Lecture 13

CSE 331

Project groups due FRIDAY!

Deadline: Friday, March 3, 11:59pm

CSE 331 Syllabus Piazza Schedule Homeworks Autolab Project Support Pages

Project Overview

Group signup form

Spring 2023

Details and motivations for the project.

Motivation

CSE 331 is primarily concerned with the technical aspects of algorithms: how to design them and then how to analyze their correctness and runtime. However, algorithms are pervasive in our world and are common place in many aspects of society. The main aim of the project is to have you explore in some depth some of the social implications of algorithms.

Just to give some examples for such implications:

- Big data is hot these days and there is a (not uncommon) belief that by running (mainly machine learning) algorithms on big data, we can detect patterns and use those to potentially make policy decisions. Here is a cautionary talk:

Exams in Two Weeks!

March 10: Quiz 1

March 13: Midterm 1

March 15: Midterm 2

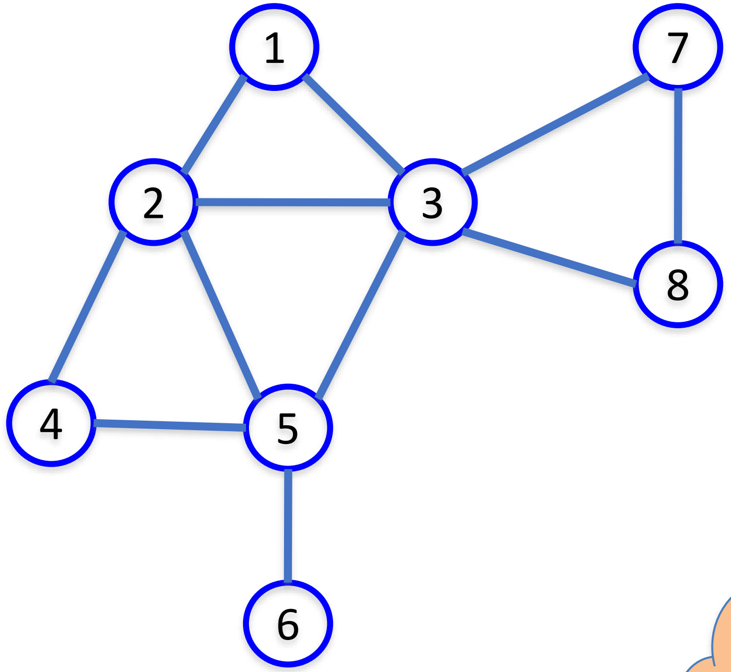
DFS(u)

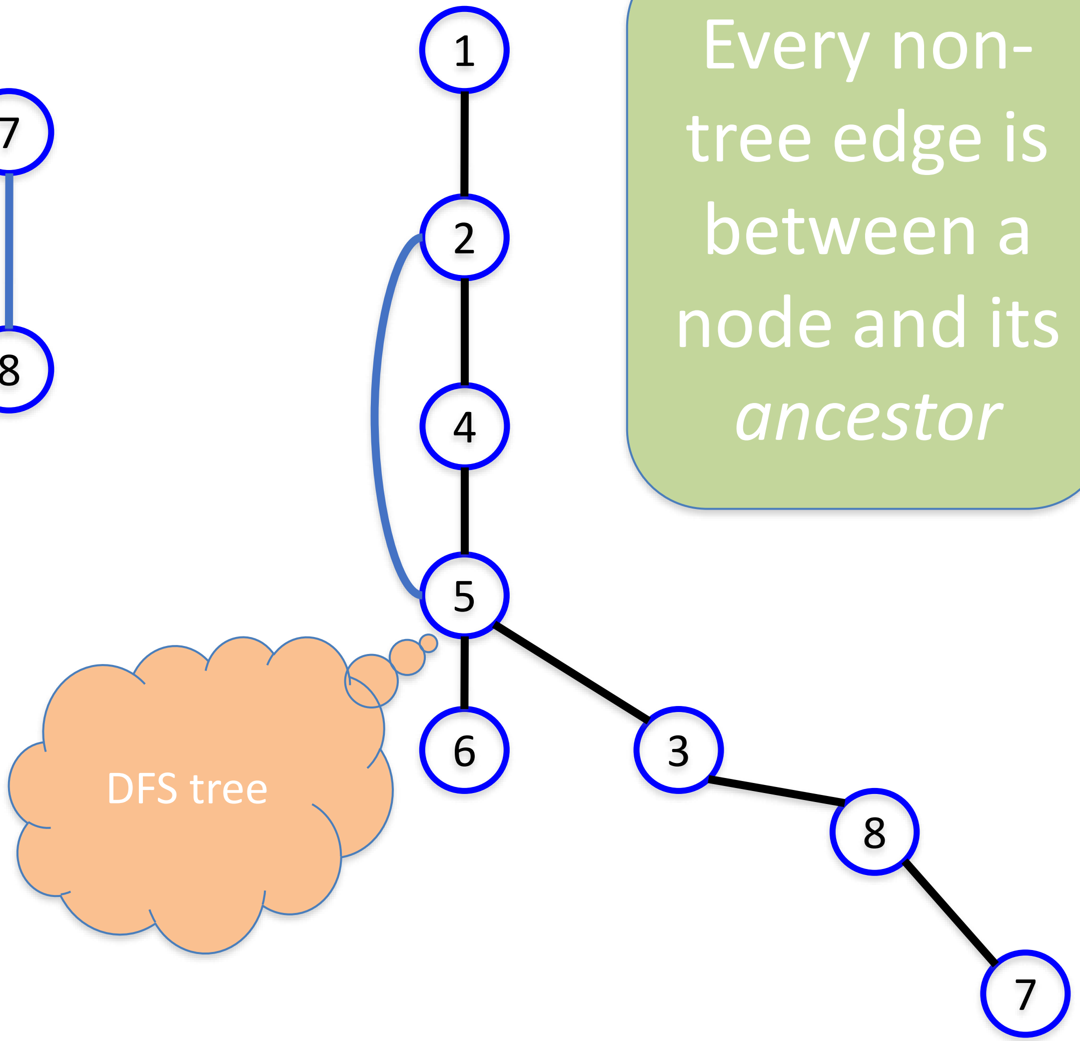
Mark u as explored and add u to R

For each edge (u,v)

If v is not explored then DFS(v)

A DFS run



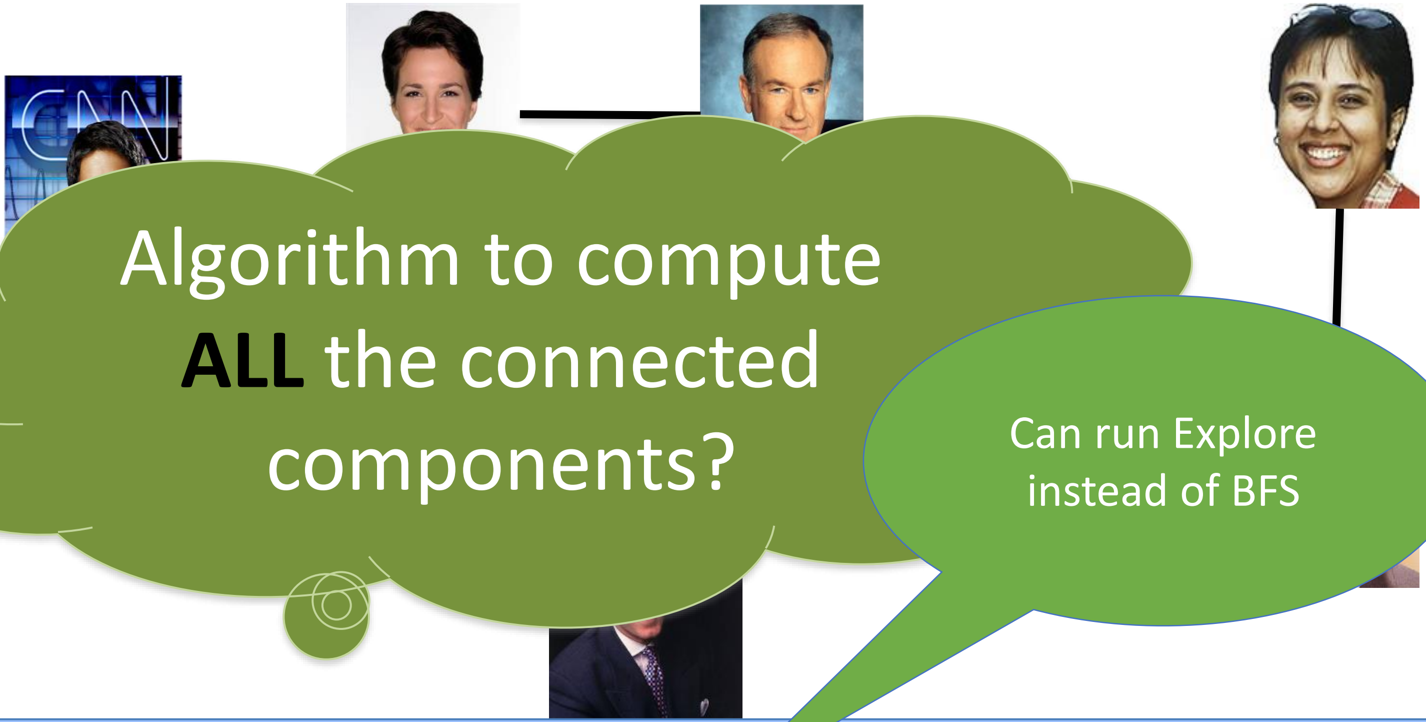


Every non-tree edge is between a node and its *ancestor*

DFS a special case of Explore

Connected components are disjoint

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

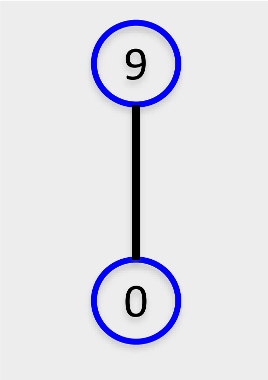


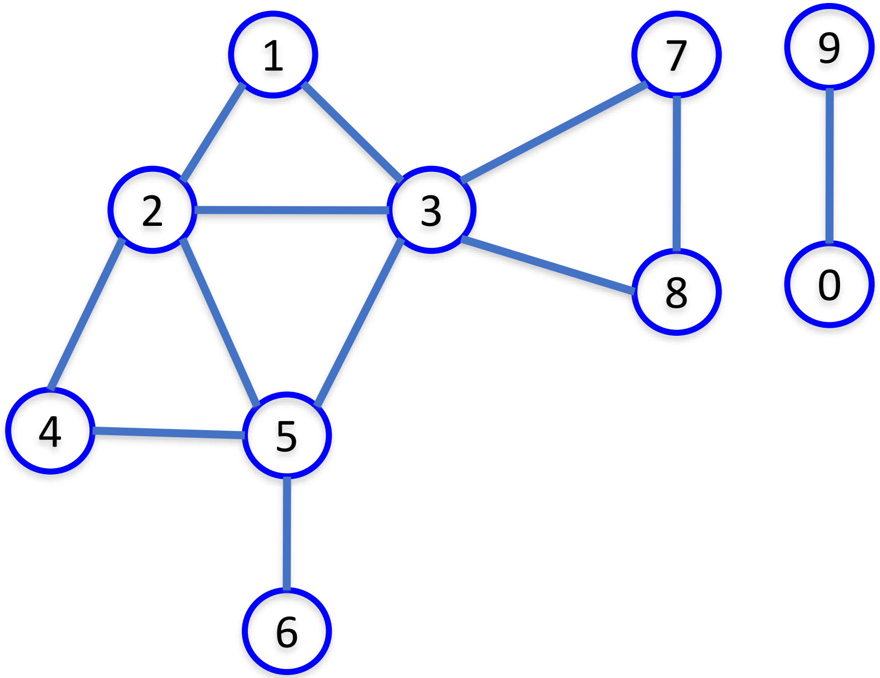
Algorithm to compute **ALL** the connected components?

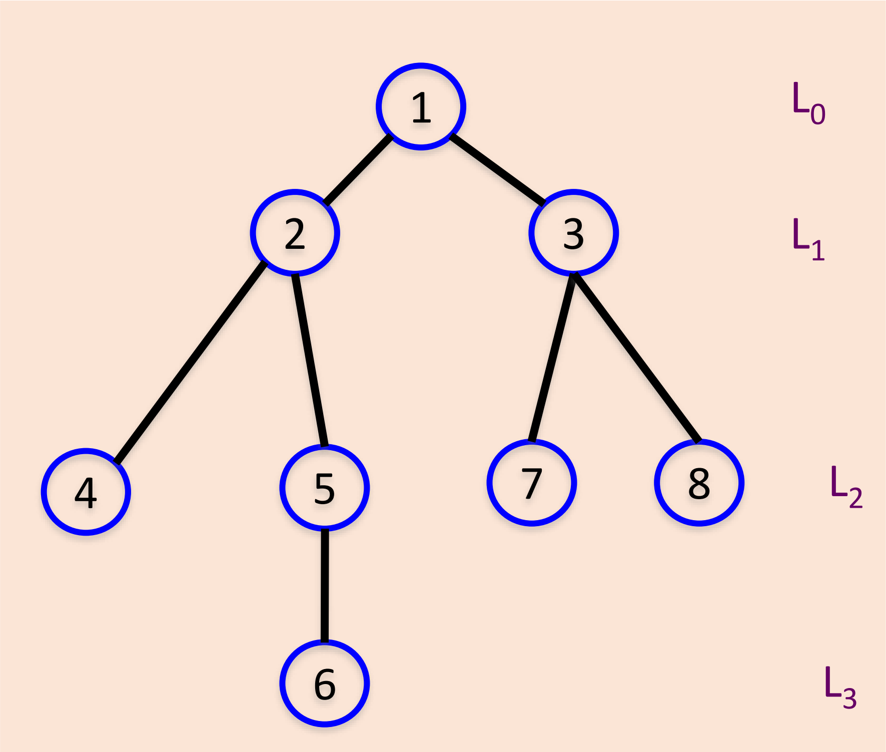
Can run Explore instead of BFS

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

Computing all CCs







Today’s agenda

Run-time analysis of BFS (DFS)

Stacks and Queues

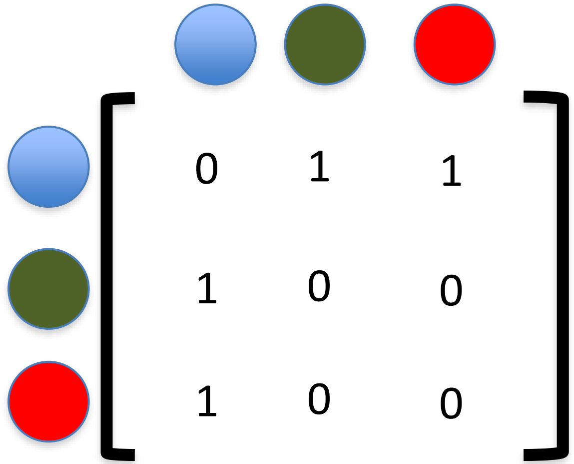
Last in First out

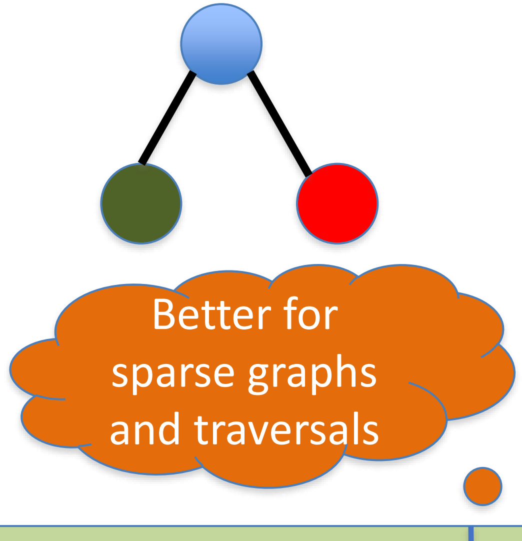
First in First out

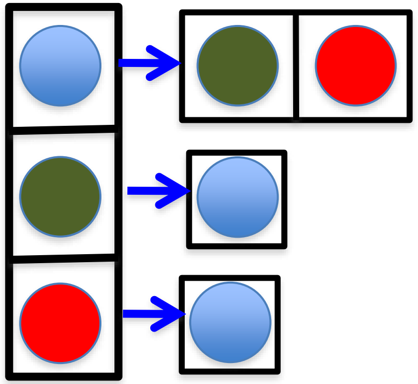
But first…

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)