

Lecture 10

CSE 331

Sep 21, 2022

Project groups due in <2 weeks

Deadline: Friday, Sep 30, 11:59pm

Forming groups

You form groups of size **exactly three (3)** for the project. Below are the various logs

Project Overview

Group signup form

• You have two choices in forming your group:

1. You can form your group on your own: i.e. you can submit the list of **EXACTLY** three (3) groups members in your group.

</> Note

Note that if you pick this option, your group needs to have **exactly THREE (3)** members. In particular, if your group has only two members you cannot submit as a group of size two. If you do not know many people in class, feel free to use piazza to look for the third group member.

Also, if you form a group of size three, please make **only one submission per group**.

2. You can submit *just your name*, and you will be assigned a random group among *all* students who take this second option. However, **note that if you pick this option you could end up in a group of size 2**. There will be at most two groups of size 2.

</> Potential risk

Note that if you pick the option of being assigned a random group, you take on the risk that a assigned group might not "pull their weight." We unfortunately cannot help with such aspects of group dynamics. (Of course if a group member is being abusive, please do let Atri know.) Please note that a group member who does not do much work will get penalized on the [individual component](#) of the project grade.

• Submitting your group composition

Use [this Google form](#) to submit your group composition (the form will allow you to pick one of the two options above).

• You need to fill in the form for group composition by **11:59pm on Friday, September 30**.

• </> Deadline is strict!

If you do not fill in the form for group composition by the deadline, then you get a zero for the entire project.

If you need it, ask for help



Homework 2 out!

Homework 2

Due by **11:30pm, Tuesday, September 27, 2022.**

Make sure you follow all the [homework policies](#).

All submissions should be done via [Autolab](#).

Sample Problem

The Problem

This problem is just to get you thinking about asymptotic analysis and input sizes.

An integer $n \geq 2$ is a prime, if the only divisors it has is 1 and n . Consider the following algorithm to check if the given number n is prime or not:

For every integer $2 \leq i \leq \sqrt{n}$, check if i divides n . If so declare n to be not a prime. If no such i exists, declare n to be a prime.

What is the function $f(n)$ such that the algorithm above has running time $\Theta(f(n))$? Is this a polynomial running time -- justify your answer. (A tangential question: Why is the algorithm correct?)

[Click here for the Solution](#)

HW 1 solutions

note #129   

stop following **2 views** Actions

Solutions to HW 1 (+HW2 out)

Here is a link to solutions for HW 1: <https://buffalo.box.com/s/lnvc07ue42f8ggdu947c7wt03fukf>

Please note that downloading is disabled and please do not share the link with anyone else.

Also this will be a good time to do a post-mortem on HW 1: @93

On a related note, HW2 is up: <http://www-student.cse.buffalo.edu/~atri/cse331/fall22/hrs/hw2/index.html>

[homework1](#) [homework2](#)

Edit good note 

Updated 2 minutes ago by Atri Rudra

Implementation Steps

(0) How to represent the input?

(1) How do we find a free woman w ?

(2) How would w pick her best unproposed man m ?

(3) How do we know who m is engaged to?

(4) How do we decide if m prefers w' to w ?

Overall running time

Init(1-4)



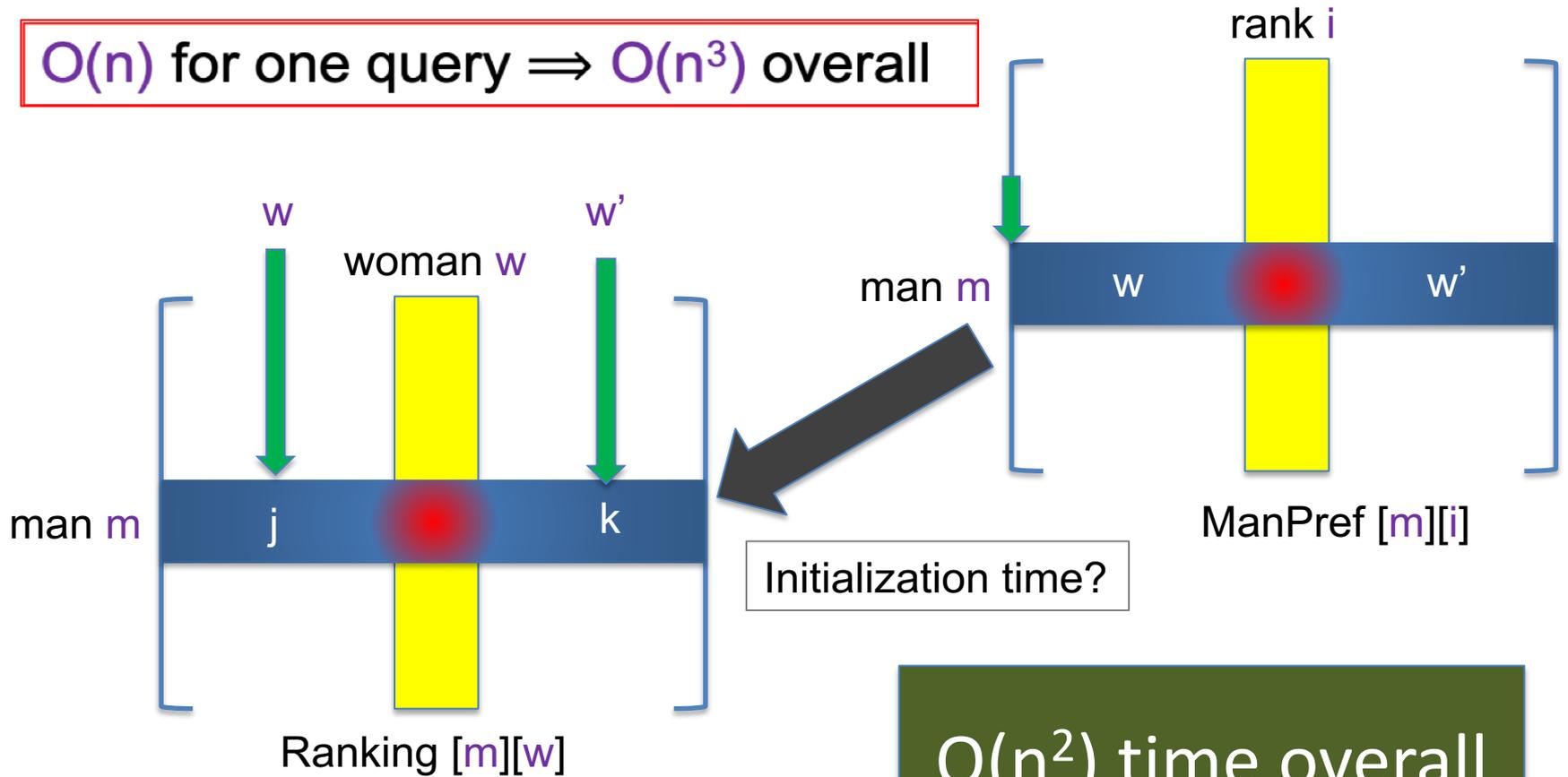
n^2 X (Query/Update(1-4))

Questions?



Answering Q4

$O(n)$ for one query $\Rightarrow O(n^3)$ overall



$O(1)$ query time

$O(n^2)$ time overall

(4) How do we decide if **m** prefers **w'** to **w**?

Puzzle

Prove that **any** algorithm for the SMP takes $\Omega(n^2)$ time

Main Steps in Algorithm Design

Problem Statement



Problem Definition



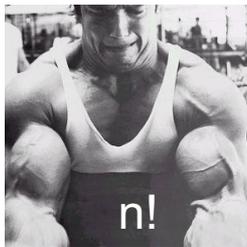
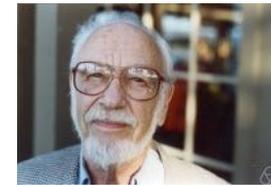
Algorithm



“Implementation”

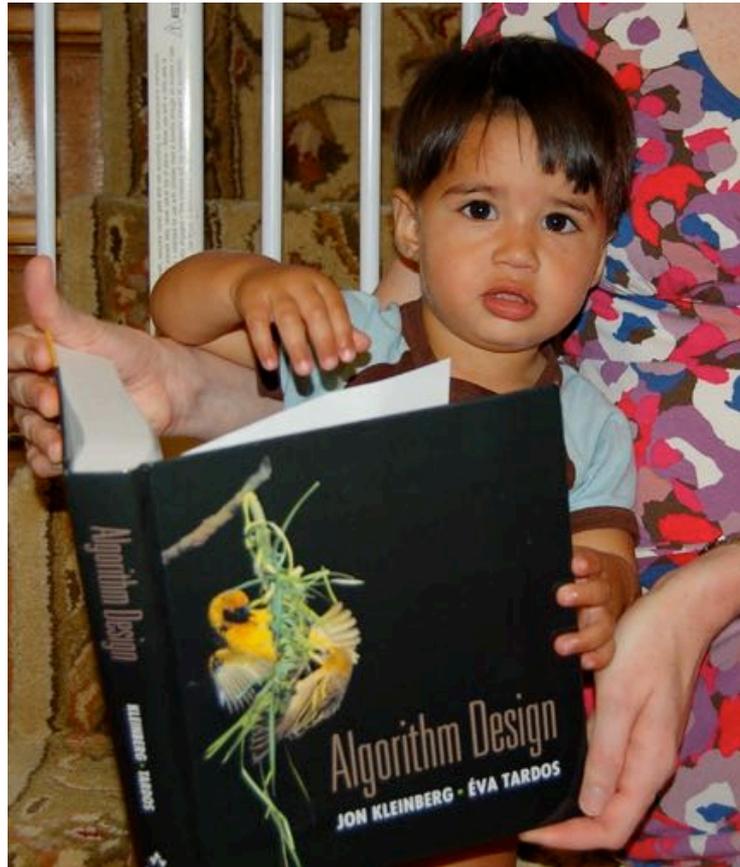


Analysis



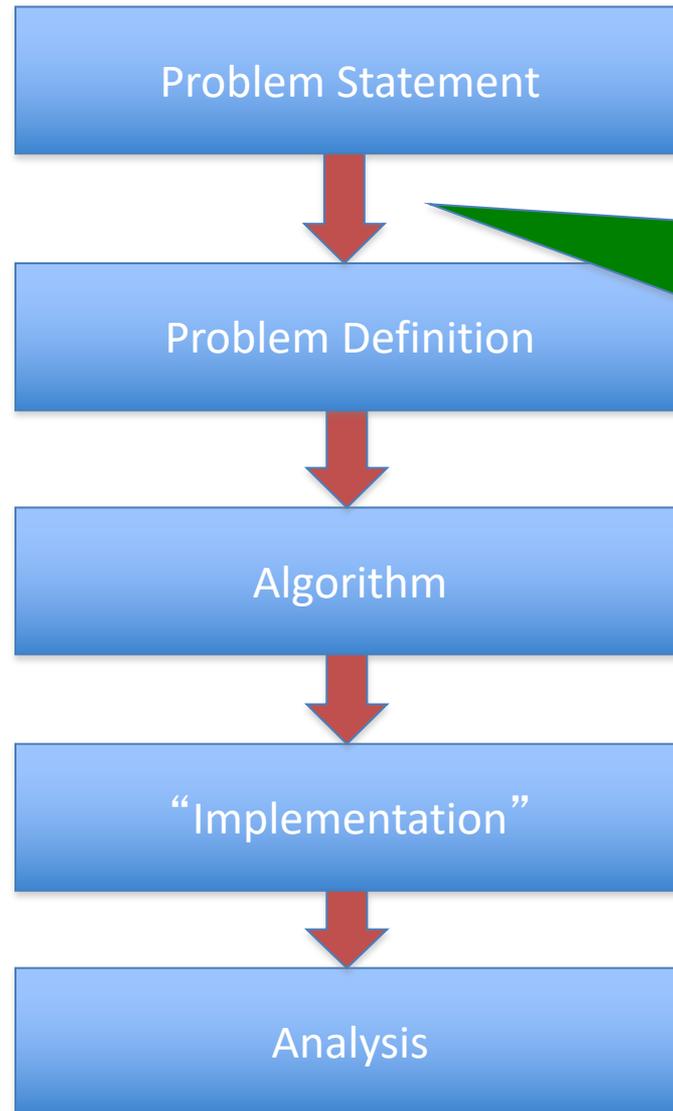
Correctness Analysis

Reading Assignments



Sec 1.1 and Chap. 2 in [KT]

Up Next....

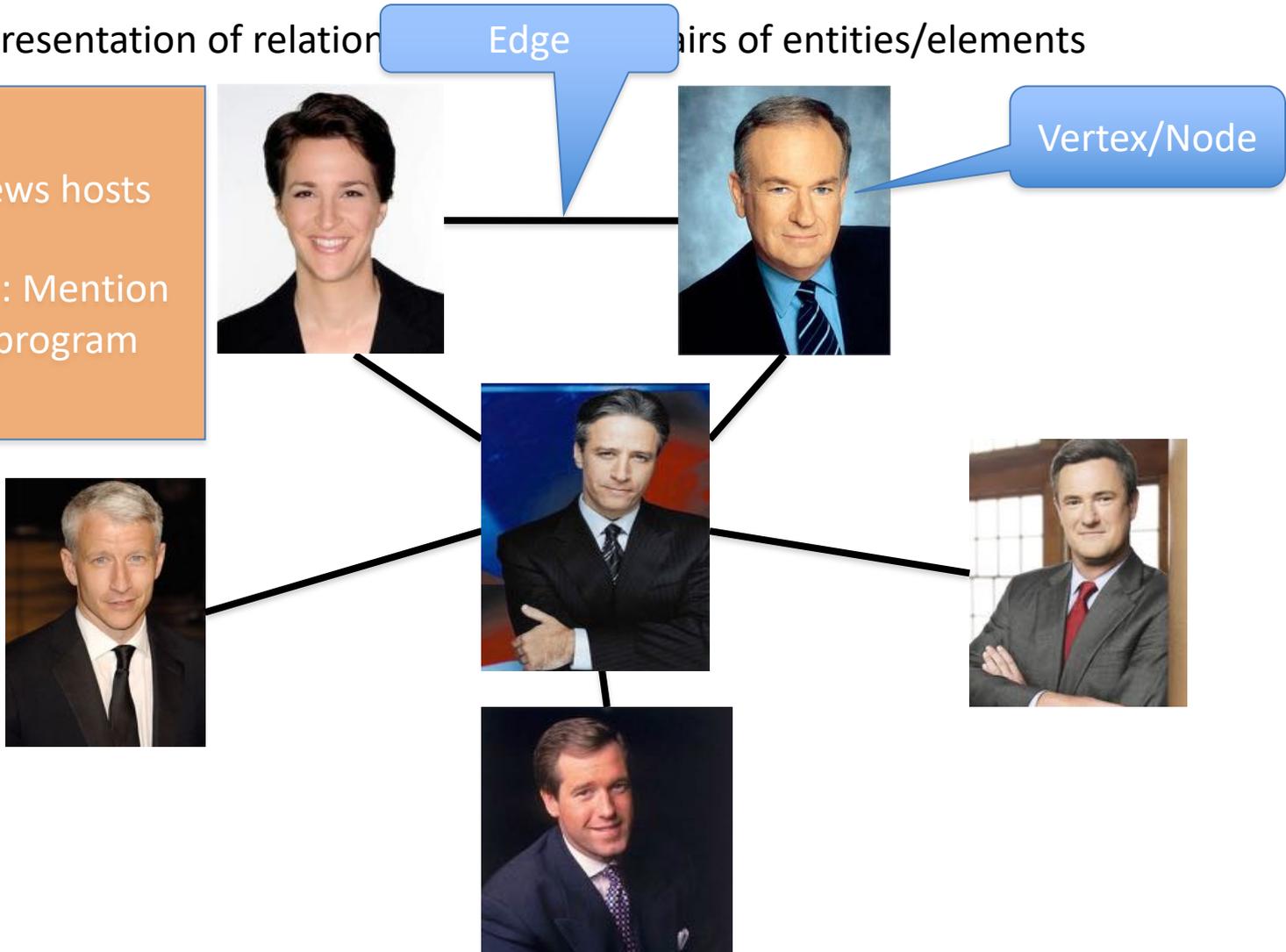


A generic tool
to abstract
out problems

Graphs

Representation of relationships between pairs of entities/elements

Entities: News hosts
Relationship: Mention in other's program



Graphs are omnipresent

Airline Route maps

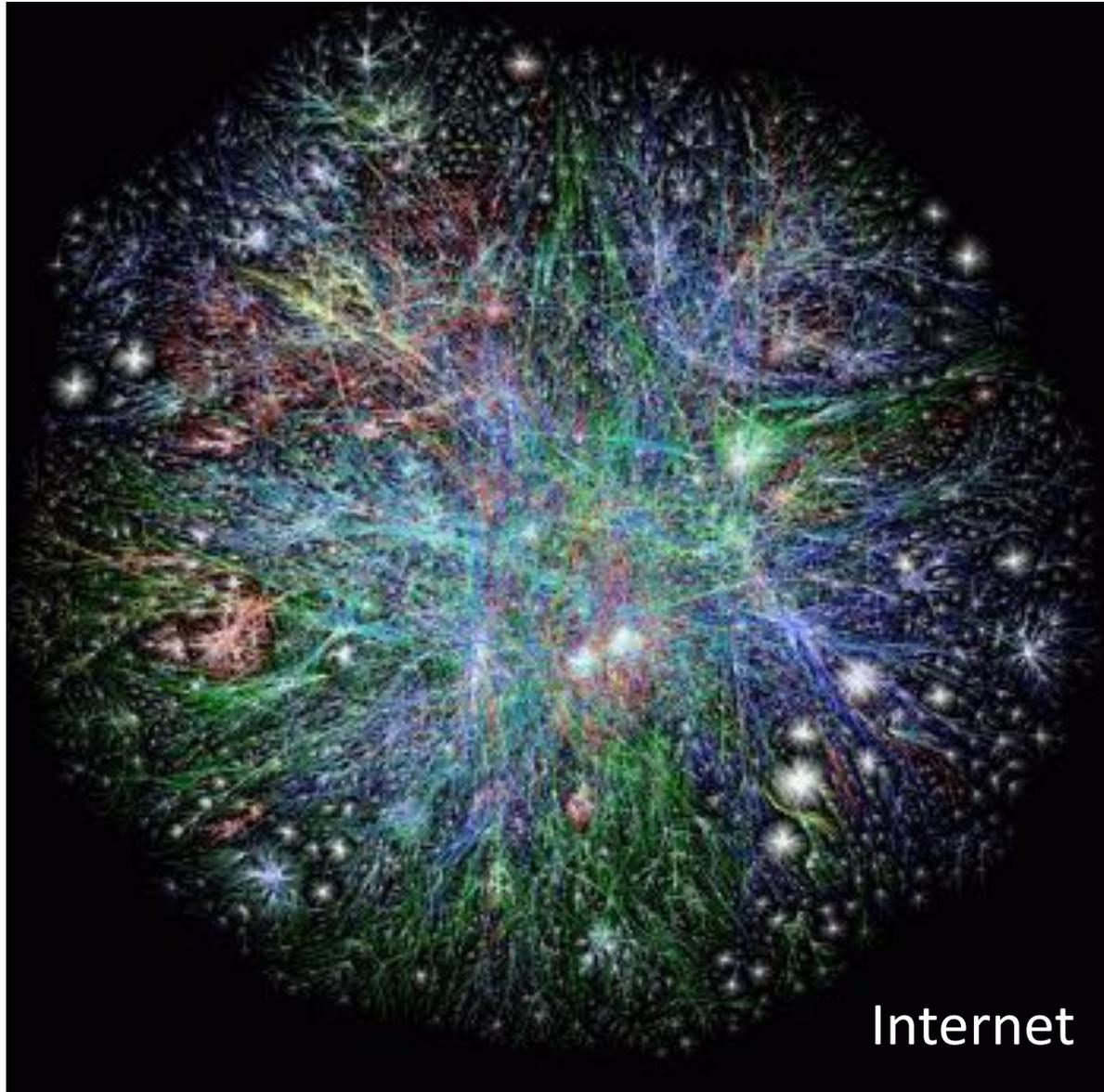


Español • Help • Speak up

Book travel • Manage your flights • Travel deals • Where we jet • TrueBlue® program

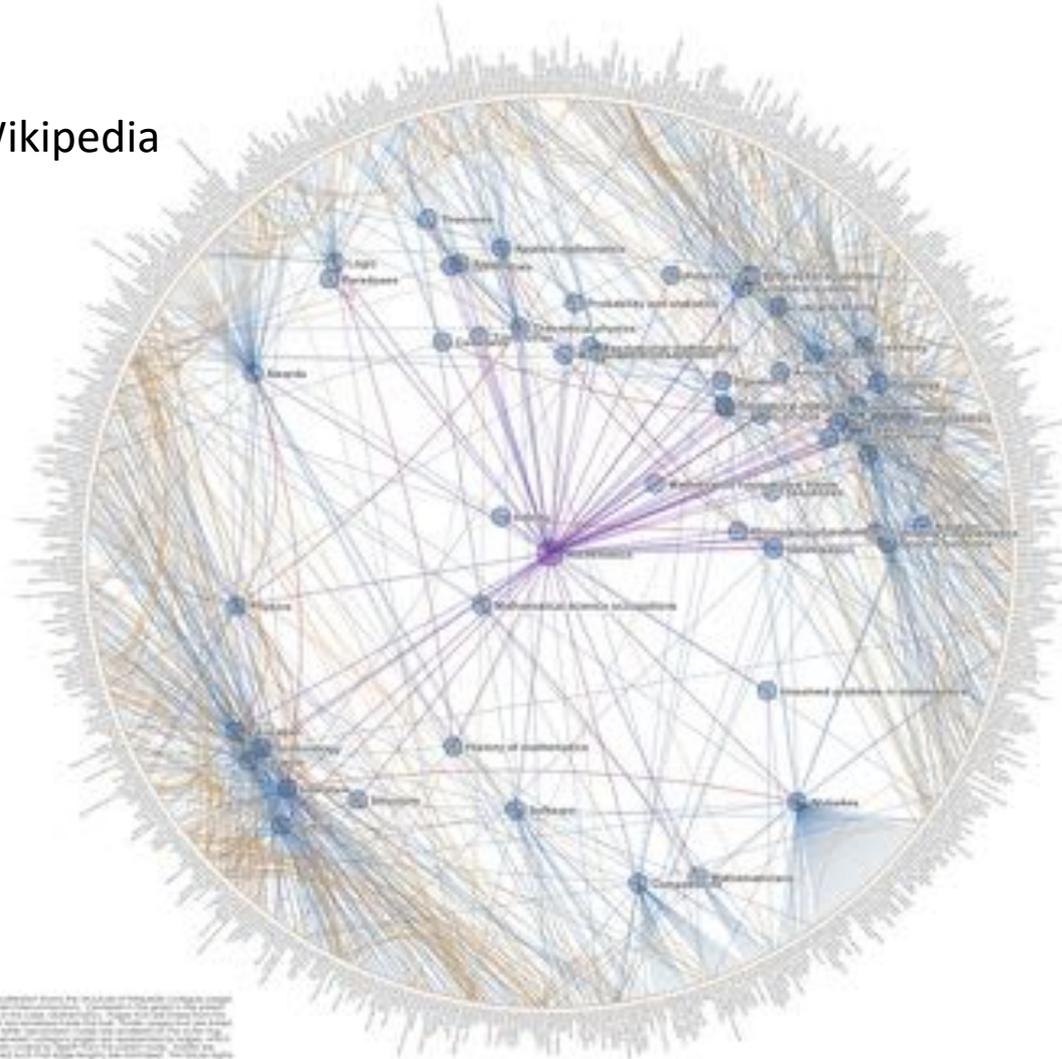


What does this graph represent?



And this one?

Math articles on Wikipedia



This visualization was created by the author using a network graph visualization tool. The data was collected from the Wikipedia database. The visualization is a network graph where nodes represent math articles and edges represent relationships between them. The nodes are labeled with the names of the math articles. The edges are colored by the type of relationship between the articles. The visualization is a circular network graph with a decorative border. The nodes are labeled with mathematical terms such as 'Theorems', 'Algebra', 'Calculus', 'Geometry', 'Probability and statistics', 'Combinatorics', 'Number theory', 'Topology', 'Set theory', 'Logic', 'Mathematical analysis', 'Mathematical logic', 'Mathematical physics', 'Mathematical biology', 'Mathematical chemistry', 'Mathematical economics', 'Mathematical finance', 'Mathematical engineering', 'Mathematical medicine', 'Mathematical psychology', 'Mathematical sociology', 'Mathematical anthropology', 'Mathematical linguistics', 'Mathematical history', 'Mathematical philosophy', 'Mathematical art', 'Mathematical music', 'Mathematical literature', 'Mathematical culture', 'Mathematical education', 'Mathematical research', 'Mathematical discovery', 'Mathematical invention', 'Mathematical creation', 'Mathematical innovation', 'Mathematical progress', 'Mathematical development', 'Mathematical growth', 'Mathematical expansion', 'Mathematical contraction', 'Mathematical regression', 'Mathematical correlation', 'Mathematical causation', 'Mathematical correlation', 'Mathematical causation', 'Mathematical correlation', 'Mathematical causation'.

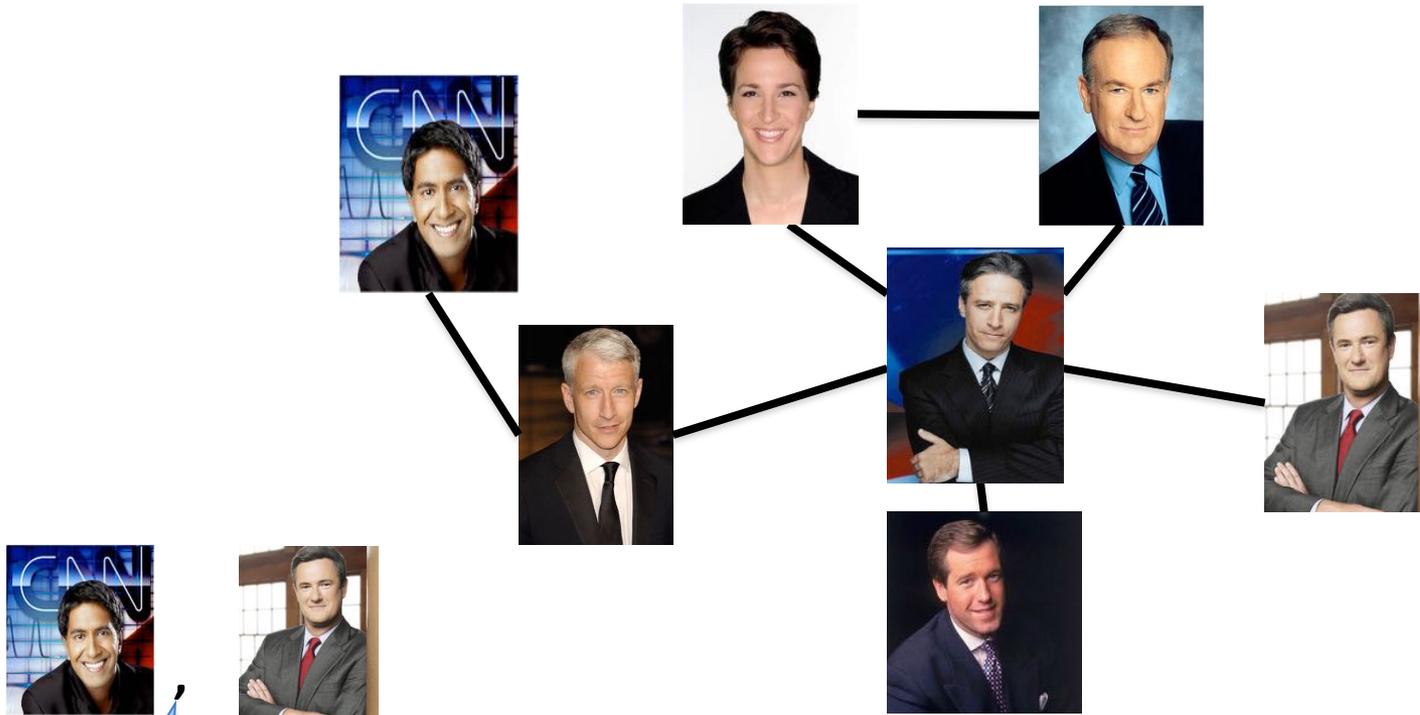
And this one?



Rest of today's agenda

Basic Graph definitions

Paths



Sequence of vertices connected by edges

Connected



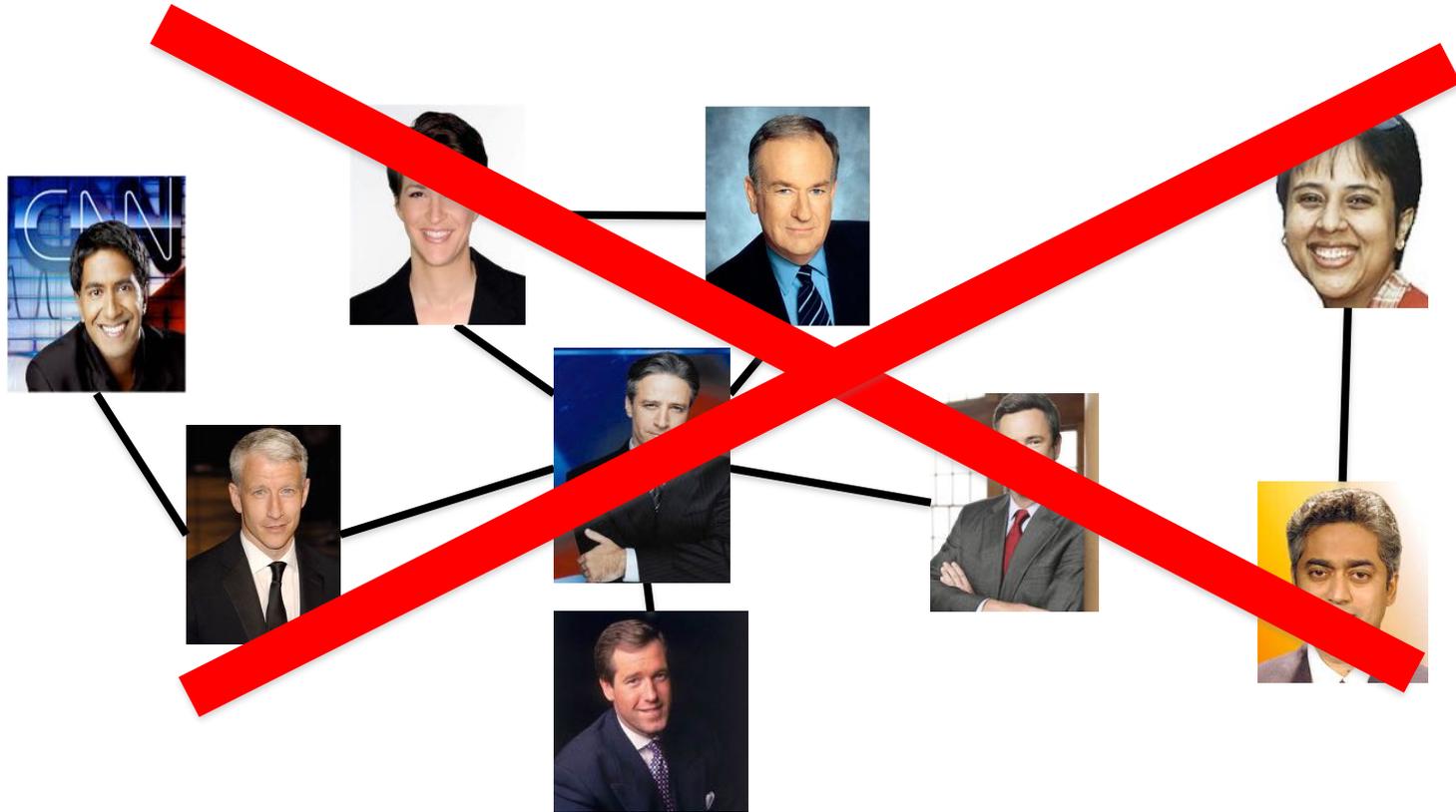
Path length 3

Connectivity

u and w are connected iff there is a path between them

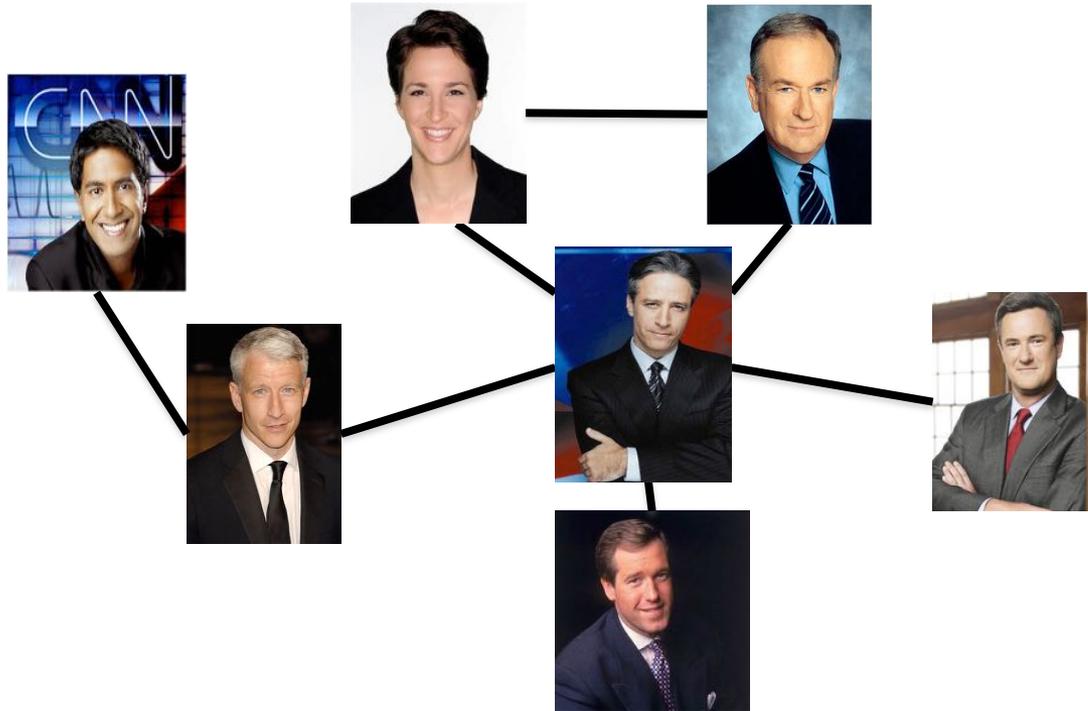
A graph is connected iff all pairs of vertices are connected

Connected Graphs



Every pair of vertices has a path between them

Cycles

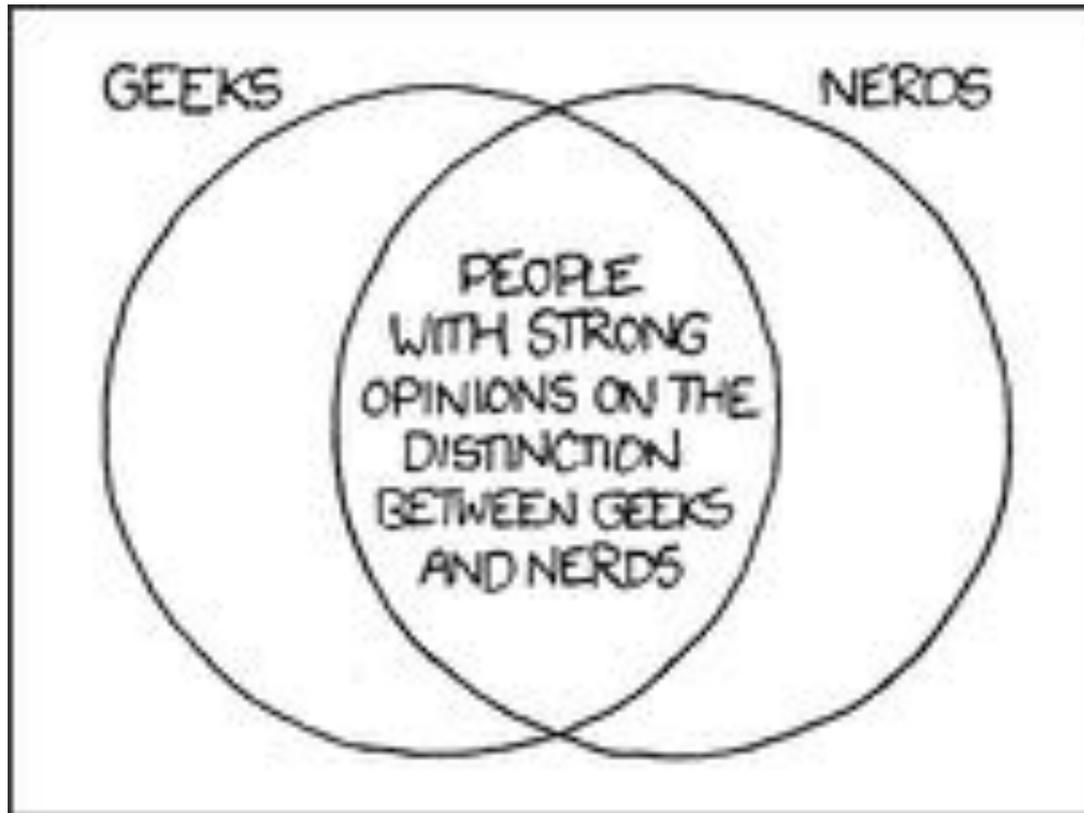


Sequence of k vertices connected by edges, first $k-1$ are distinct





Formally define everything



http://imgs.xkcd.com/comics/geeks_and_nerds.png