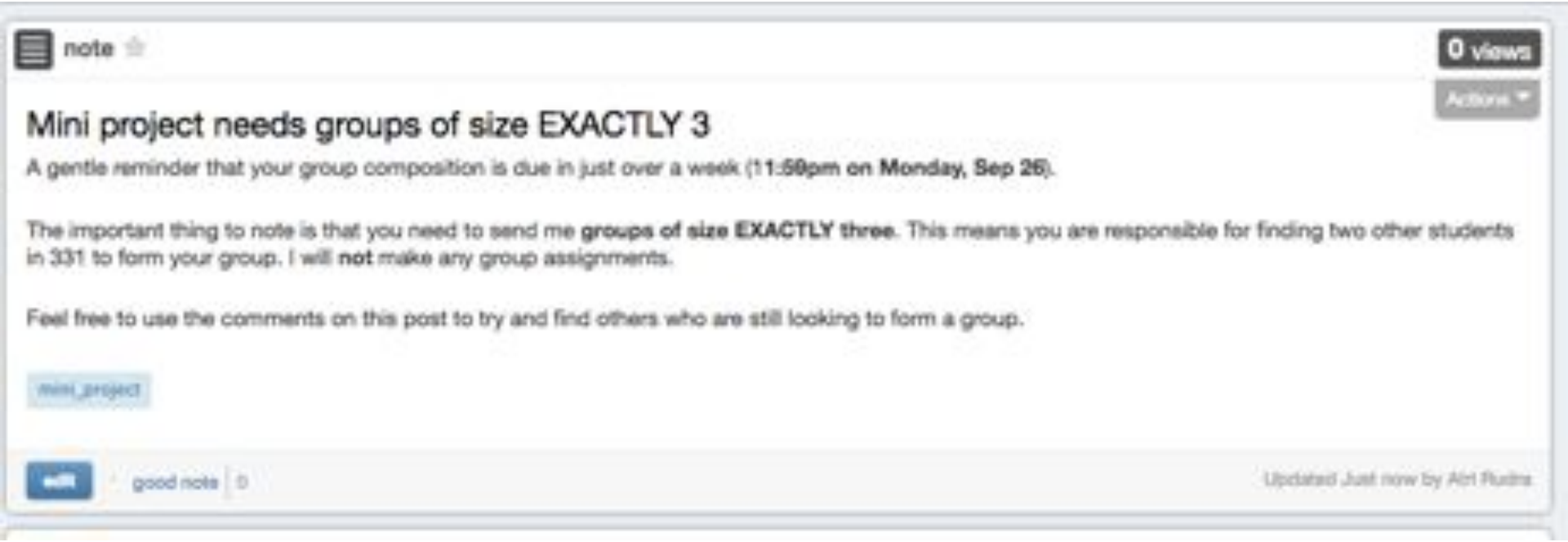
Lecture 9

CSE 331

Sep 19, 2016

Mini Project choice due Sep 26


note

0 views

Actions

Mini project needs groups of size EXACTLY 3

A gentle reminder that your group composition is due in just over a week (**11:59pm on Monday, Sep 26**).

The important thing to note is that you need to send me **groups of size EXACTLY three**. This means you are responsible for finding two other students in 331 to form your group. I will **not** make any group assignments.

Feel free to use the comments on this post to try and find others who are still looking to form a group.

mini_project

good note | 0

Updated Just now by Ari Rudra

Gale-Shapley Algorithm

Intially all men and women are free

While there exists a free woman who can propose

At most n^2 iterations

Let w be such a woman and m be the best man she has not proposed to

w proposes to m

If m is free

(m,w) get engaged

Else (m,w') are engaged

If m prefers w' to w

w remains free

Else

(m,w) get engaged and w' is free

O(1) time implementation

Output the engaged pairs as the final output

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)

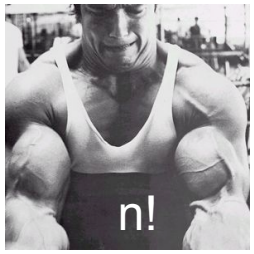
n^2 X (Query/Update(1-4))

Questions?

Puzzle

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

Main Steps in Algorithm Design



Problem Statement

Problem Definition

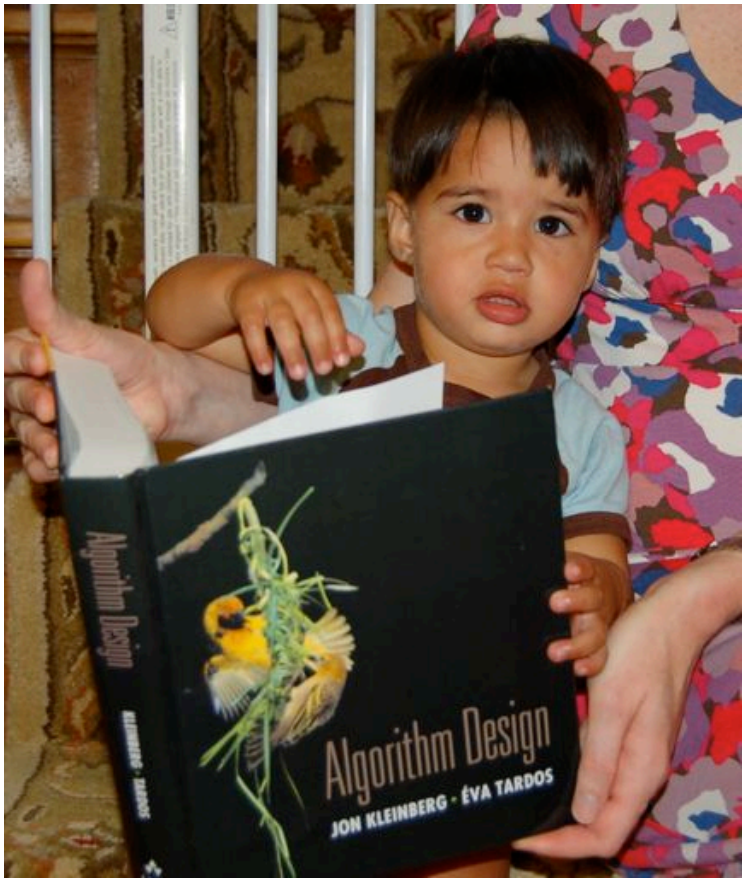
Algorithm

"Implementation"

Analysis

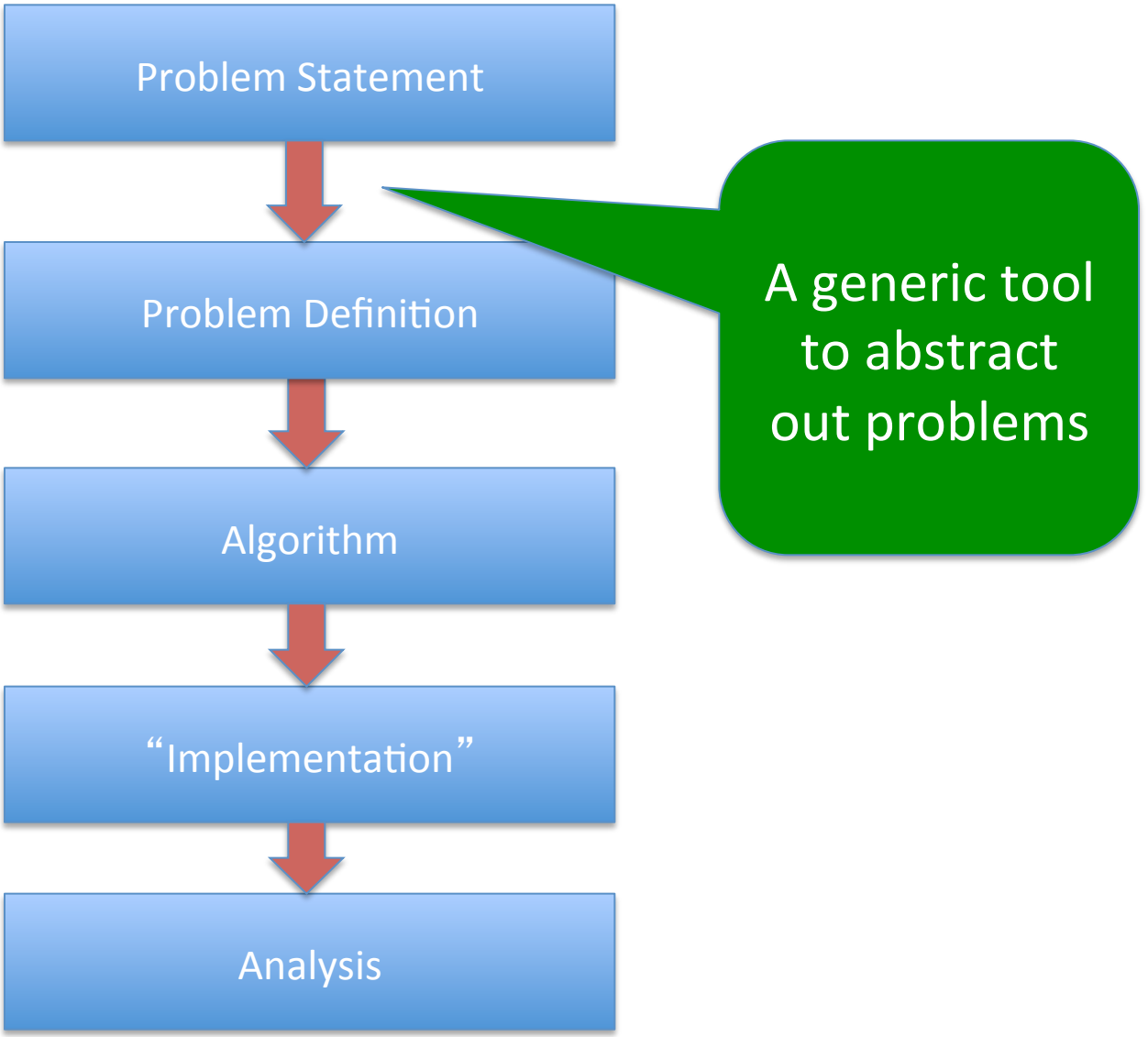
Correctness Analysis

Reading Assignments



Sec 1.1 and Chap. 2 in [KT]

Up Next....

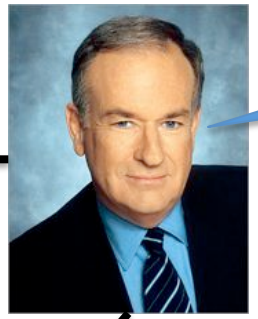

Problem Statement
Problem Definition
Algorithm
"Implementation"
Analysis
A generic tool to abstract out problems

Graphs

Representation of relation[illegible] Edge [illegible]airs of entities/elements

Entities: News hosts

Relationship: Mention in other's program

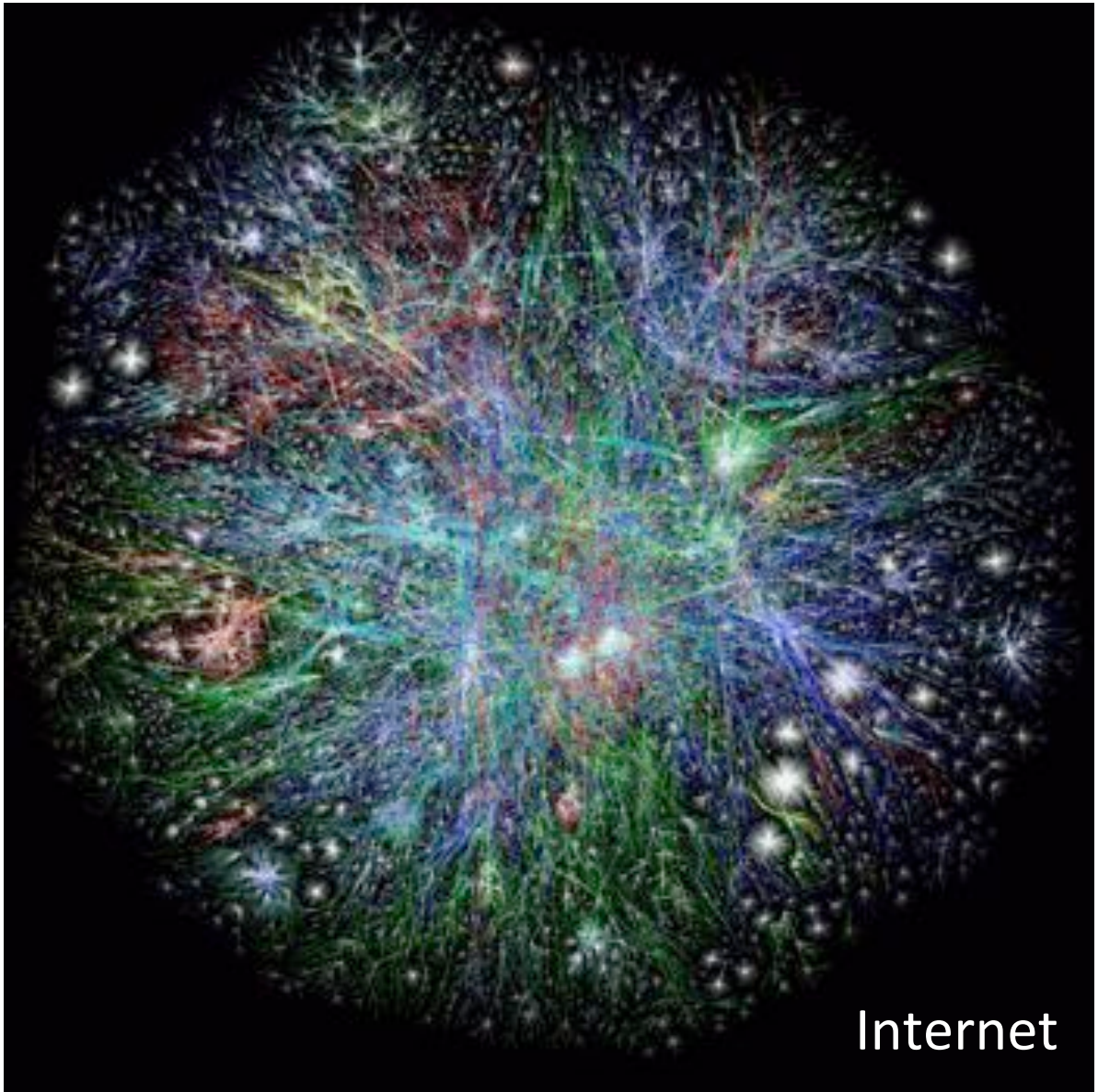


Vertex/Node

Graphs are omnipresent

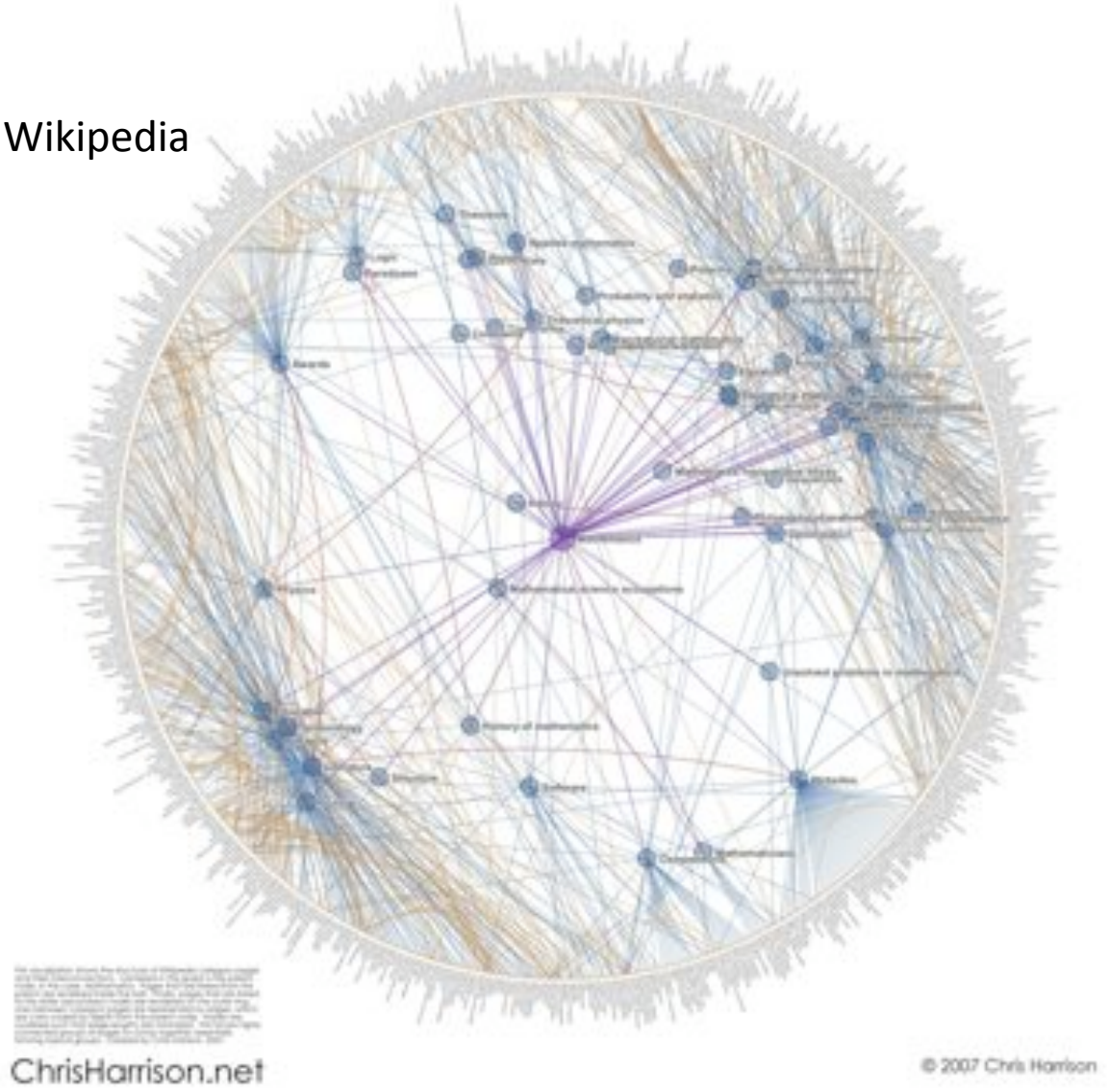
Airline Route maps

What does this graph represent?

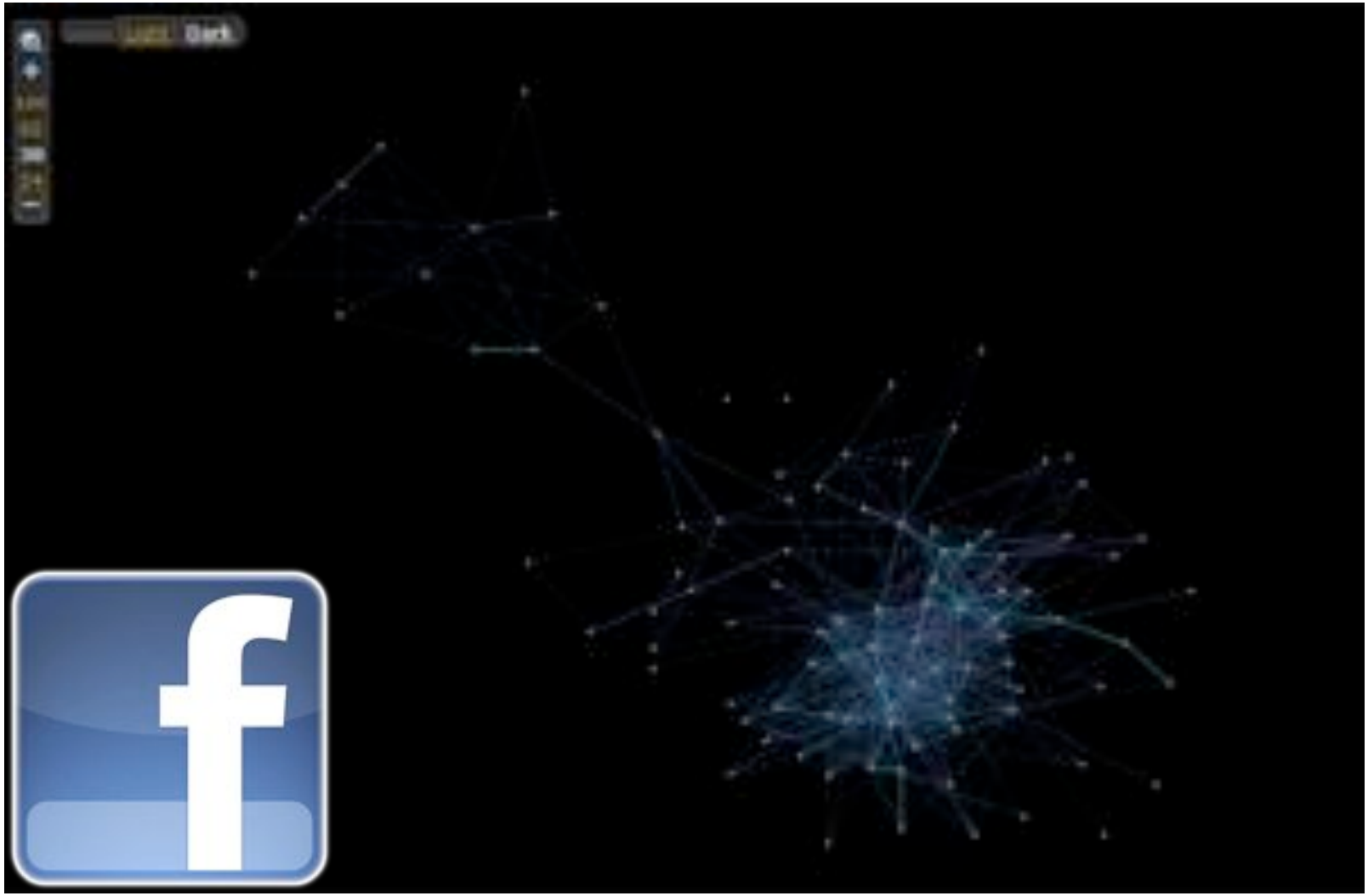


And this one?

Math articles on Wikipedia



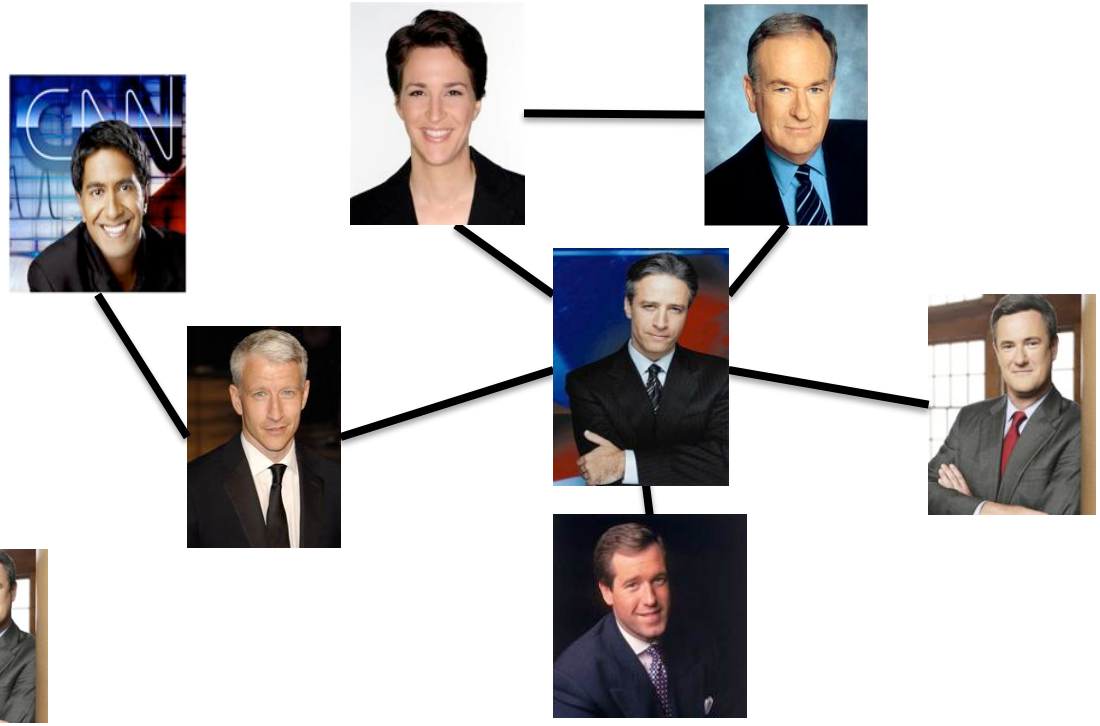
And this one?



Rest of today's agenda

Basic Graph definitions

Paths



Connected

Sequence of vertices connected by edges

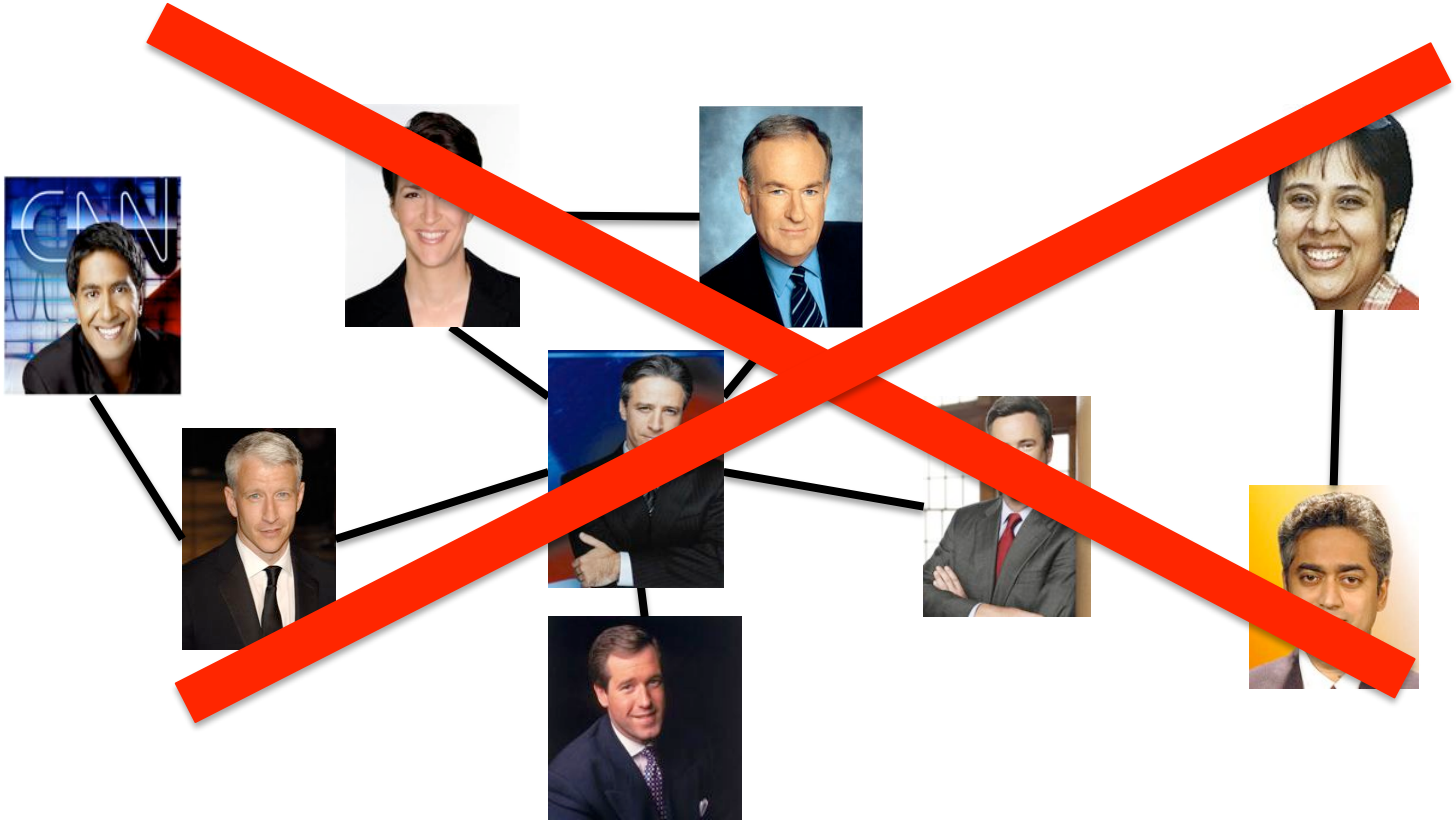
Path length 3

Connectivity

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

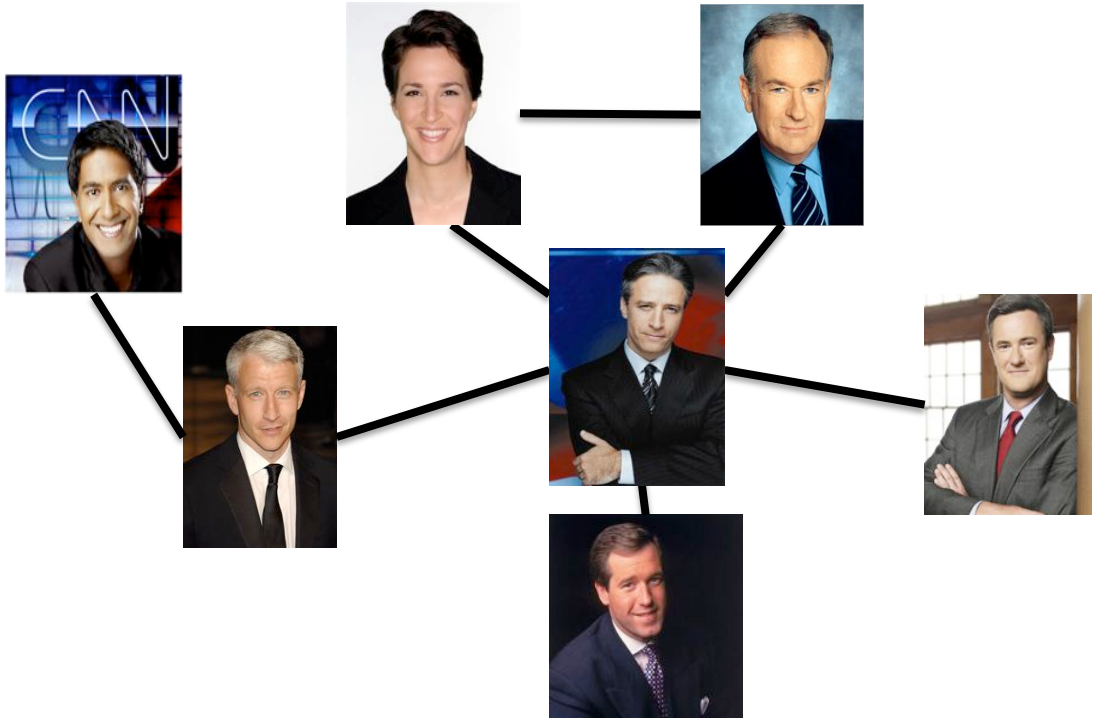
A graph is connected iff all pairs of vertices are connected

Connected Graphs

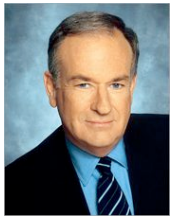


Every pair of vertices has a path between them

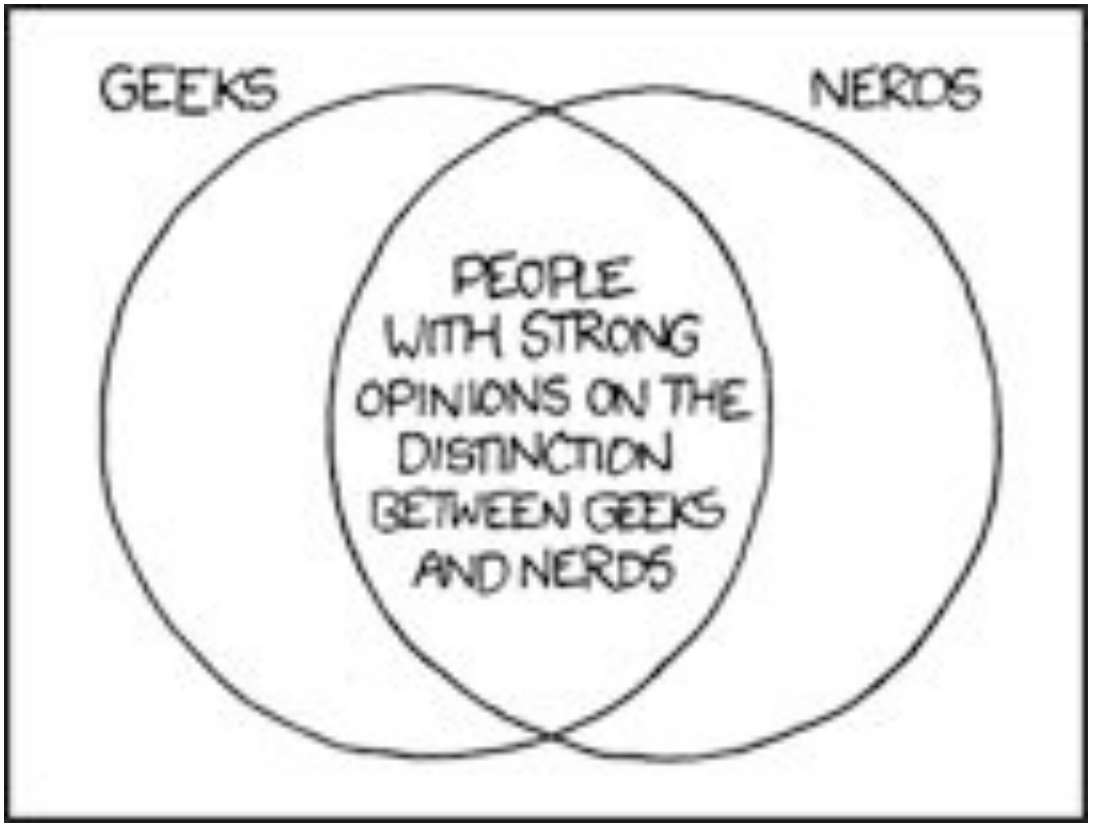
Cycles



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

,  , ,

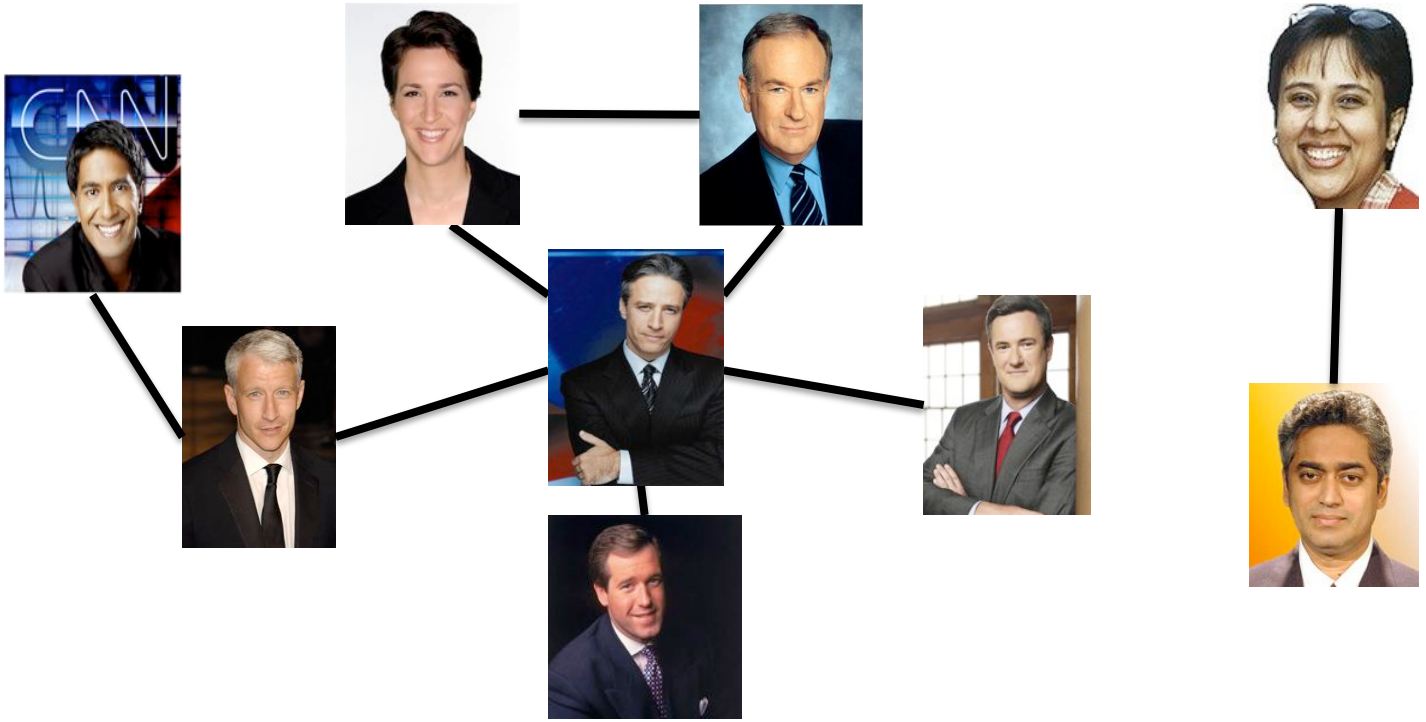
Formally define everything



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

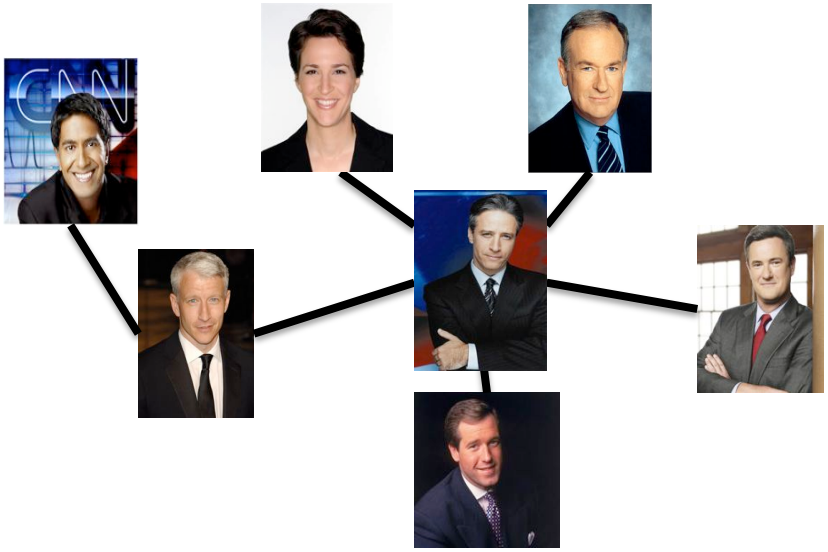
Tree

Connected undirected graph with no cycles



Rooted Tree

A rooted tree



How many rooted trees can an n vertex tree have?

Pick any vertex as root

Let the rest of the tree hang under “gravity”

SG’s parent=AC

AC’s child =SG

Rest of Today's agenda

Prove n vertex tree has n-1 edges

Algorithms for checking connectivity