ready to be graded.
 - By default I will start grading on Oct 5.
- The [group formation](#) page has the details on how to do this post.

Main thing: do **NOT** submit your report till your group is formed.

===== Instructions on forming the group =====

- Under "Options" click on "Group Options"
- Name your group if you want (not required)
- Enter the name of the 2nd person in your group and then click on "Create Group". (Unless things have changed, Autolab does not accept more than one email.)
- Once the group is done, add the 3rd person to the group.

Today's agenda

Computing Connected component (with DFS)

DFS(**u**)

Mark **u** as explored and add **u** to **R**

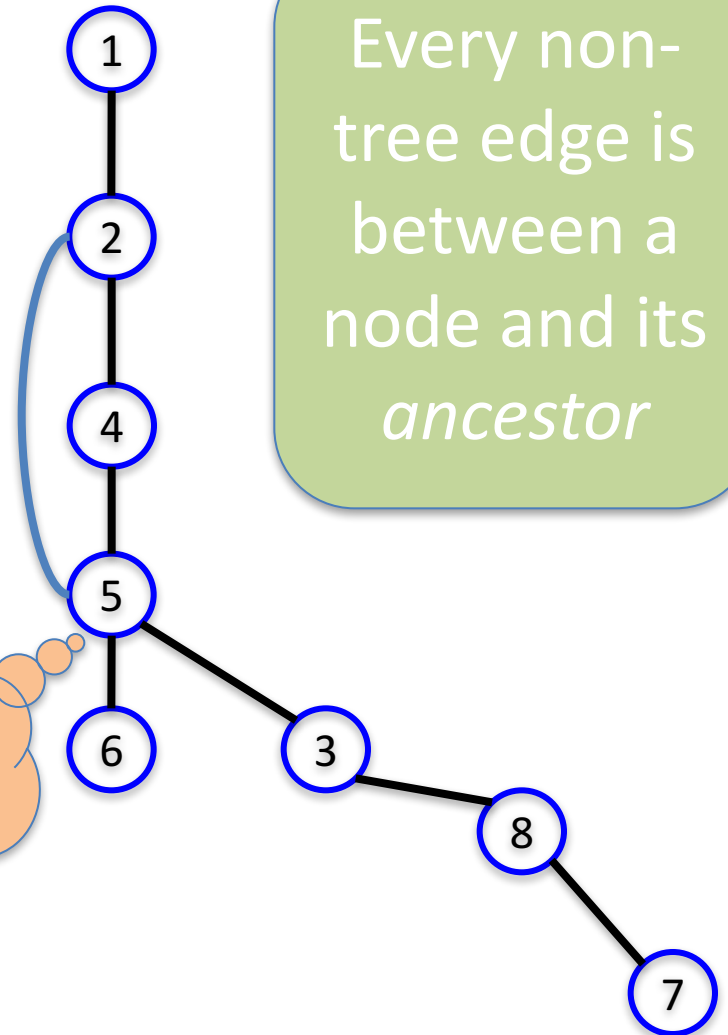
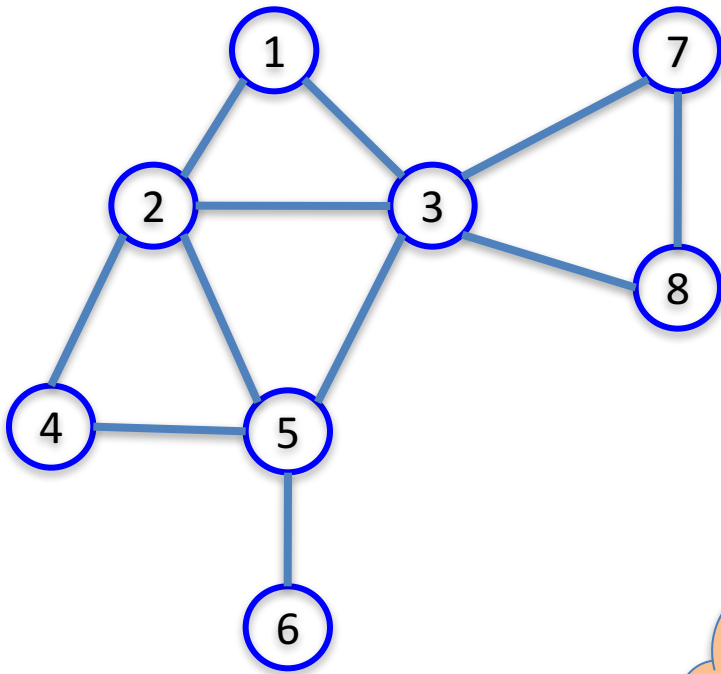
For each edge (**u**,**v**)

 If **v** is not explored then DFS(**v**)

Why is DFS a special case of Explore?



A DFS run



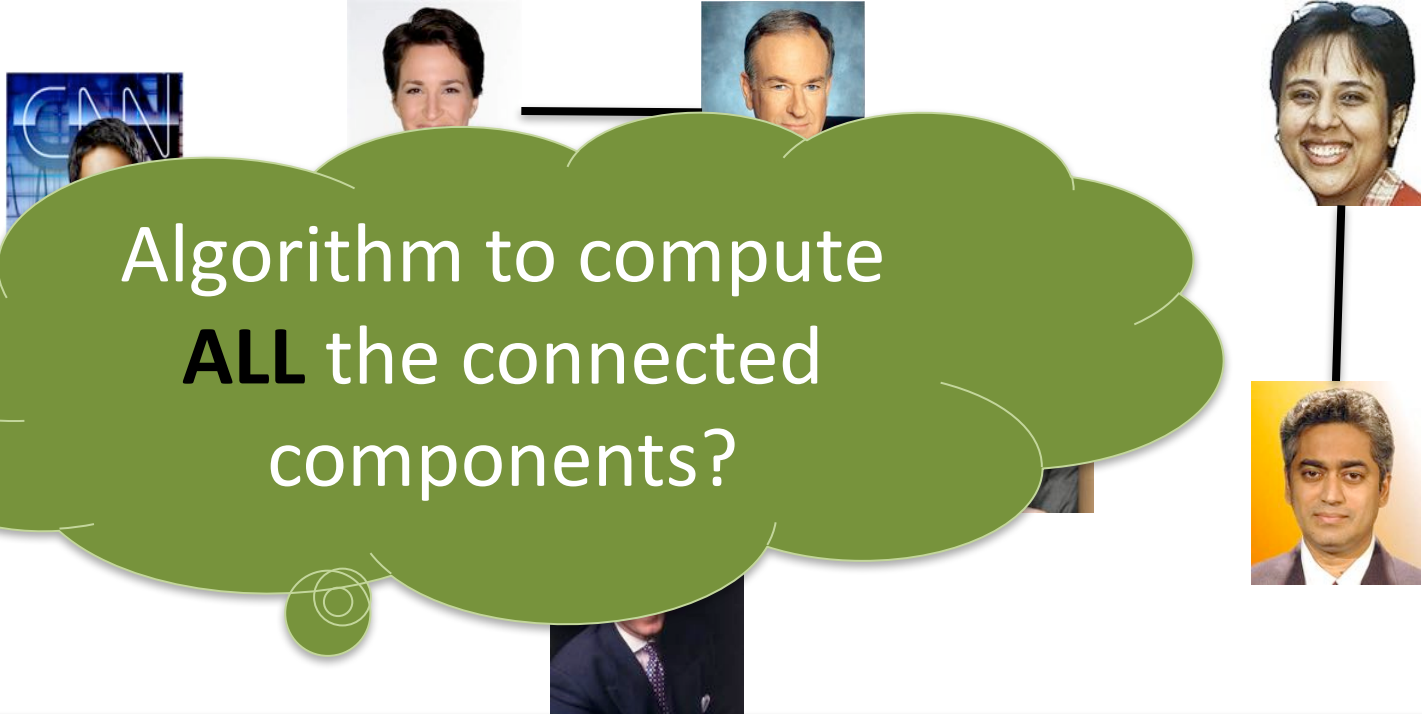
Every non-tree edge is between a node and its *ancestor*

Questions?



Connected components are disjoint

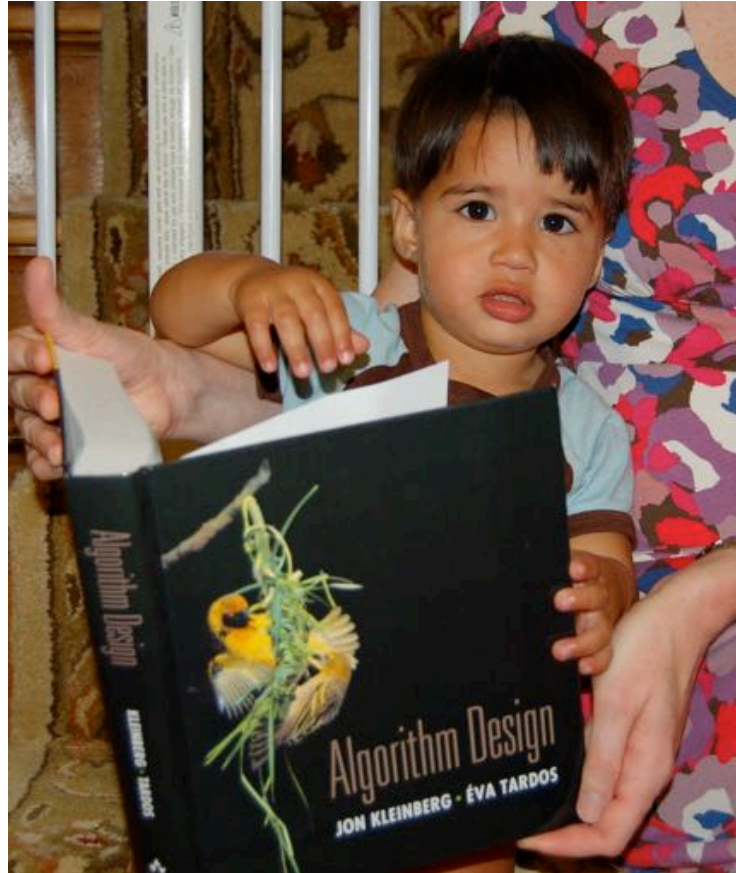
Either Connected components of s and t are the same or are disjoint



Algorithm to compute
ALL the connected
components?

Run BFS on some node s . Then run BFS on t that is not connected to s

Reading Assignment



Sec 3.2 in [KT]

Rest of today's agenda

Run-time analysis of BFS (DFS)



Stacks and Queues



Last in First out

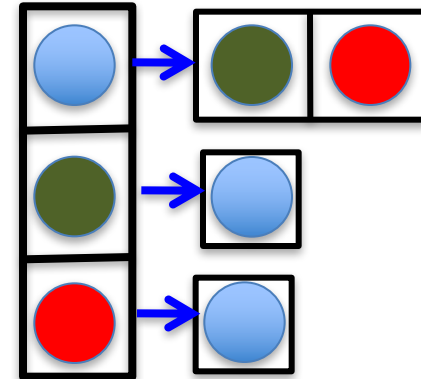
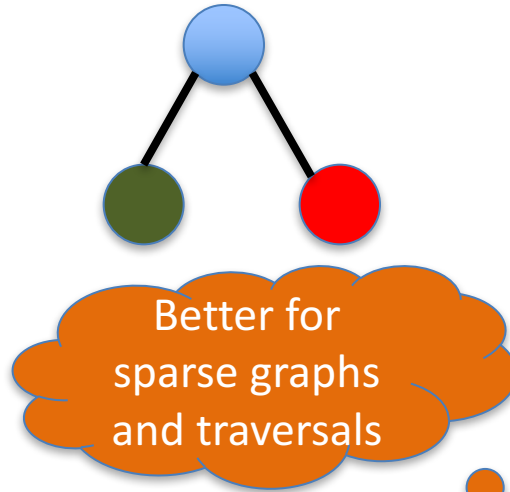
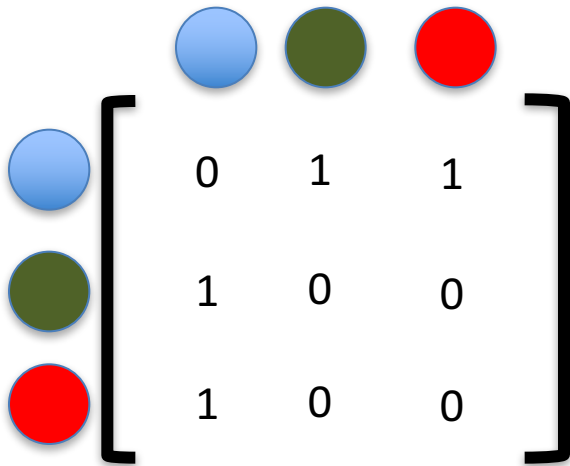


First in First out

But first...

How do we represent graphs?

Graph representations



Adjacency matrix		Adjacency List
$O(1)$	$(u,v) \in E?$	$O(n) [O(n_v)]$
$O(n)$	All neighbors of u ?	$O(n_u)$
$O(n^2)$	Space?	$O(m+n)$

Questions?

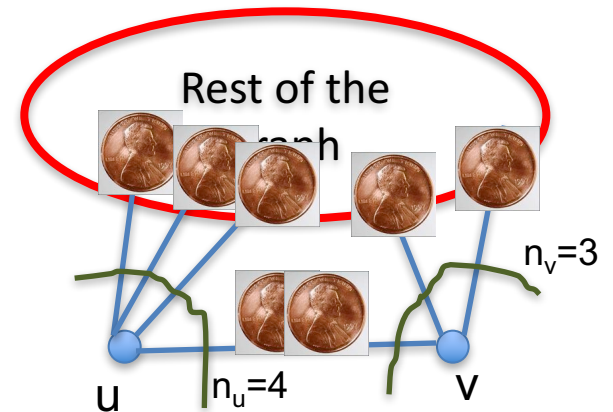


2 · # edges = sum of # neighbors

$$2m = \sum_{u \text{ in } V} n_u$$

Give 2 pennies to each edge

Total # of pennies = $2m$



Each edges gives one penny to its end points

of pennies u receives = n_u

Breadth First Search (BFS)

Build layers of vertices connected to s

$$L_0 = \{s\}$$

Assume L_0, \dots, L_j have been constructed

L_{j+1} set of vertices not chosen yet but are connected to L_j

Stop when new layer is empty

Use linked lists

Use $CC[v]$ array

An illustration

