
Welcome
to
CSE 331

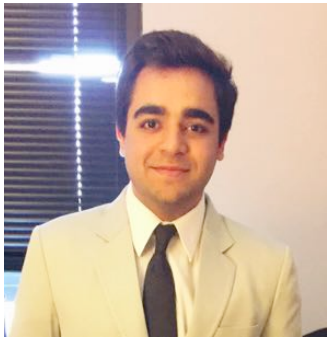
Let's do some introductions

http://www.zazzle.com/warning_teaching_assistant_bag-149882665435161818

TAs first

Anand

Aishani



Adhish

Sravanika

Katie

Dhruv

Kevin

Simran

Emily

Zhenkang

Lectures will be videotaped

http://www.imdb.com/title/tt0363510/mediaviewer/rm2499681792

About Me

Atri Rudra

atri@buffalo.edu

Office: 319 Davis

Office hours: Mon, 3:30-4:20pm; Wed 2:00-2:50pm

OH starts today

Contact us all at

cse-331-staff@buffalo.edu

TAs will not respond to individual emails (except for re-grading requests)

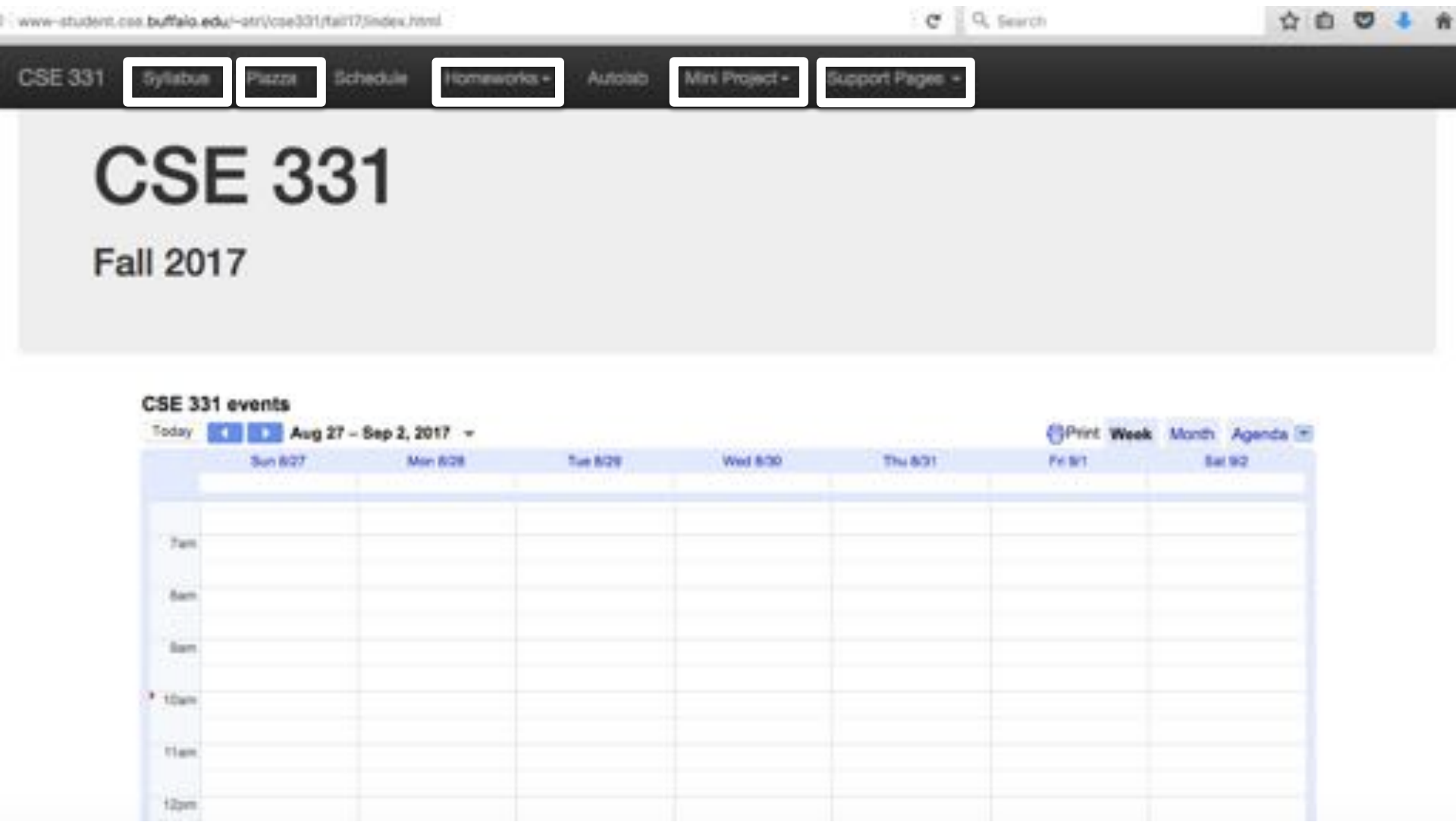
Handouts for today

Syllabus (online)

Homework Policy document (online)

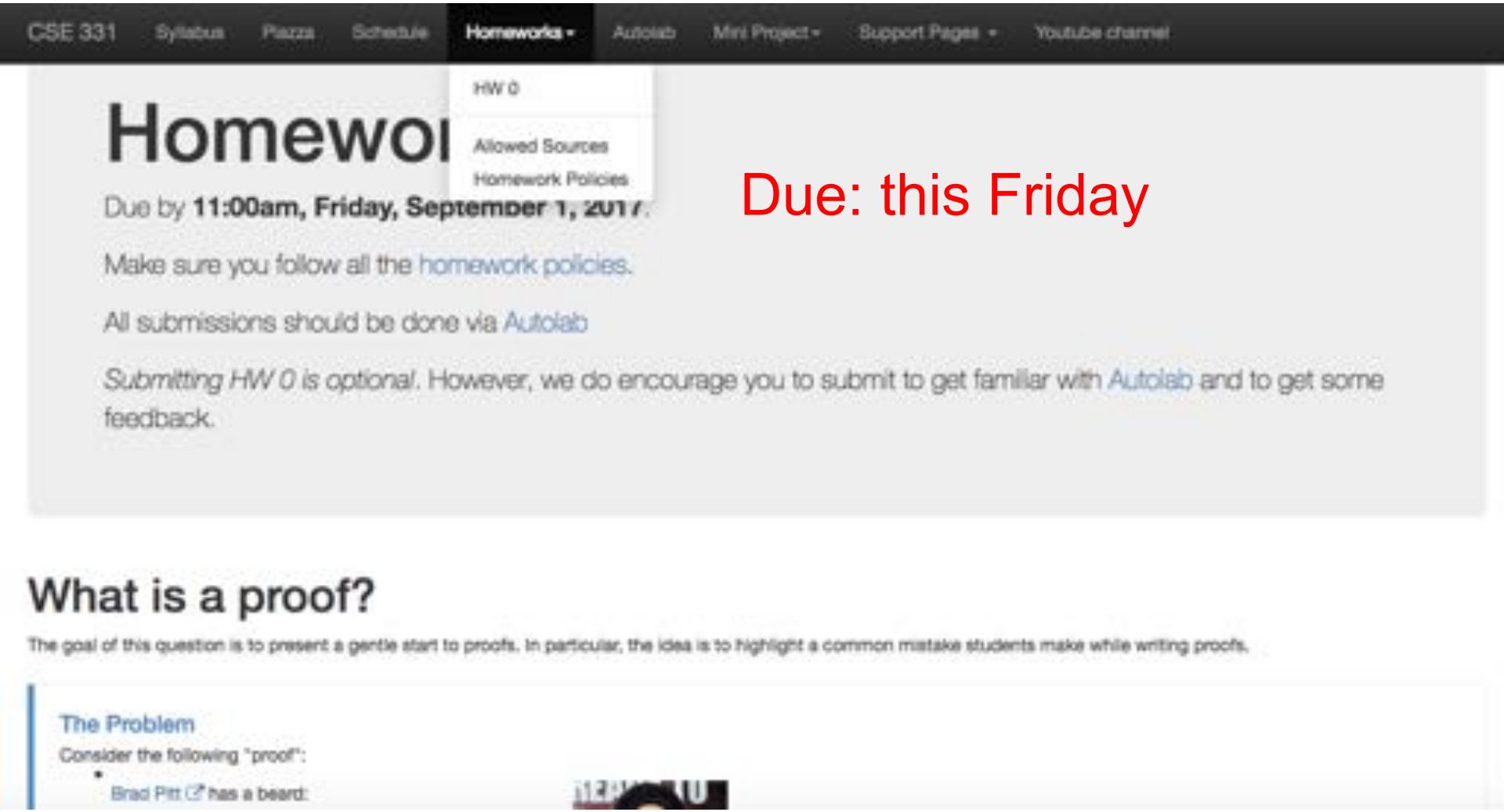
Homework 0 (online)

One Stop Shop for the Course



http://www-student.cse.buffalo.edu/~atri/cse331/fall17/index.html

Homework 0 (Optional)



Due: this Friday

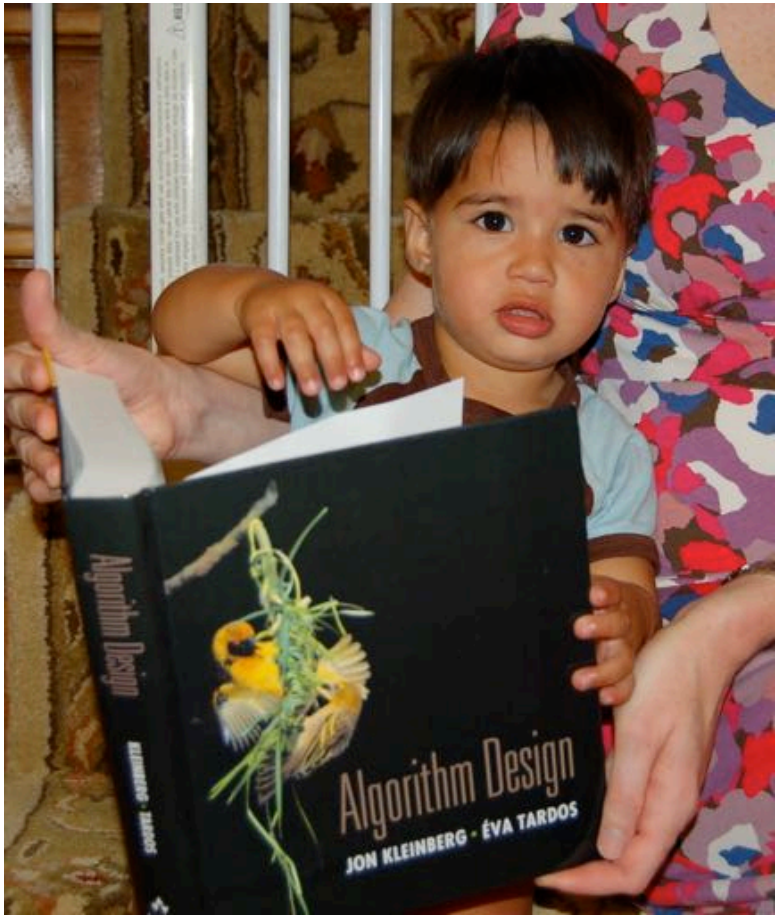
Three things to remember

WORK HARD!

DO NOT CHEAT!

READ CAREFULLY!

Wait.. What???



Make sure you follow submission instructions

Two most common ways of losing points

Make sure you read problem statements carefully

Academic Dishonesty

All your submissions must be your own work

Penalty:

- Minimum: An **grade reduction in course**
- Possible: **F** (or higher penalty) if warranted

YOUR responsibility to know what is cheating, plagiarism etc.

- If not sure, come talk to me

Excuses like "I have a job," "This was OK earlier/in my country," "This course is hard," etc. **WON'T WORK**

I DO NOT HAVE ANY PATIENCE WITH ANY CHEATING :

YOU WILL GET A GRADE REDUCTION IN THE COURSE

FOR YOUR FIRST MISTAKE

Read the syllabus CAREFULLY!

No graded material will be handed back till you submit a signed form!

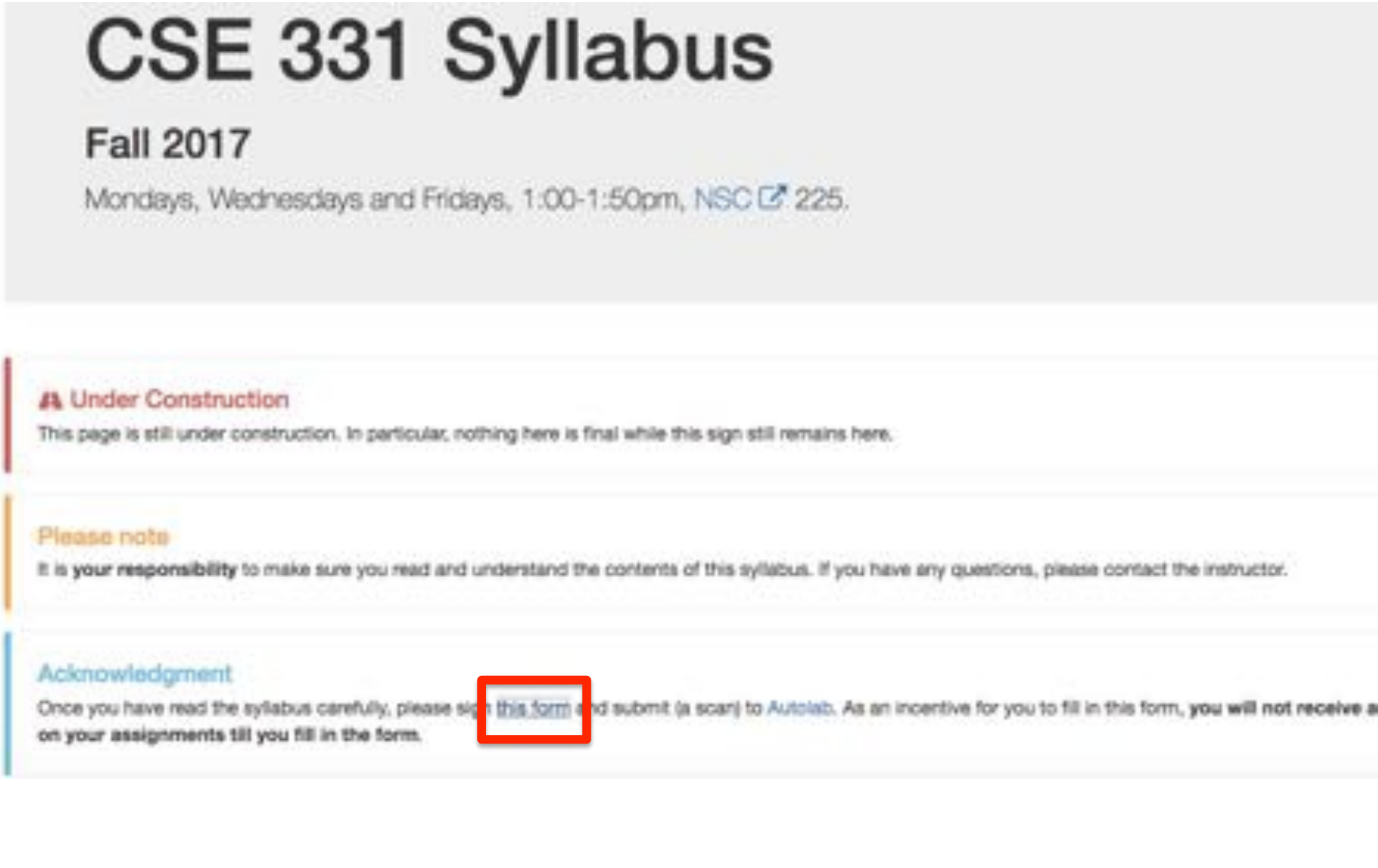
CSE 331 **Introduction to Algorithm Analysis and Design** **Fall 2017**

University at Buffalo
Department of Computer Science & Engineering
CSE 331 — Introduction to Algorithm Analysis and Design

- Make sure you fill in form **with a pen.**
- After you have filled in the form, scan it and upload it to Autolab.

I, _____ (PRINT name), acknowledge that I have read and understood the syllabus (and the homework policy document) for this course, CSE 331 *Introduction to Algorithm Analysis and Design.*

Where to find the form



CSE 331 Syllabus

Fall 2017

Mondays, Wednesdays and Fridays, 1:00-1:50pm, NSC 225.

Under Construction

This page is still under construction. In particular, nothing here is final while this sign still remains here.

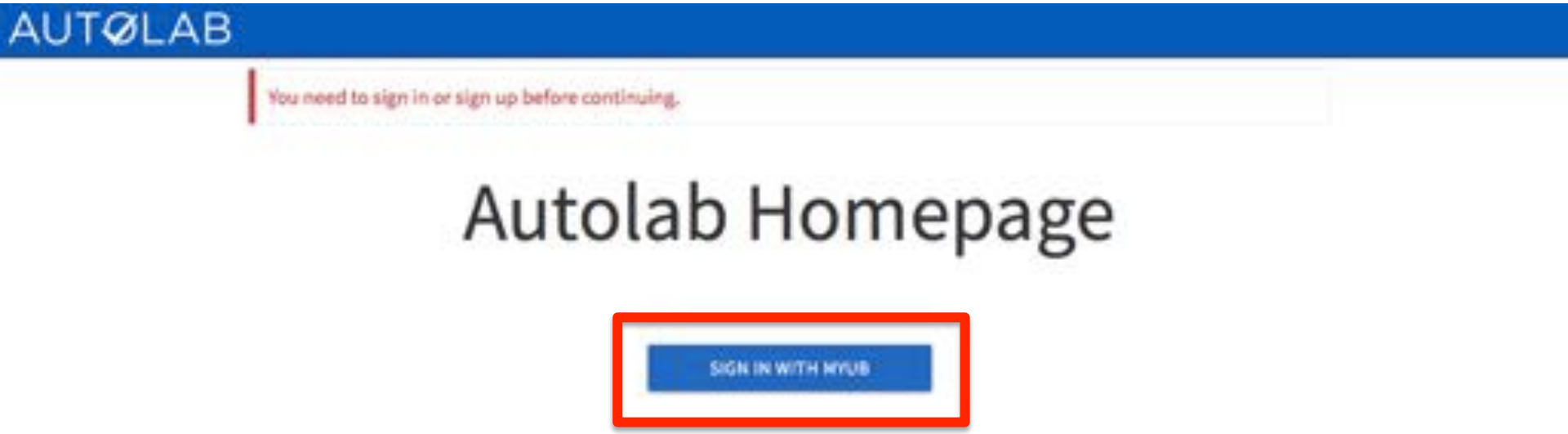
Please note

It is **your responsibility** to make sure you read and understand the contents of this syllabus. If you have any questions, please contact the instructor.

Acknowledgment

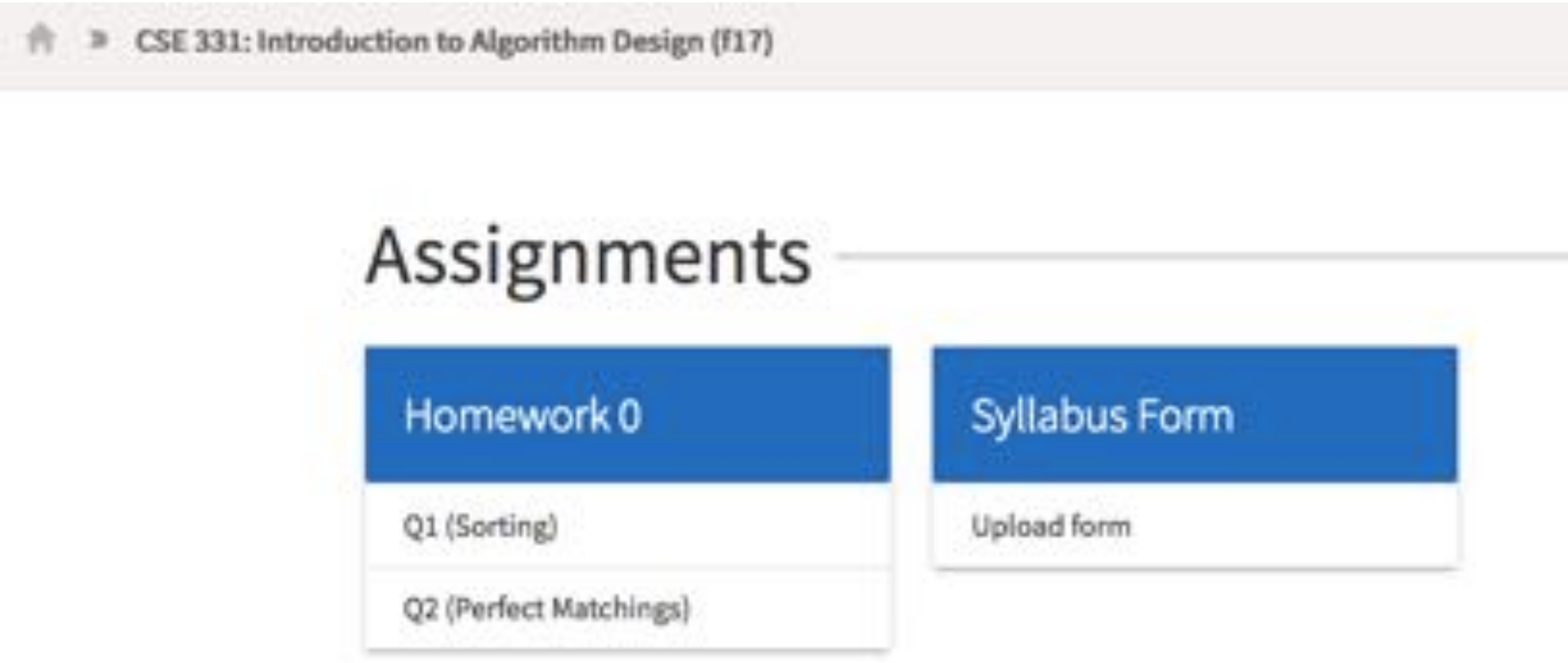
Once you have read the syllabus carefully, please sign this form and submit (a scan) to Autolab. As an incentive for you to fill in this form, **you will not receive a**
on your assignments till you fill in the form.

Autolab



https://autograder.cse.buffalo.edu/

You can submit the following now



If you were registered by 9pm on Sunday, Aug 27 you should be on Autolab

Grading break-down

Grading Policy

Here is the split of grades:

Course Component	% of grade
Mini project	6%
Homeworks	31%
Quizzes	3%
Exams	60%

Pre-requisites

Required (officially)

- CSE 250, CSE 191 and MTH 142
- At least a C-

Required (for practical purposes)

- Comfort with proofs
- Willingness to work hard!

Disabilities

Information included in the syllabus

In short, let me know and consult with Office of Disability Services

Preferred Name

If you prefer using name diff from UB records

Let me know and we'll make a note of it.

TA Office hours

YOU decide!


poll

0 views

Actions

Vote for TA office hours

Please choose all the time slots below that you will be able to make to for a 331 office hour. There will be a total of 21 hours over a week and the slots below are where at least one TA is available. We will try to schedule office hours during the most popular times (based on availability of rooms etc.) Remember homeworks are due at 11am on Fridays and there will be no office hours on Friday.

I want to get this on the way soon as possible, so I will pick the most popular slots at **Wed 3pm**.

- Mon, 10-11am
- Mon, 11am-noon
- Mon, 2-3pm
- Mon 2:30-3:30pm
- Mon, 5-6pm
- Tue, 10am-11am
- Tue, 11am-noon
- Tue, noon-1pm
- Tue, 1-2pm
- Tue, 2-3pm
- Tue, 3-4pm
- Tue, 4-5pm
- Tue, 5-6pm
- Wed, 9-10am

Recitations

Are on for this week!

Exams

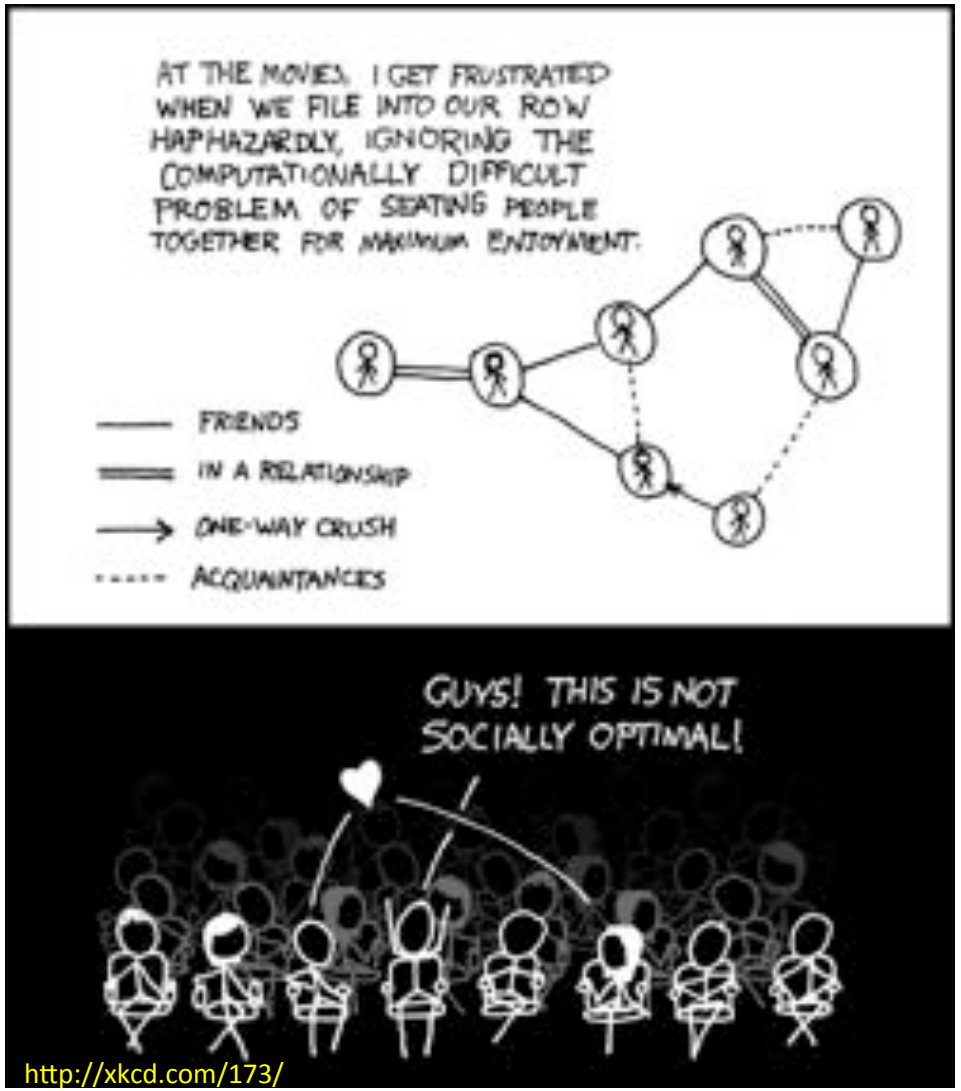
Mid term (two parts)

Mon, **Oct 16** and Wed, **Oct 18**, 2017. Usual place and time.

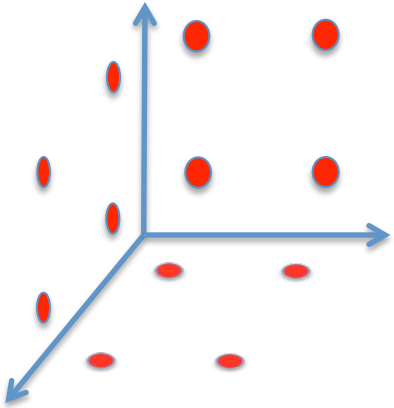
Final exam

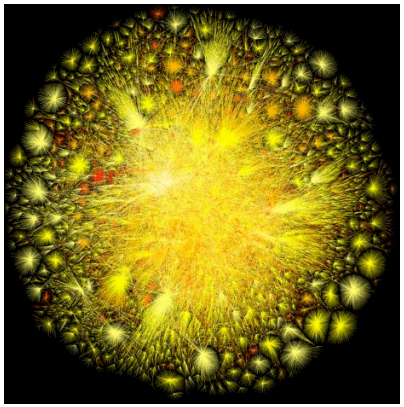
Fri, **Dec 15**, 2017. NSC 225, **noon-2:30pm**

This course: how to solve problems!



Why should I care ?



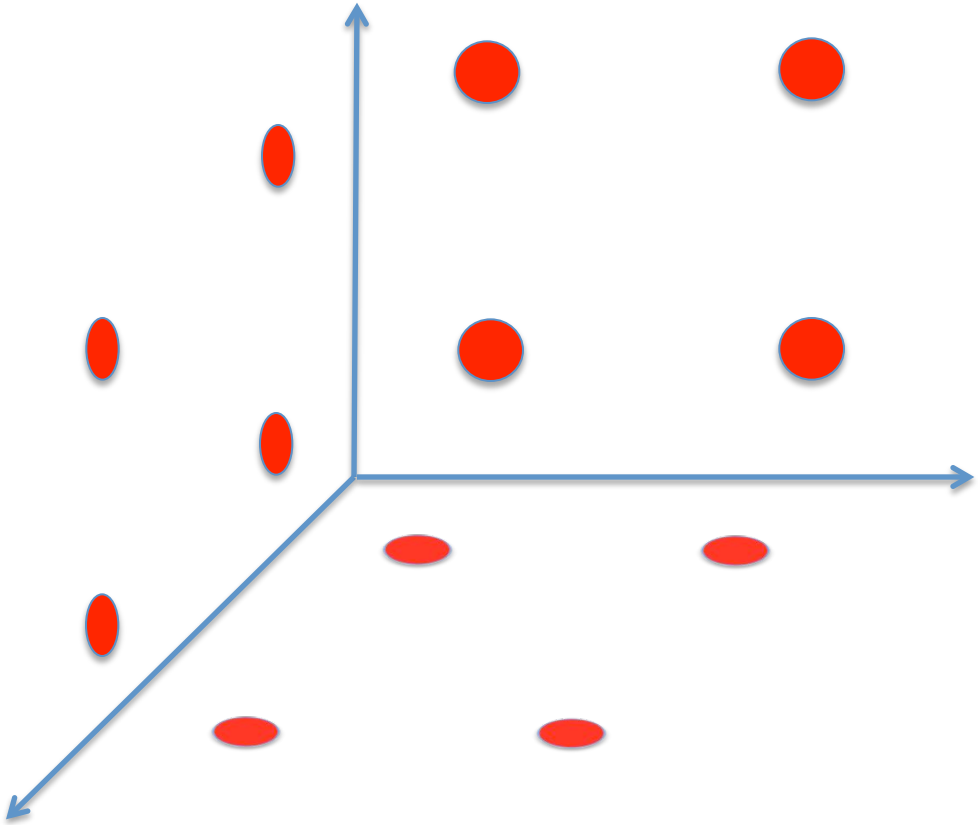


Combining Shadows to Understanding the network

LogicBlox

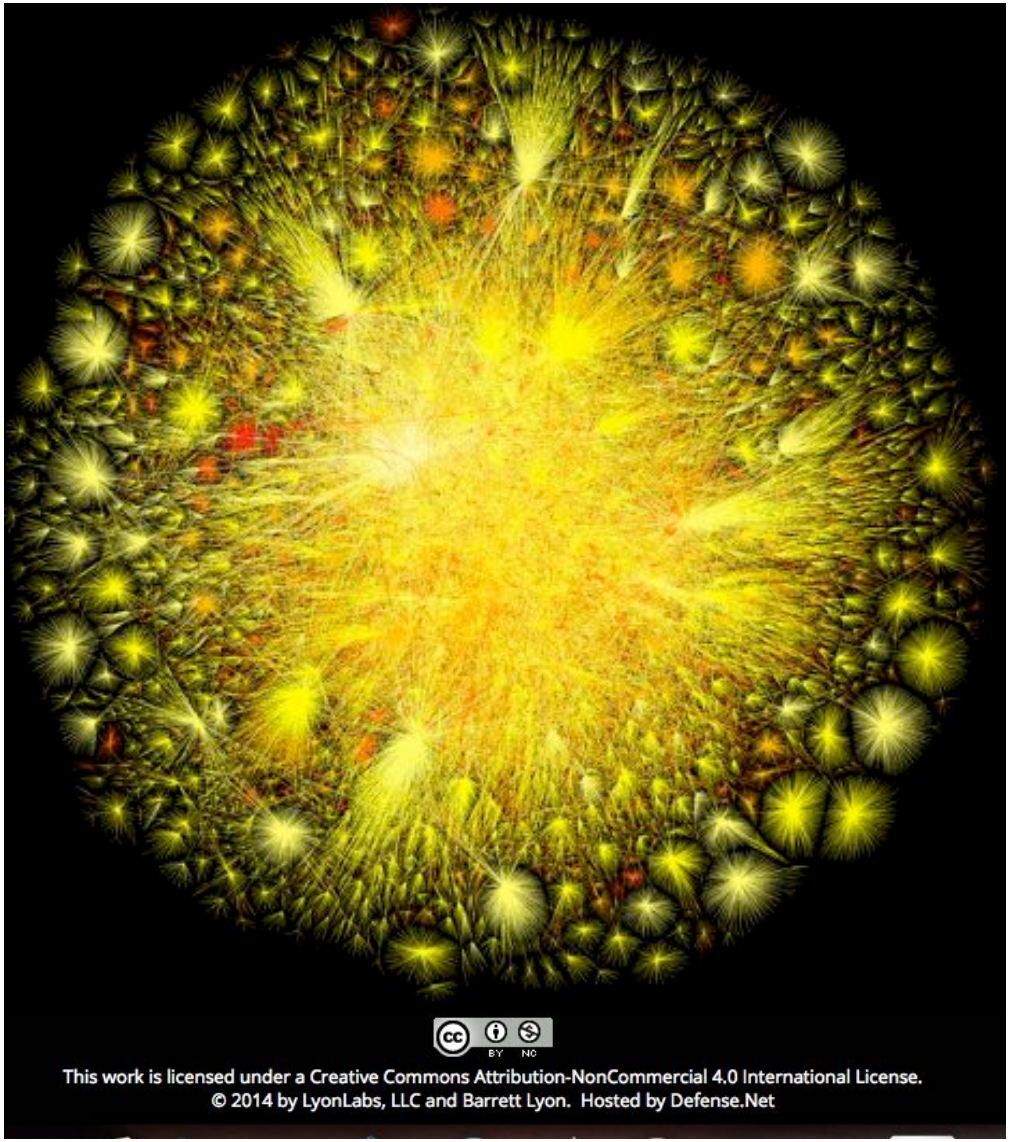
Stanford University

The key technical problem

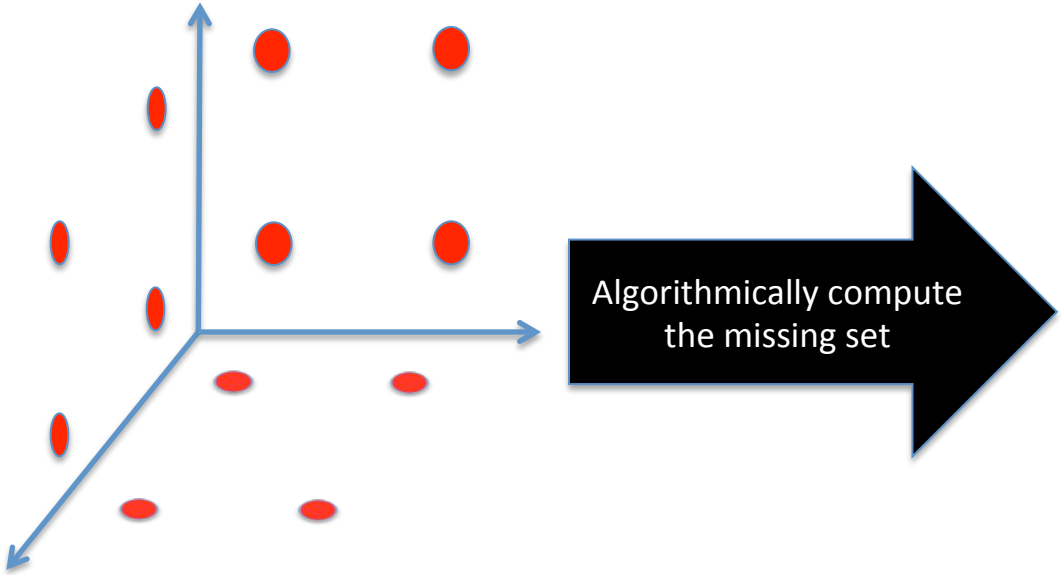


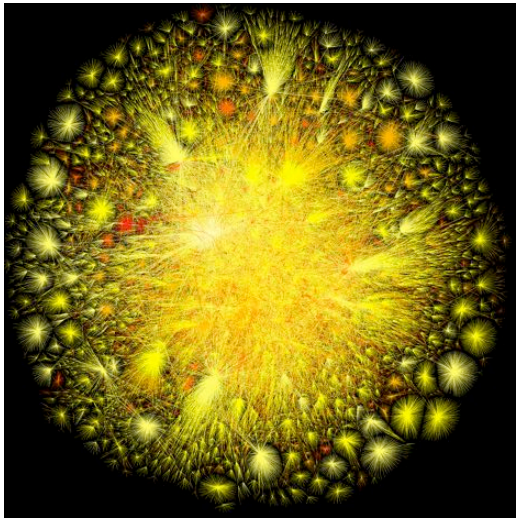
Given the three projections, what is the largest size of the original set of points?

Detecting Communities



Conquering Shadows to Conquering the Internet



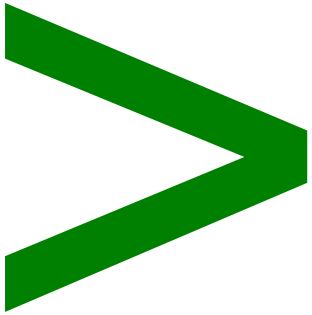


The proof is in the performance

EMPTYHEADED




10x faster



ORACLE

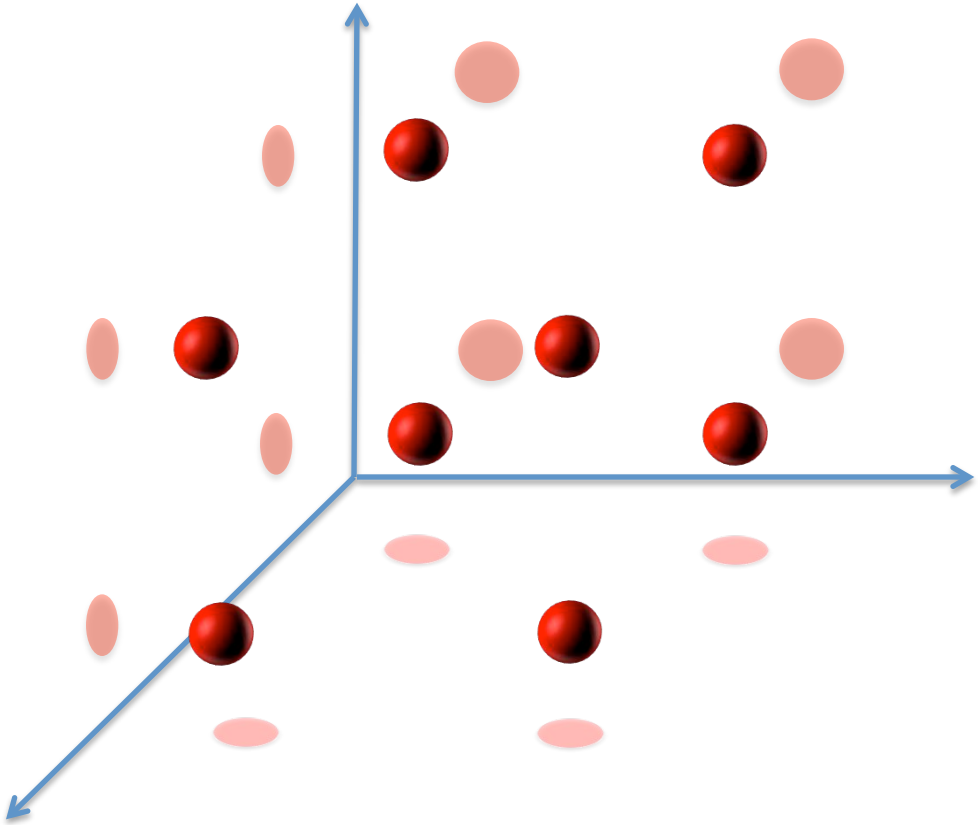
Dato GraphLab

LogicBlox

SNAP

Better algorithm with little hacking will beat a worse algorithm with tons of hacking

The key technical problem



Highly trivial: $4^3 = 64$

Still trivial: $4^2 = 16$

Correct answer: $4^{1.5} = 8$

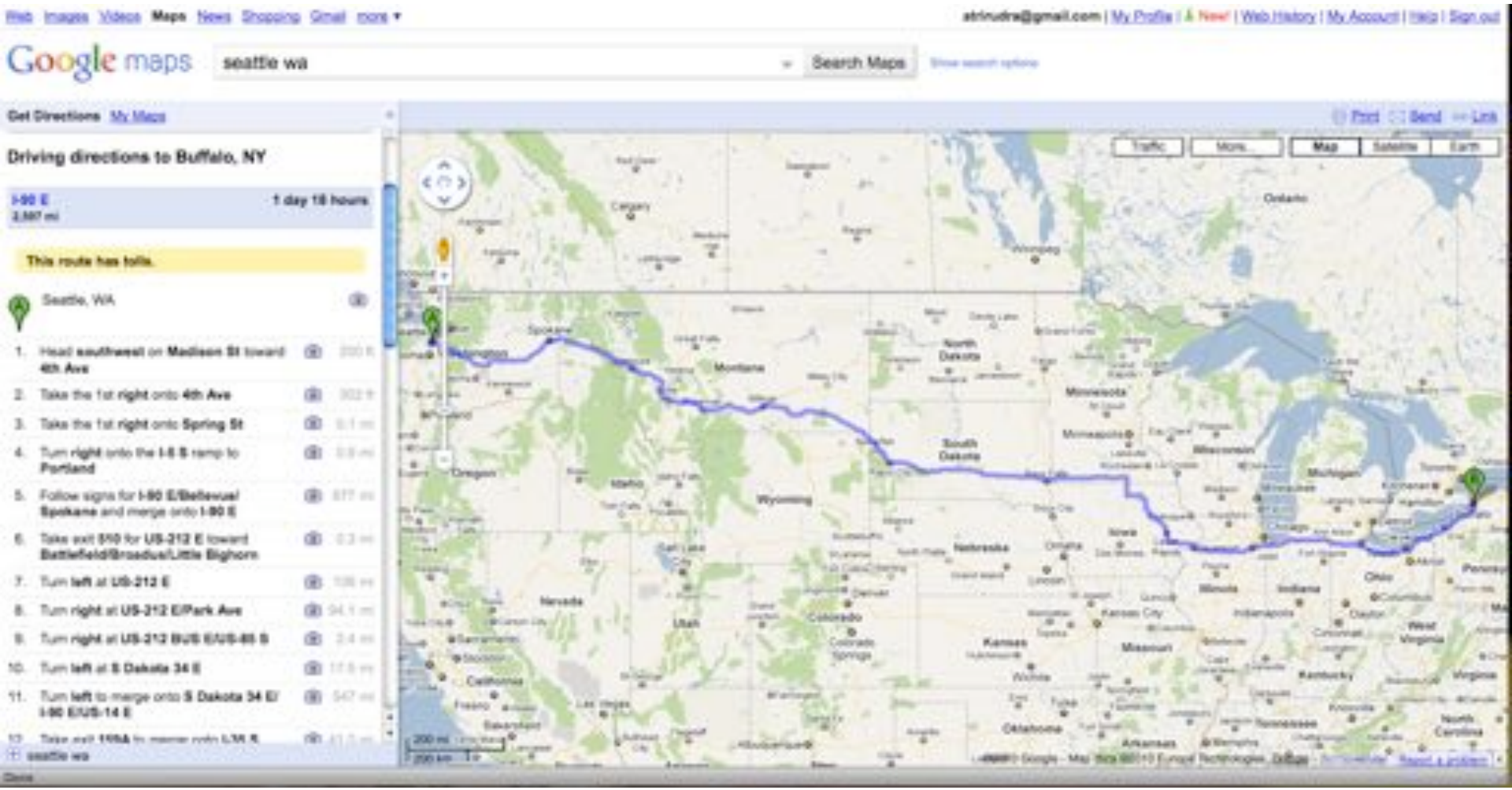
If detecting communities is not for you

From someone who got a Google job

“You can let your algorithms class know that the phone interviews are essentially like **a difficult algorithms test**.

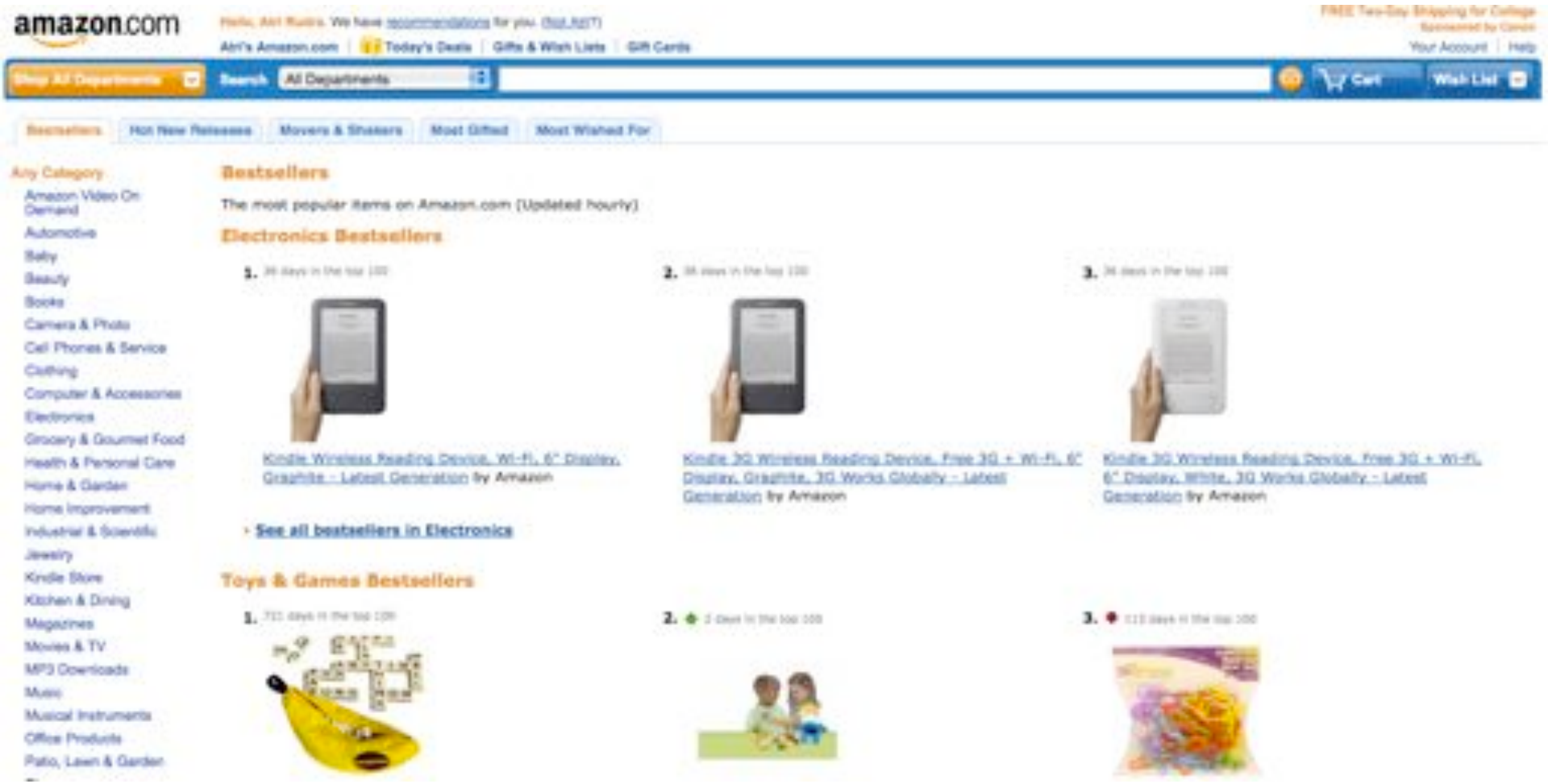
Lots of data structures, specifying the algorithm, analyzing the run time and space requirements... And all on the phone and **you're supposed to talk through your thought process**.”

Why care about algorithms?



Driving directions

Why care about algorithms?

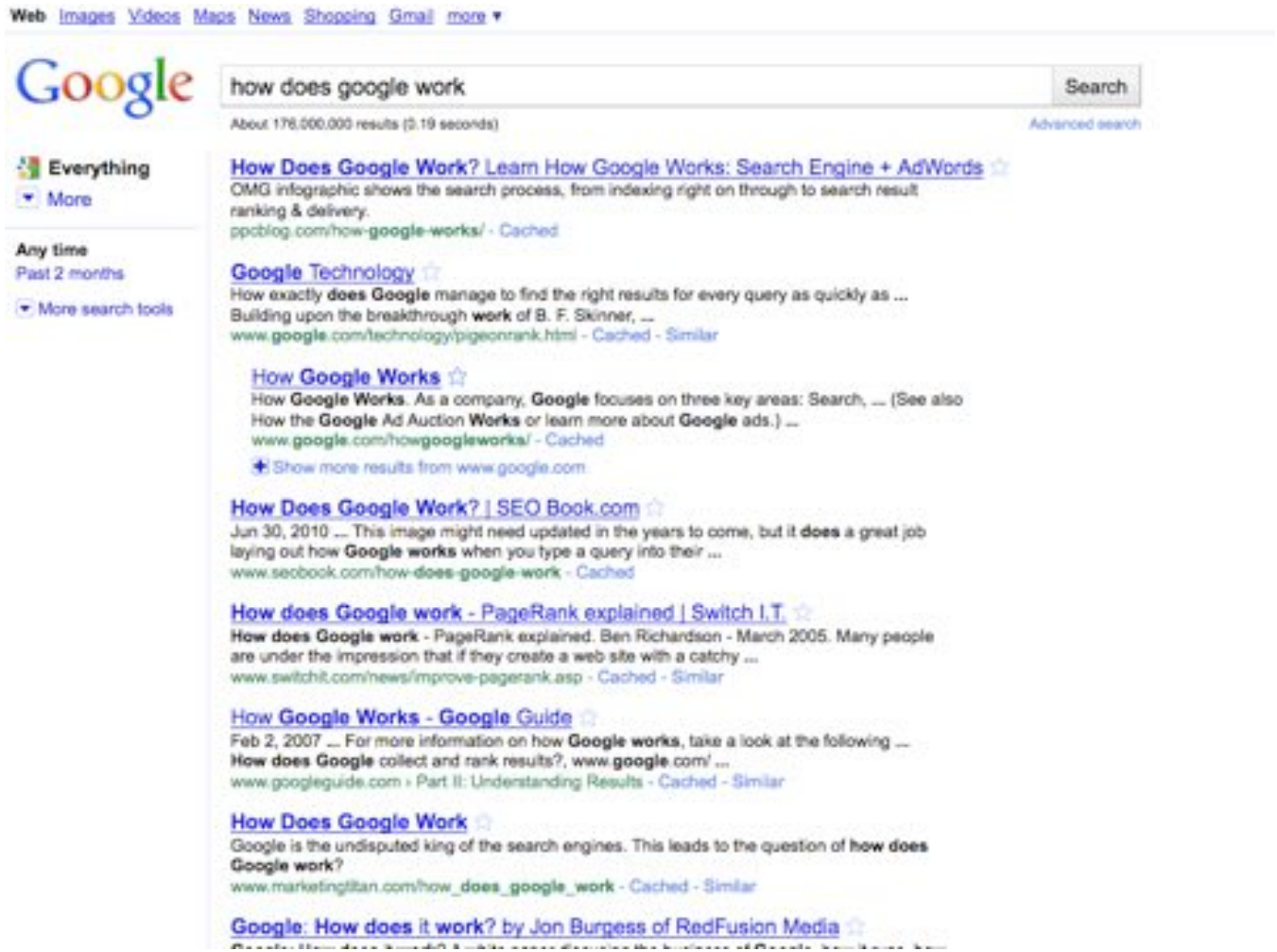


Computing Bestsellers on the fly

Why care about algorithms?

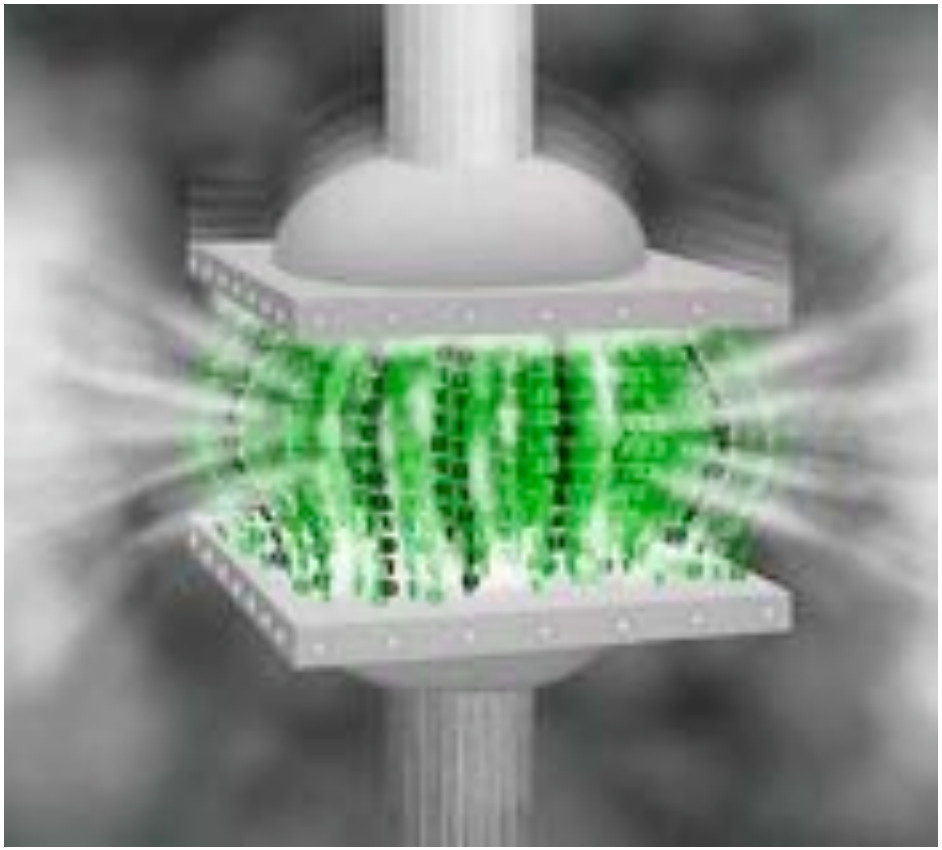
Booking cheapest air tickets

Why care about algorithms?



Google searches

Why care about algorithms?



http://www.di.ens.fr/~cherniav/teaching.html

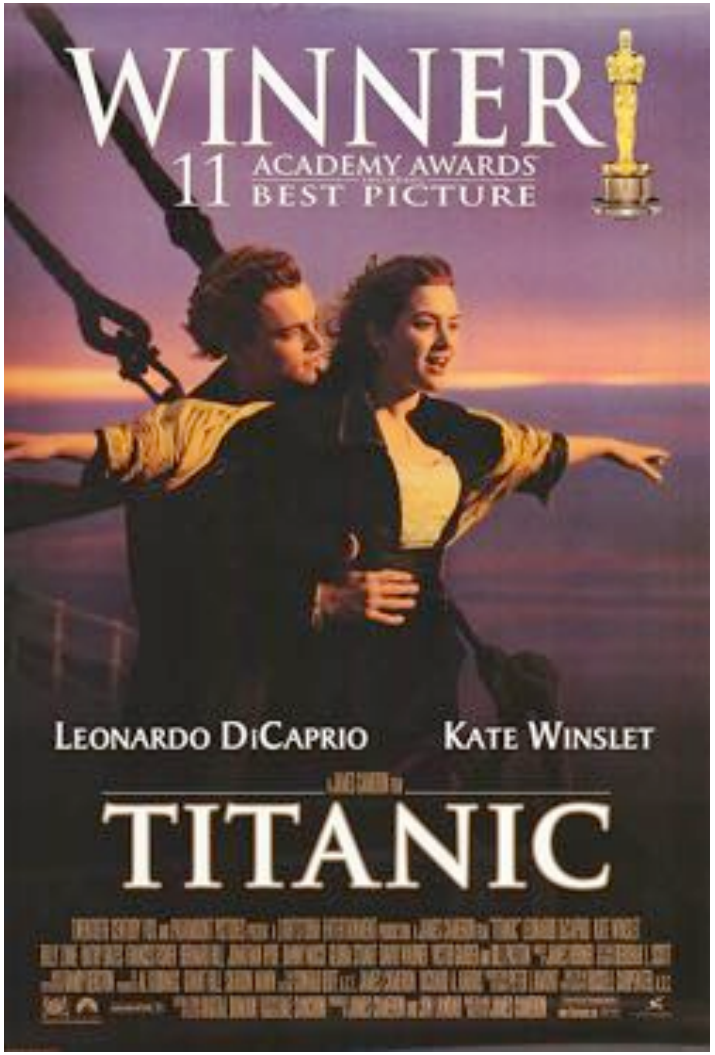
Data compression

Why care about algorithms?

http://www.switched.com/2010/02/11/fix-dvd-scratches-using-a-banana-and-toothpaste/ courtesy: Unplgd

Error correction

(And I could) go on…



http://www.movieposter.com/poster/MPW-33672/Titanic.html

Find out for yourself

Mini project: Video on social impact of algorithm. Groups of size = 3

CSE 331 Syllabus Piazza Schedule Homeworks Autolab Mini Project Support Pages

CSE 331 Mini Project

Fall 2017

Details and motivations for the mini project.

Under Construction

This page is still under construction. In particular, nothing here is final while this sign still remains here.

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 is common place in many aspects of society. The main aim of the mini-project is to have you explore in some depth social implications of algorithms.

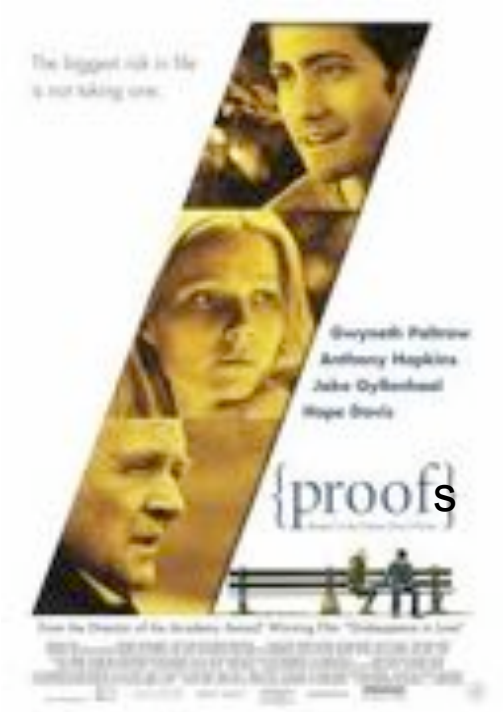
Just to give two examples for such implications:

- Algorithms are pervasive in financial transactions and these algorithms have consequences beyond just trading:

Questions/Comments?

Now about the course

We'll do loads of



http://www.impawards.com/2005/proof.html

Writing down your thought process formally and precisely!

The language of proofs

Brad Pitt had a beard

waleg.com

Every goat has a beard

animaldiversity.org

Hence, Brad Pitt is a goat.

Why do proofs?

Makes you think logically about problems and solutions

From a friend who works on Google Maps:

> Proving that the algorithm I am implementing is correct helps me identify corner cases

CSE 331 Support Pages

Why should we do proofs?

We will focus a lot on proofs in CSE 331. In this document I will motivate why doing proofs is good even though you might not do proofs for a living. While doing this, we will also go through examples of how to write algorithm ideas and details as well as proof ideas and details (which you will need to write in your homework solutions).

Some reasons to do proofs

In this section, I will lay out some reasons why I think it is beneficial for you guys to do proofs. The first two are probably more along the lines of "if you do proofs for a living" situation. The rest of the reasons should be valid for all of you. I will try and make the reasons as concrete as possible: in the next section, we will consider algorithms for the specific problem of generating all permutations (recall that we previously had punted on designing an algorithm for this problem).

Sometimes you might not have a choice

One of the easiest way to verify an algorithm idea you have is to code up the algorithm and then test it on some (say random) inputs. However, sometimes this might not be a choice. E.g. if you work on Quantum Computing, then you do not have a quantum computer to run your quantum code on! So currently pretty much the only choice you have is to prove that your algorithm is indeed correct. For example, one of the crowning achievements of quantum computing is Shor's algorithm to computes the factors of large numbers efficiently on a quantum computer (that recall does not exist yet!). (You might also want to read Scott Aaronson's high level description of Shor's algorithm.) The reason why factoring large numbers is important is that if one can solve this problem efficiently then one can break the RSA cryptosystem. RSA is used everywhere (e.g. when you use your credit card online, RSA is used to make the transaction secure), so this is a big deal.

http://www-student.cse.buffalo.edu/~atri/cse331/support/proofs/index.html

A common complaint

Your examples in class look nothing like HW questions.

True because….

zazzle.com

False because…

HWs and exams will test your **understanding** of the material

To get an A in the class

Have to get at least 90.000000000000000000000%

Rest graded on the curve

A cautionary tale…

When I was an undergrad

- Took algorithms as a sophomore

Understood all the lectures

Did not study outside of lectures

- (We had no homeworks)

Did decent on the mid-term

Nearly flunked the finals

Got a **C**

Questions/Comments?

How we will make 331

What we'll strive to do

Help you with your questions and/or doubts

If need be, email us for time outside of regular office hours

We’re not mind readers

If you need it, ask for help

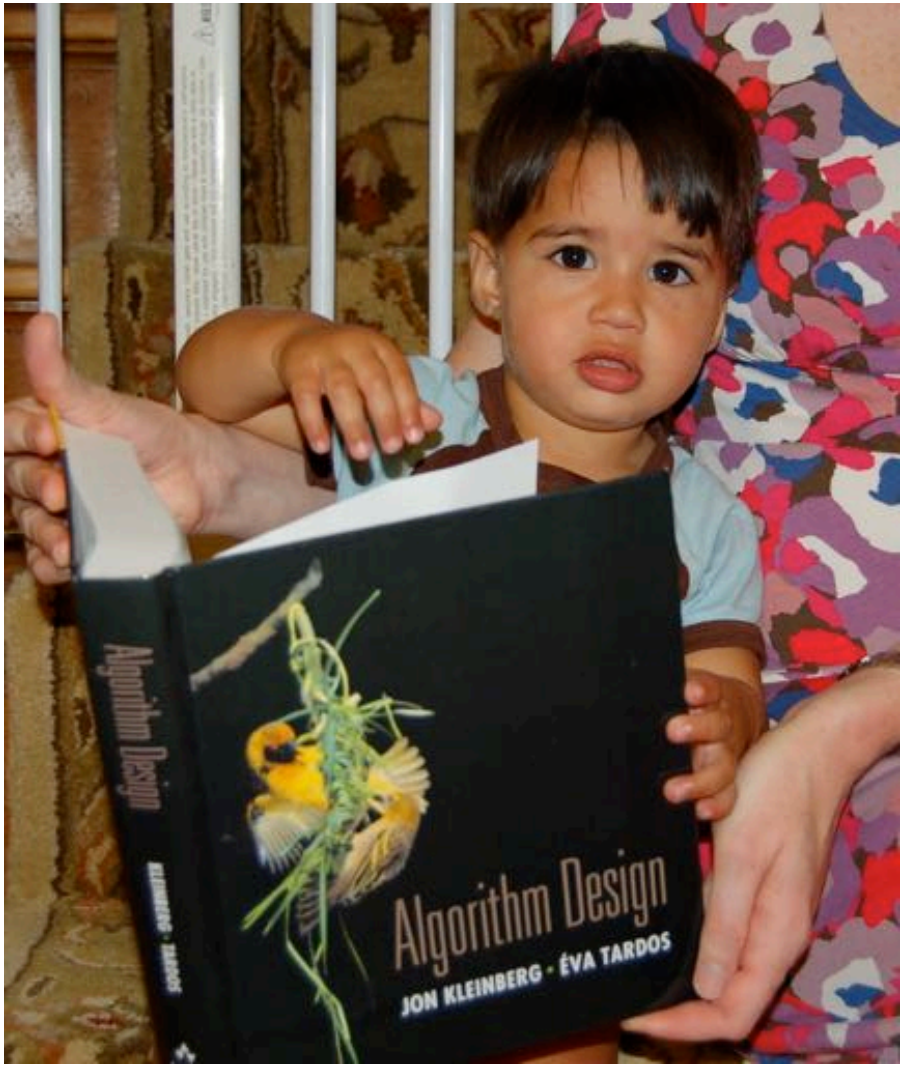
More chances to recover

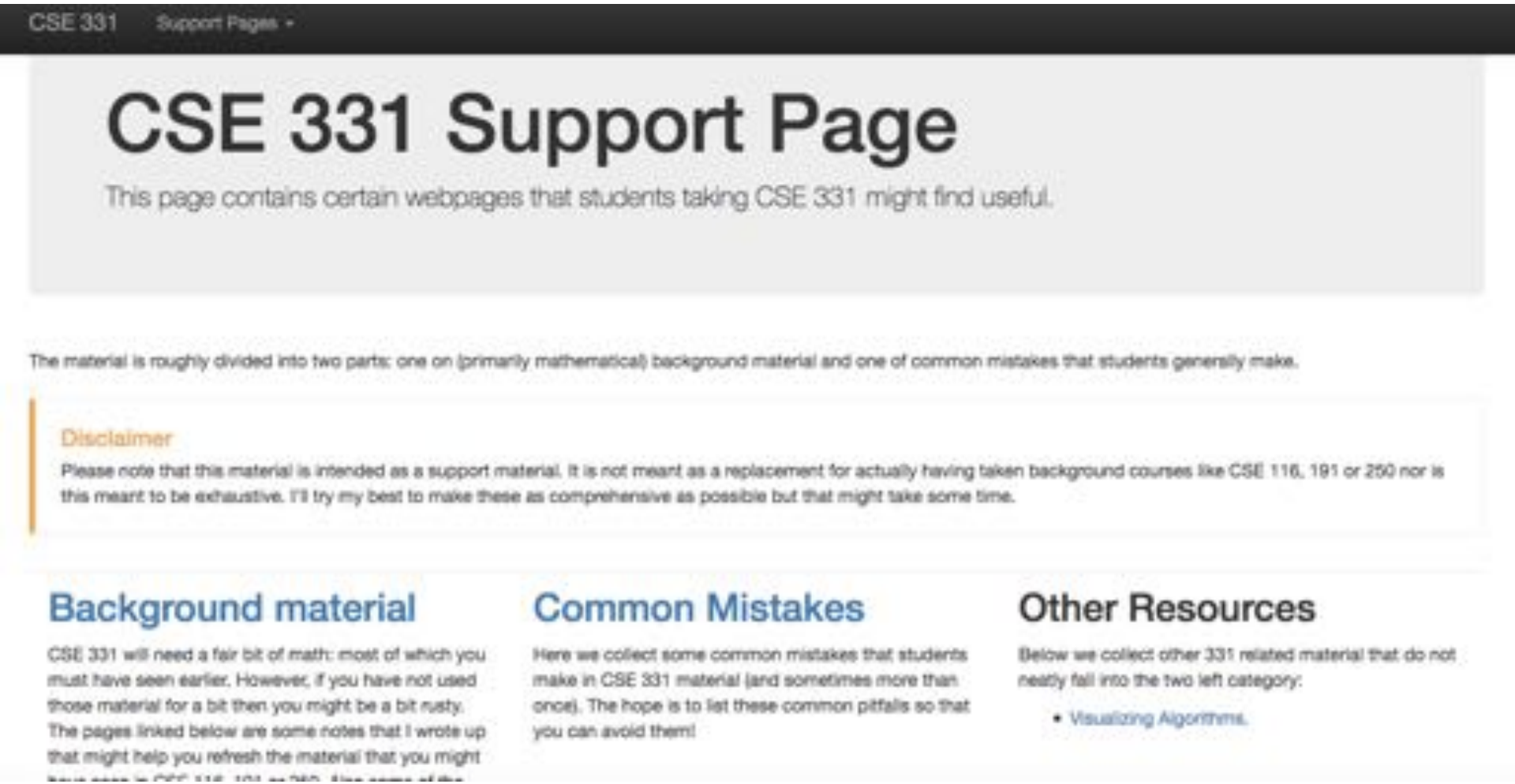
Lowest three HW scores will be dropped

If you do better on the final exam than the mid-term exam

then only final exam score will count

Follow the Textbook





http://www-student.cse.buffalo.edu/~atri/cse331/support/index.html

The cautionary tale has asilver lining…

C in undergrad algorithms

Ph.D. in algorithms/complexity

The only way to do well is to work hard