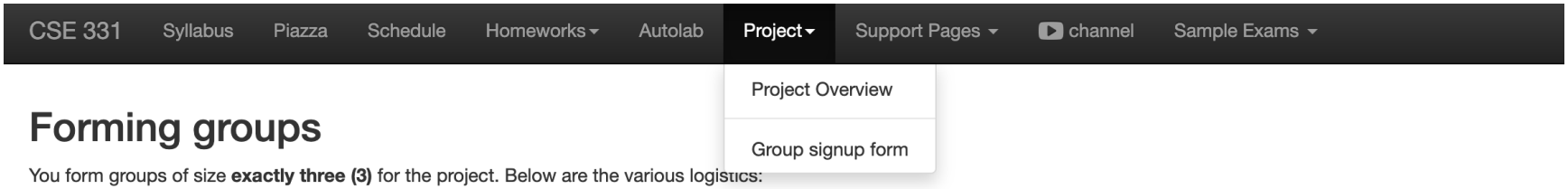
Lecture 11

CSE 331

Sep 20, 2024

Register your project groups

Deadline: Friday, Sep 20, 11:59pm



Forming groups

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

- 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) group members in your group.

> **</> Note**
>
> Note that if you pick th… …nnot submit as a group of size two. If …
>
> Also, if you form a gro…

If you miss this deadline then you will get a ZERO on the ENTIRE project

  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 20**.

Please…

note @101 stop following 12 views

Actions

Submit your teams by tomorrow or lose 10% of your grade

I have been repeating this every lecture for the past 2+ weeks but just in case you missed it:

*The deadline to submit the Google form with your project group information is **11:59pm tomorrow, Sep 20**.*

If you miss this deadline you will get a ZERO on the ENTIRE project, which is worth 10% of your final letter grade.

So *please* make sure that you do not miss this deadline.

project

Edit good note | 0 Updated 6 minutes ago by Atri Rudra

Confirmation of form submission

note @100 stop following 41 views

Actions

Project signup confirmations

~~As a heads up, following up on @85, over the next two hours or so (it is 7:30pm now) I'll be sending confirmation of your 331 project signups *(if you filled in the form by 6pm today, Sep 18).* I'll post again when this process is done. [**So please wait until I post the confirmation before emailing me** 😃]~~

~~As a heads up, here is what to expect:~~

- ~~If you signed up individually, you should get a (reasonably properly formatted) email (though you'll be in the BCC of a mass email)~~
- ~~If you signed up as a group you should get an email with no body and the subject line being the names of your group members and group name (if y'all chose one) and nothing else [apologies for the badly formatted email]~~

I have sent confirmations for the project signups that I have (until 6pm on Wednesday)

- If you signed up individually, you should a (reasonably properly formatted) email
  - You will receive another email after the group submission deadline is done with the details of your finally assigned random group.
- If you signed up as a group look out for an email with no body and the subject line being the names of your group members and group name (if y'all chose one) and nothing else [apologies for the badly formatted email]
  - *Y'all will not receive any further confirmation on your group in the future.*

If any of the information that you receive is not correct, please contact me ASAP!

Also the confirmation is only if you signed by before **6pm on Wed, Sep 18**. If you think you signed up before then but did not receive an email, please let me know as well!

As mentioned in @85, I will not be sending any further confirmation on group submission until *after* the deadline.

project

If you need it, ask for help

Couple of HW clarifications

note @102 stop following 4 views

Actions

Couple of HW related clarifications

- The first one is on references. If you are referring to an allowed source to cite a result, please make sure it is specific. So e.g. if you want to refer to result (1.6) in the textbook for correctness of GS, then explicitly state result (1.6). Or if you want to refer to recitation notes for week x, explicitly state you are referring to recitation notes from week x.
  - Note that you have to **explicitly** cite recitation notes-- putting recitation notes in your sources is not enough.
  - The analogy to keep in mind is that when you want to use a library function you have to *exactly* state **both** the library (via e.g. an import statement) and the function name.
- Come clarifications on HW 1 solutions:
  - The solutions we hand out in class is essentially the "perfect" solution-- an upper bound on what will get you a level 5 if you will. It is however not a *lower bound* on what can get you a level 5. In other words, even if your solution does not look like the solutions (e.g. not as detailed as the ones we handed out), as long as it is correct you'll get full credit. Of course what constitutes correct is hard to specify in general but once the grading is done, please take a look at the grading rubric, which will be much more specific about what will get you a level 5.

    As another note, while our solutions are formatted and broken up using lemmas etc., your solution does **not** need to do so. As long as your solution *precisely* argues what it needed to (either with formal mathematical notation OR in English), with each step in your proof justified, then you'll receive full credit.

Please feel free to use the comment section to ask any followup question(s)!

homework1 homework2

Edit good note | 0

Updated 5 minutes ago by Atri Rudra

Story behind HW 1 Q2

note @97 stop following 60 views

Actions

Story behind the HW #1: Q2 on HW 1

Throughout the course there will be HW problems based on some really cool algorithmic idea (at least according to me!) that has some real life application and/or is something that I have used in my research. After the solutions for the corresponding HW have been handed out, I'll followup with a post on piazza giving more pointers for the connection. This is the first one in the series and is related to Q2 on HW 1.

I have had Q2 on HW 1 for all the years I have taught CSE 331. Until summer 2018, the best known upper bound was around $O((n!)^{2/3})$ (source), which is way worse the the best known lower bound, which is of the form c^n for some constant $c > 1$ (in Q2 you showed $c = \sqrt{2}$).

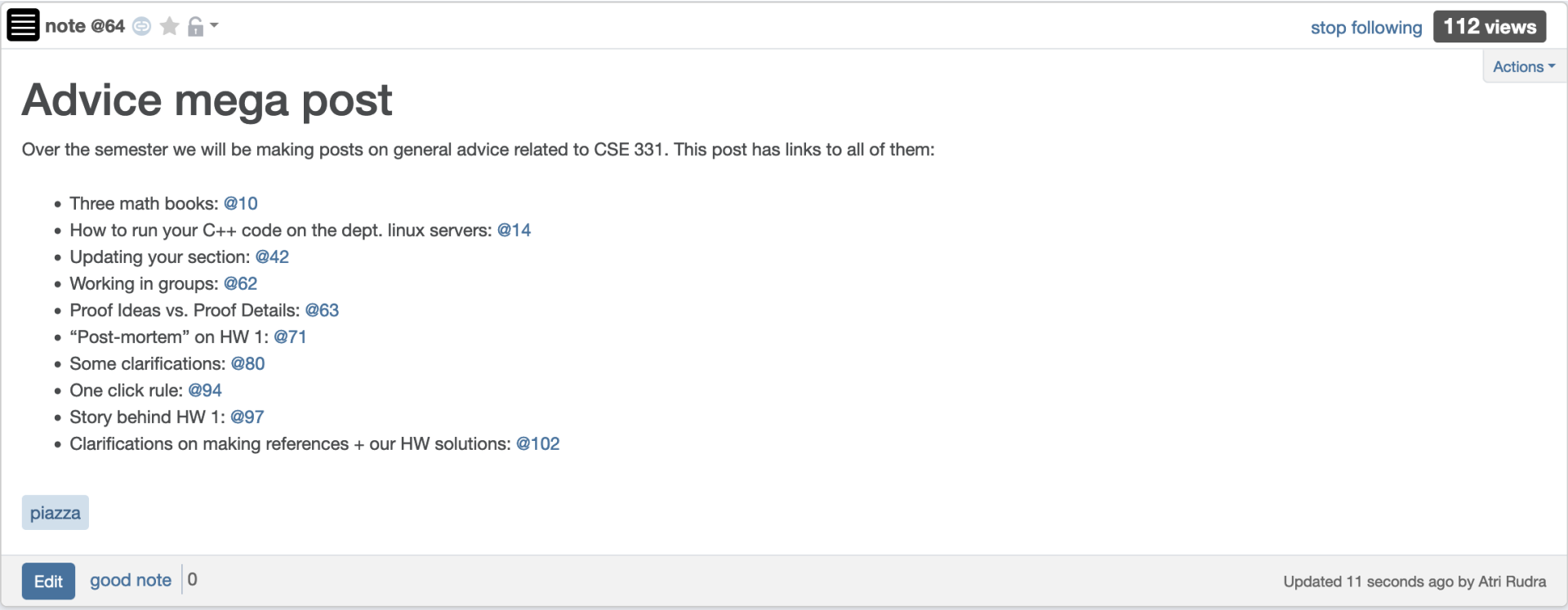
Over summer 18, a paper was presented which showed that the upper bound was C^n for some constant C. There is still a gap but the game now is to figure out the correct base C. (*Update*: The bound was improved in 2020.)

storybehindhw homework1

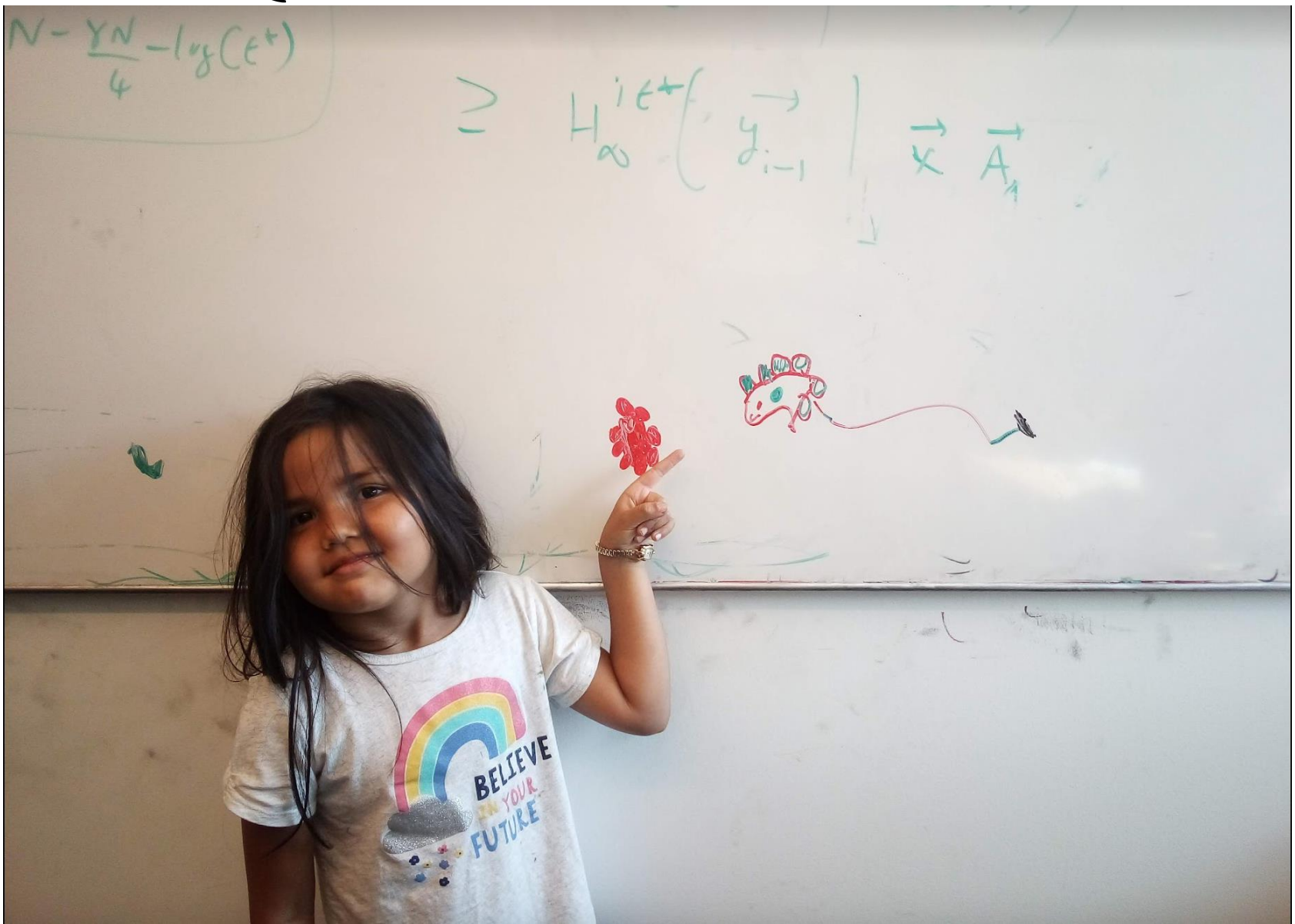
Edit good note 1

Updated 1 day ago by Atri Rudra

Advice “mega post”



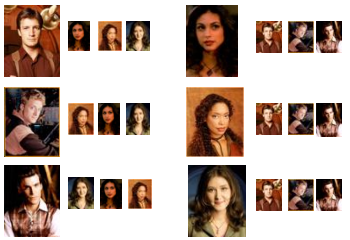
Questions/Comments?

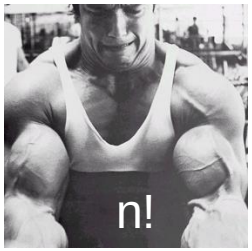


Main Steps in Algorithm Design

Problem Statement

Problem Definition





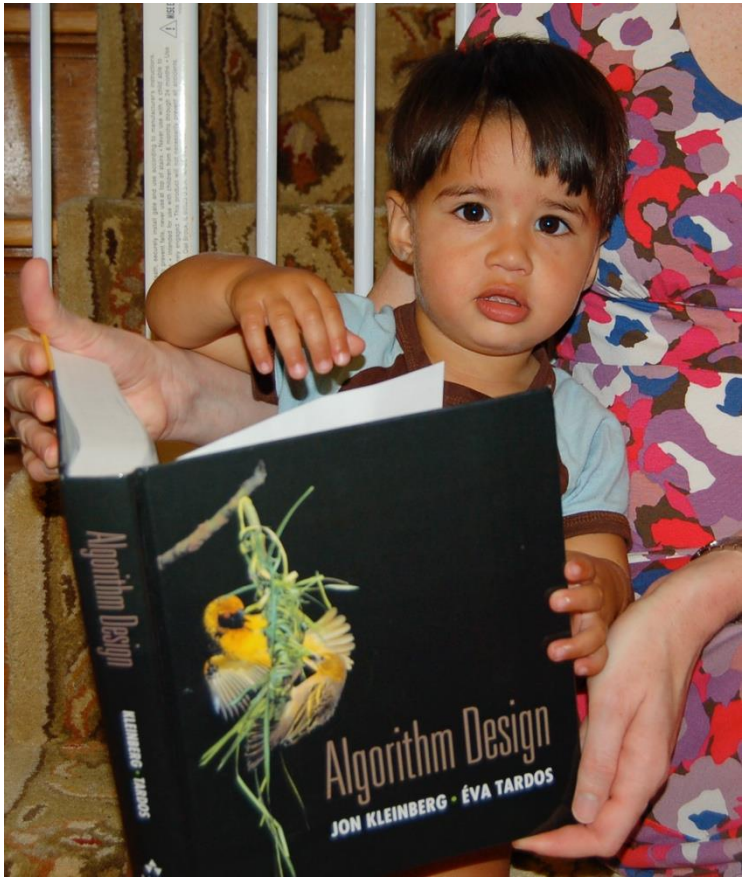
Algorithm

"Implementation"

Analysis

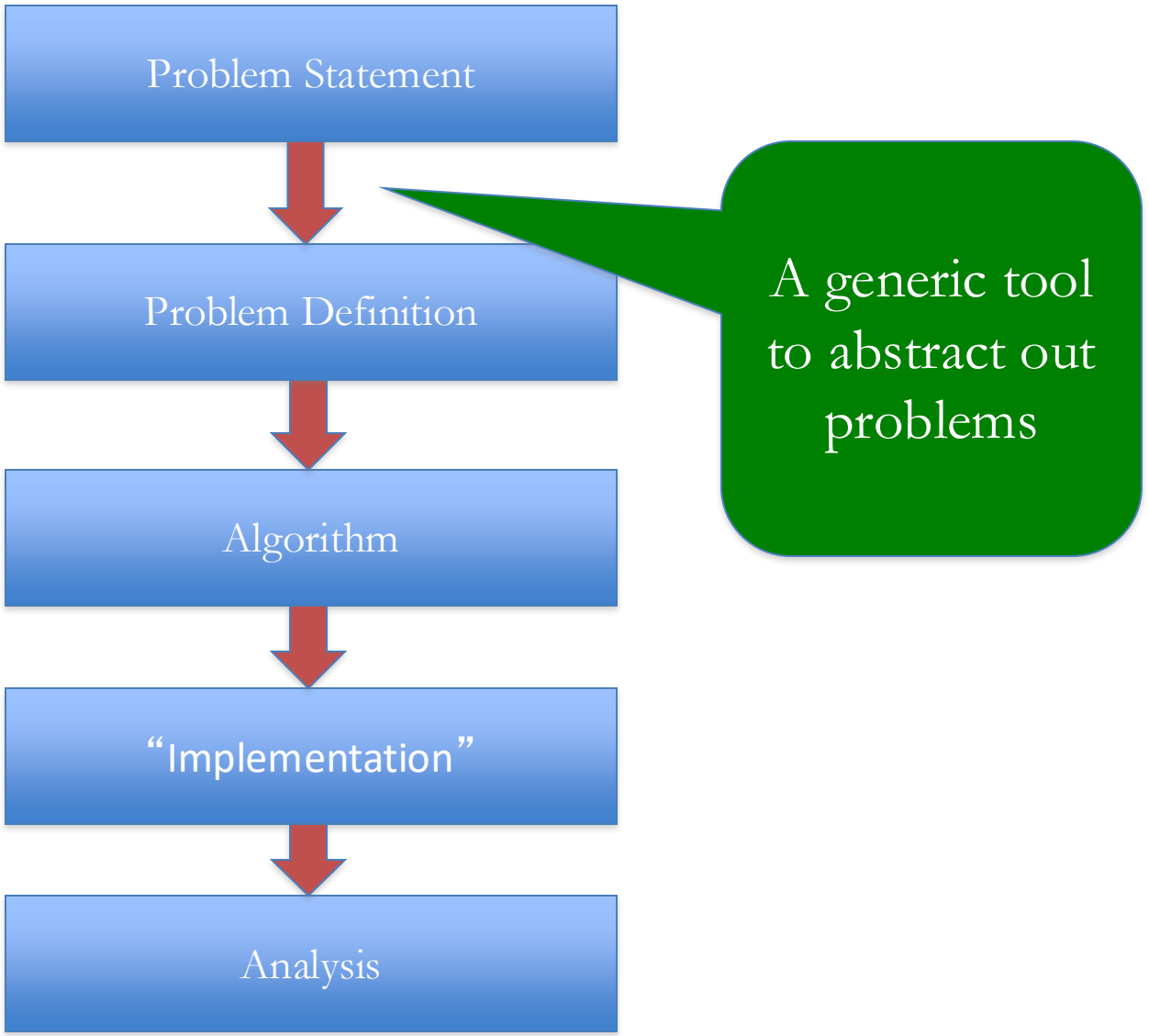
Correctness Analysis

Reading Assignments



Sec 1.1 and Chap. 2 in [KT]

Up Next….

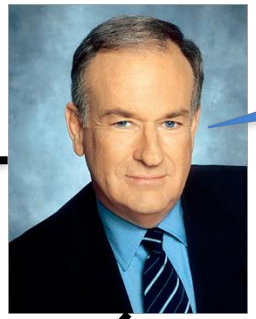

Problem Statement
Problem Definition
Algorithm
"Implementation"
Analysis
A generic tool to abstract out problems

Graphs

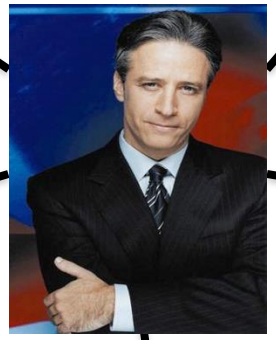
Representation of relations Edge s of entities/elements

Entities: News hosts

Relationship: Mention in other's program



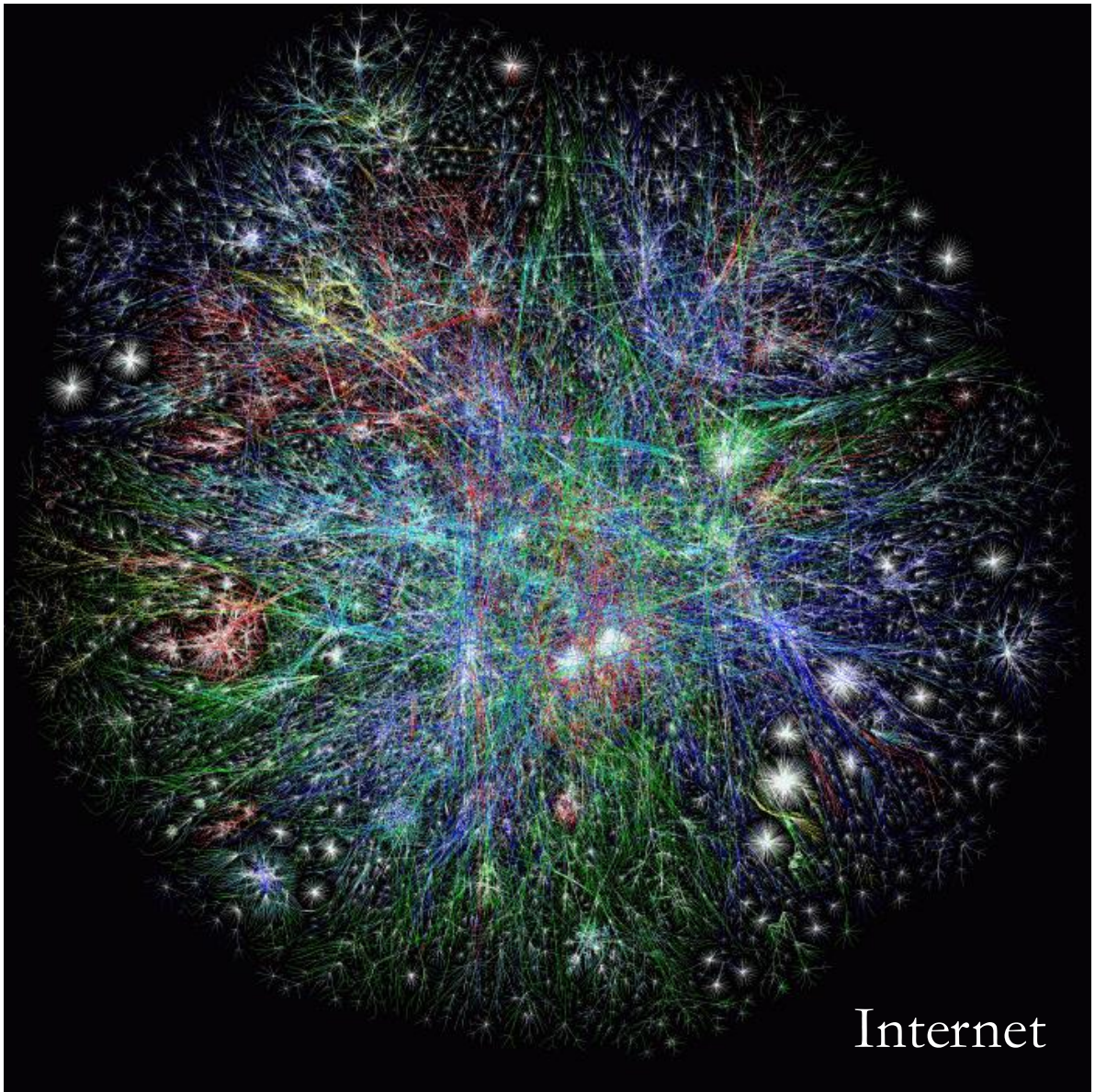
Vertex/Node



Graphs are omnipresent

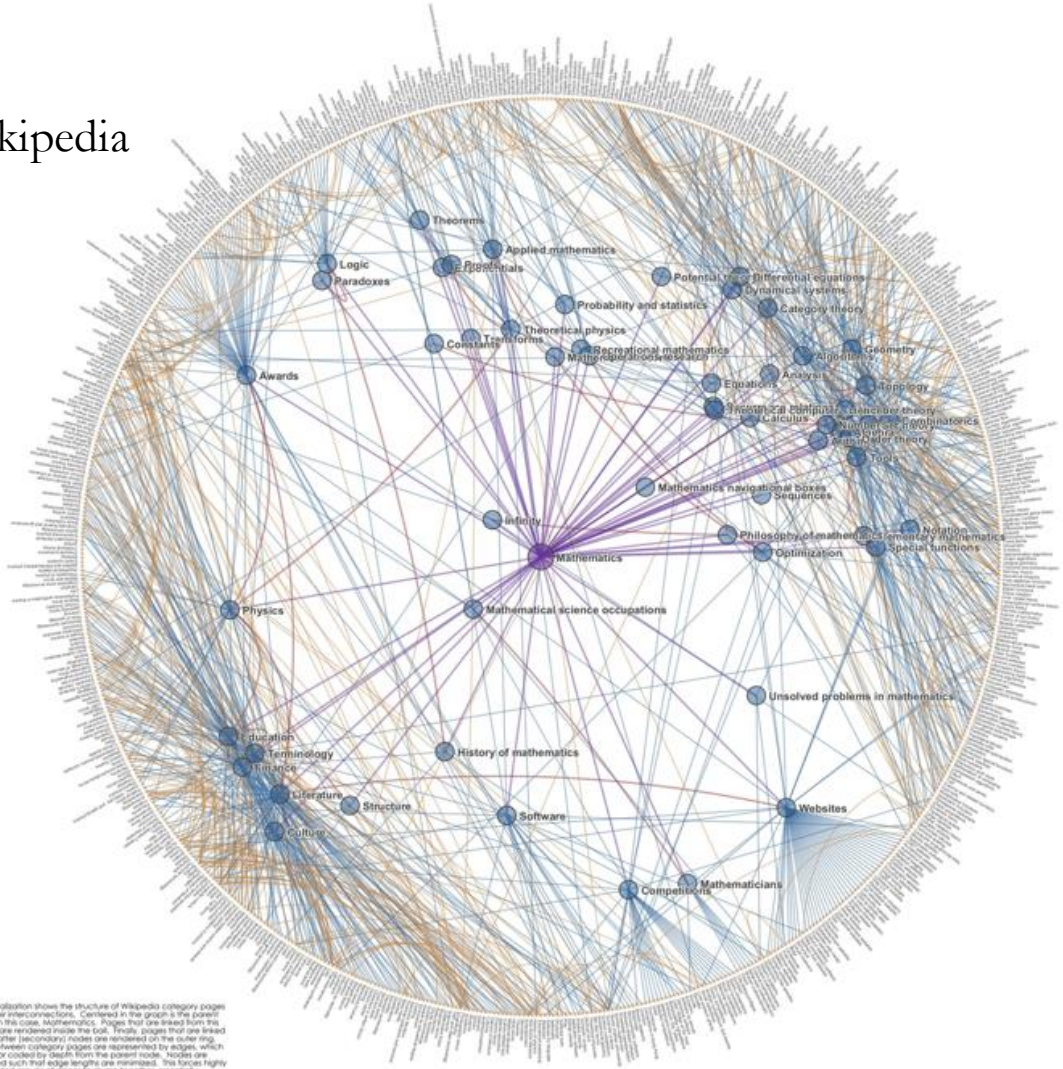
Airline Route maps

What does this graph represent?



And this one?

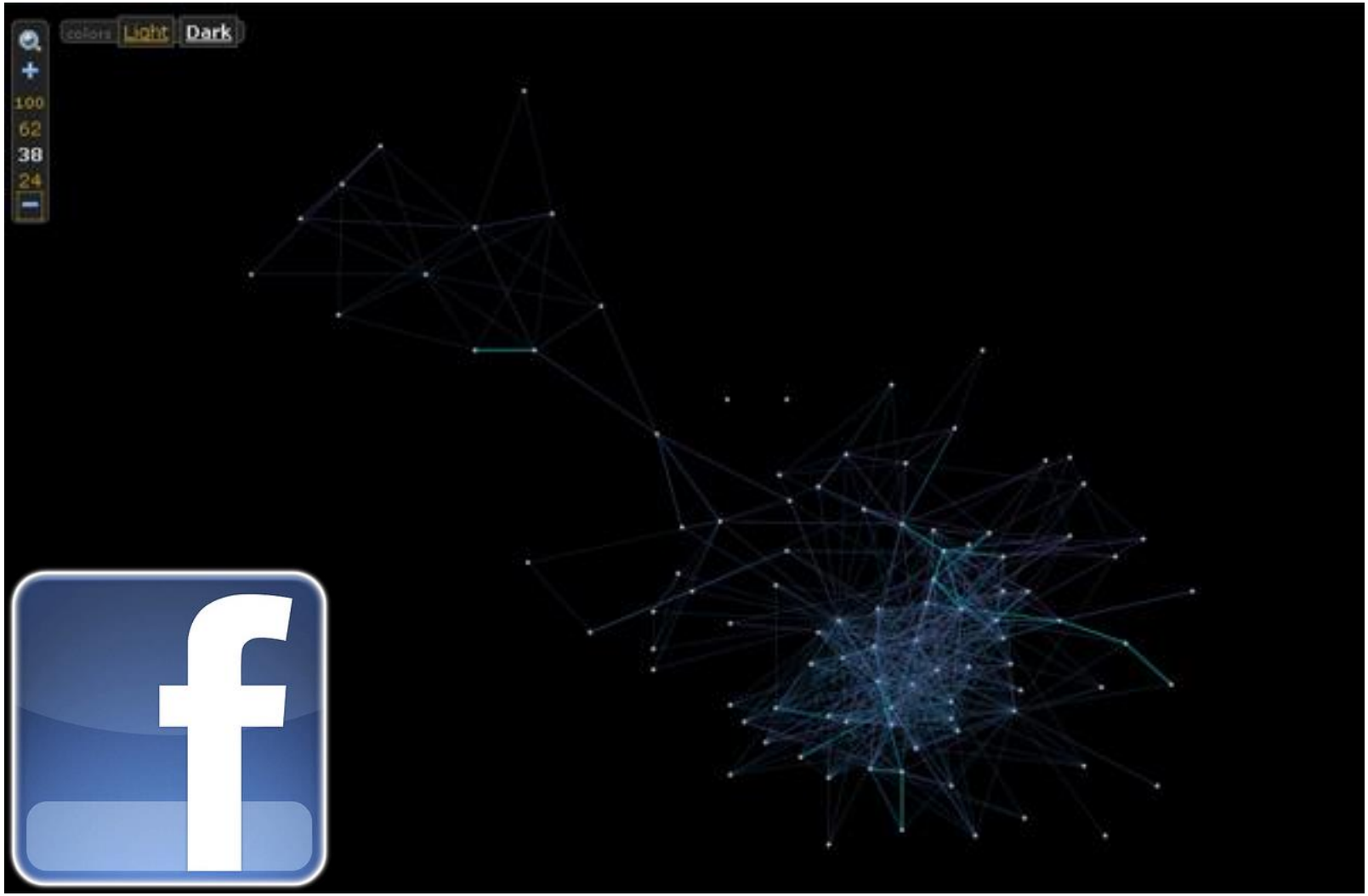
Math articles on Wikipedia



This visualization shows the structure of Wikipedia category pages and their interconnections. Centered in the graph is the parent node, in this case, Mathematics. Pages that are linked from this parent are rendered inside the disk. Finally, pages that are linked to the latter (secondary) nodes are rendered on the outer ring. Links between category pages are represented by edges, which are color coded by depth from the parent node. Nodes are clustered such that edge lengths are minimized. This forces highly connected groups of pages to clump together, essentially forming topical groups. Created by Chris Harrison, 2007.

ChrisHarrison.net

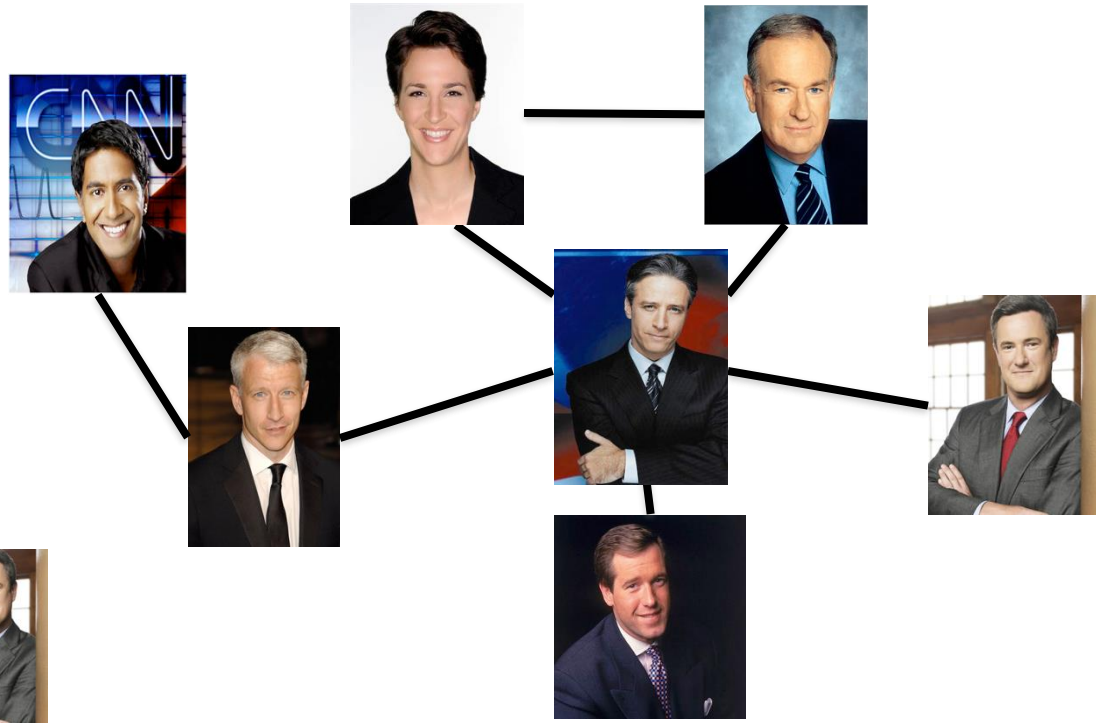
And this one?



Rest of today's agenda

Basic Graph definitions

Paths



Connected

Sequence of vertices connected by edges

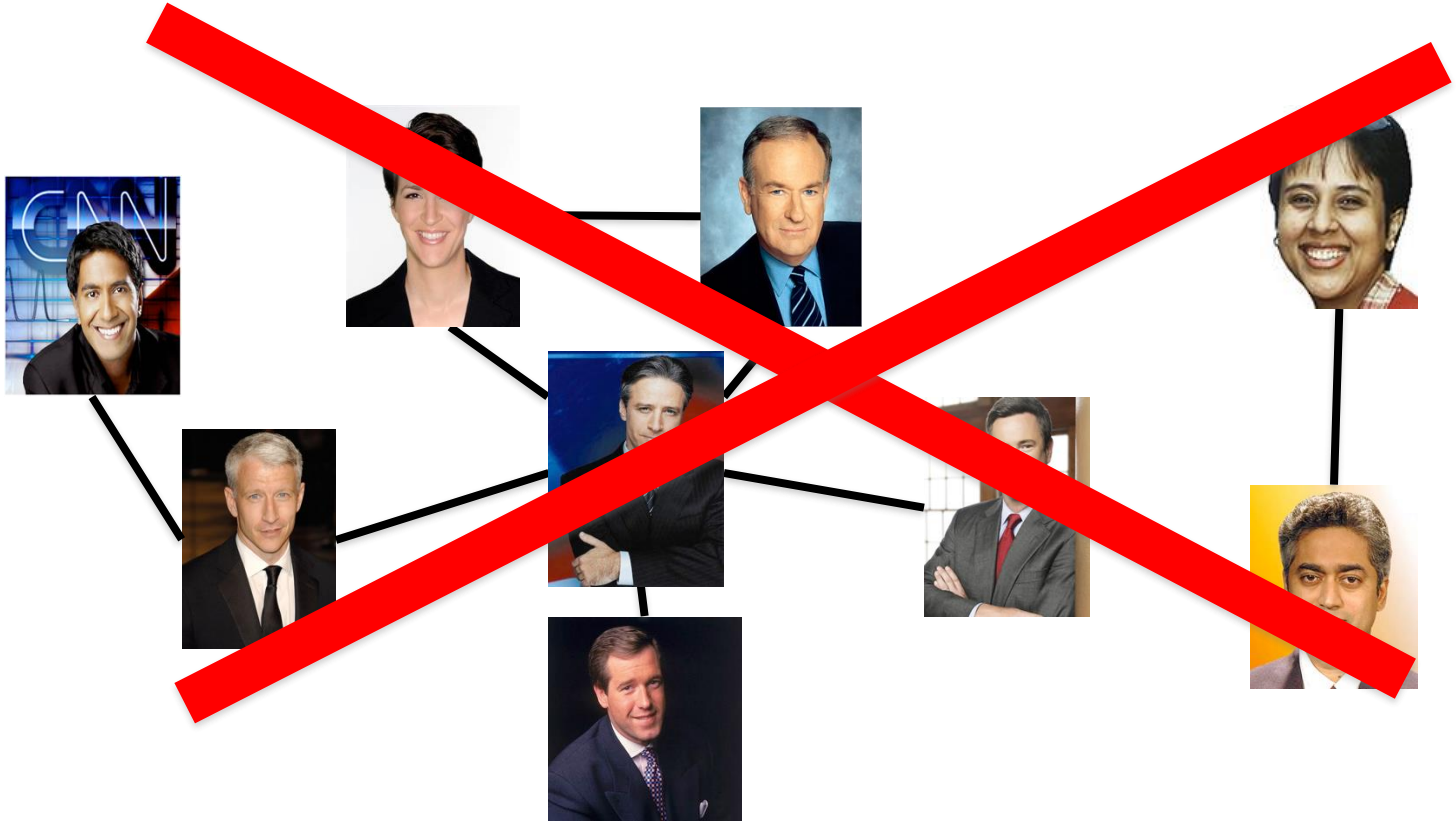
Path length 3

Connectivity

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

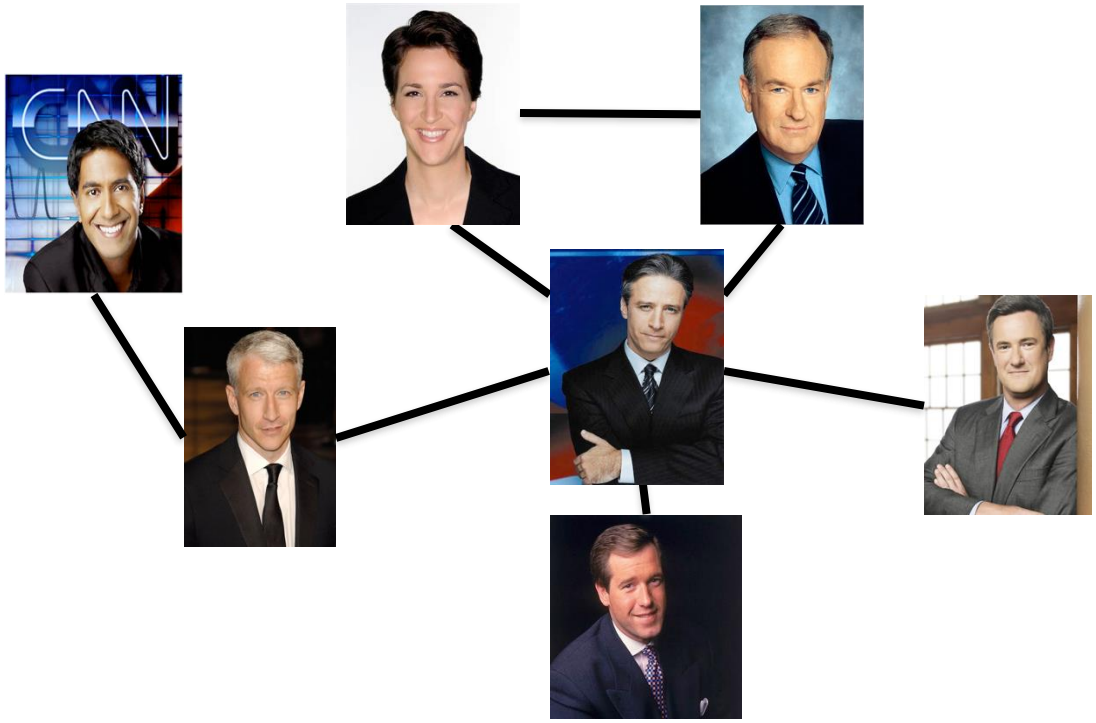
A graph is connected iff all pairs of vertices are connected

Connected Graphs

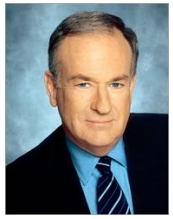


Every pair of vertices has a path between them

Cycles



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

 ,  ,  , 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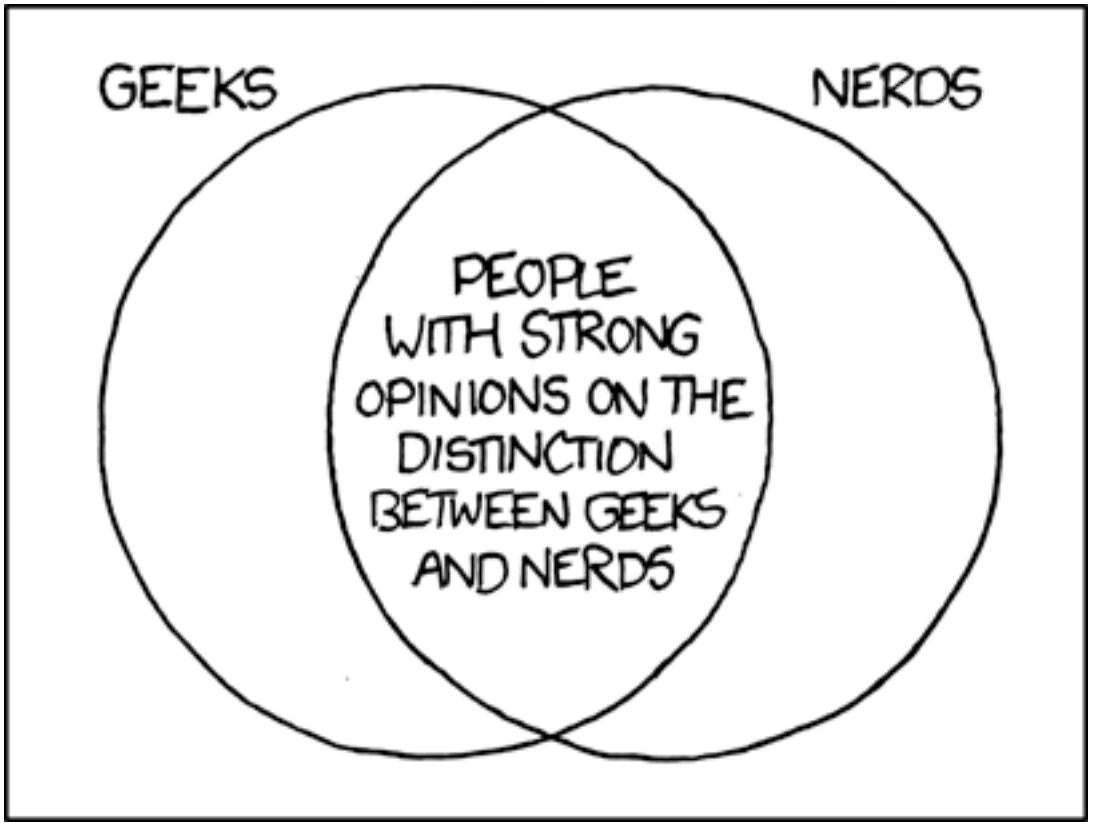
ICANHASCHEEZBURGER.COM

Formally define everything

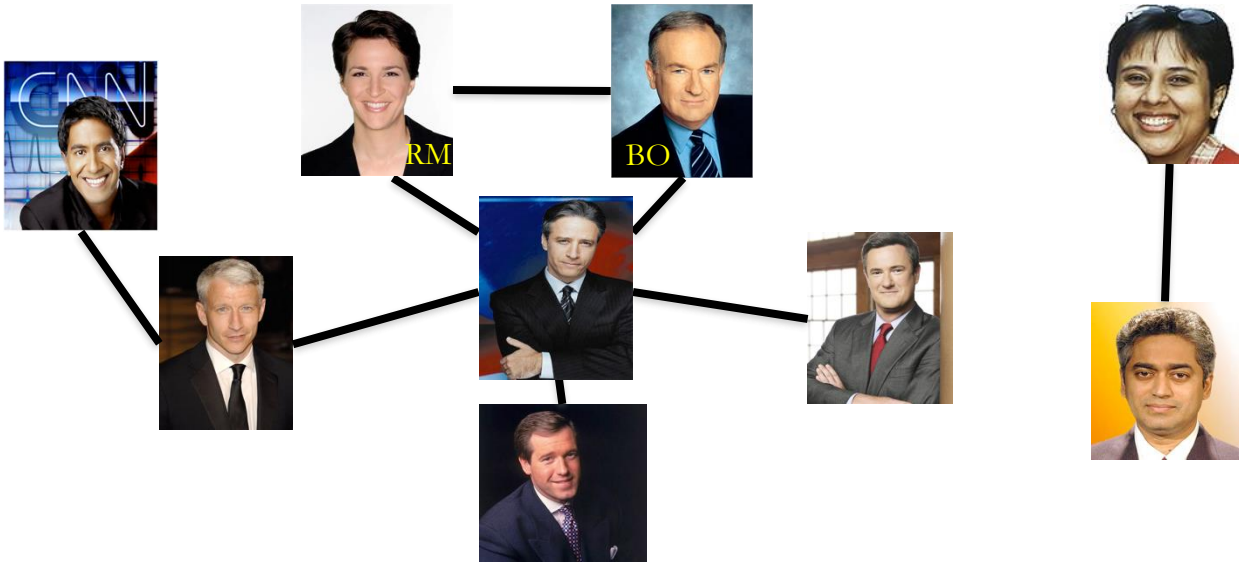


http://imgs.xkcd.com/comics/geeks_and_nerds.png

Definitions on the board…

Distance between u and v

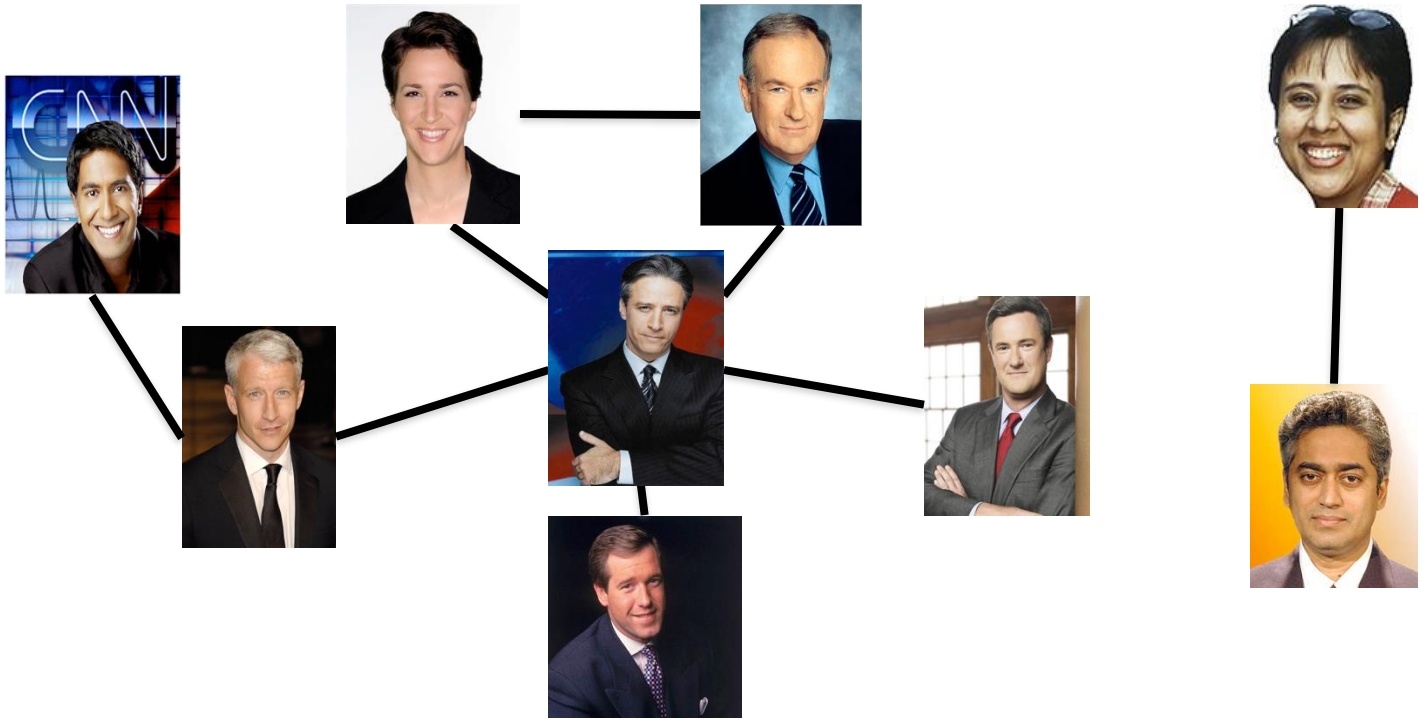
Length of the shortest length path between u and v



Distance between RM and BO? 1

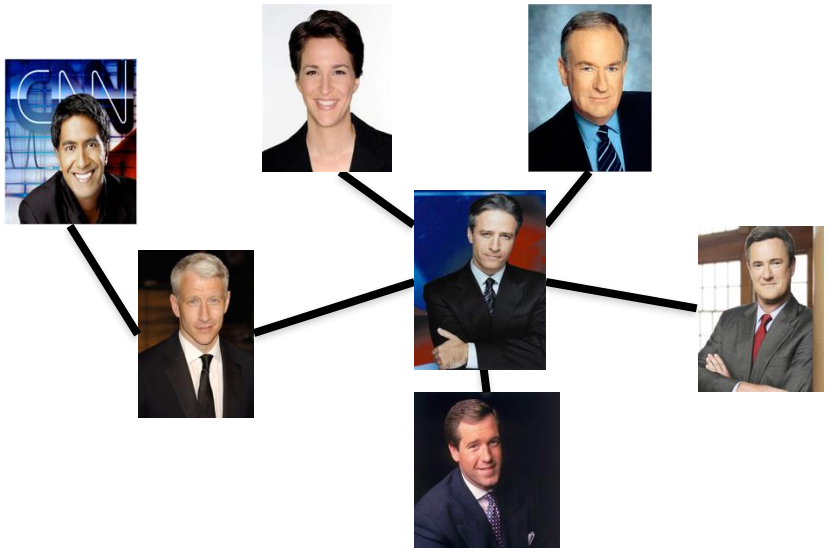
Tree

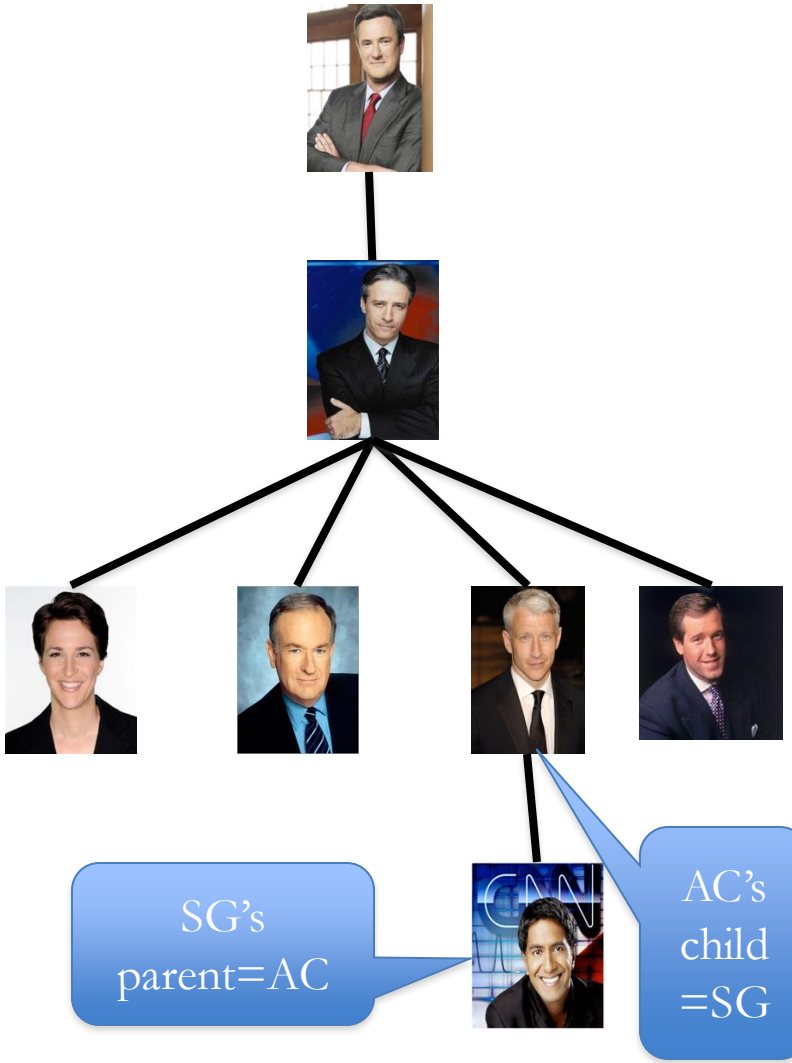
Connected undirected graph with no cycles



Rooted Tree

A rooted tree





Pick any vertex as root

Let the rest of the tree hang under "gravity"

Every n vertex tree has n-1 edges

Trees

This page collects material from previous incarnations of CSE 331 on trees, especially the proof that trees with n nodes have exactly $n - 1$ edges.

Where does the textbook talk about this?

`Section 3.1` in the textbook has the lowdown on trees.

Fall 2018 material

Here is the lecture video:

Every n vertex tree has n-1 edges

Let T be an undirected graph on n nodes

Then ANY two of the following implies the third:

T is connected

T has no cycles

T has n-1 edges