

Lecture 40

CSE 331

Dec 7, 2019

Extra OHs next week

note ☆

stop following

72 views

Extra 331 hours next week

Over the finals week there will be few extra office hours and Q&A sessions as mentioned below. Few comments:

- There *might* be one or two more additions over the next couple of days
- You will be able to pick up copies of solutions to HWs 1-10 in **any** of these times below
- Q&A sessions will be communal office hours in a bigger room-- so come prepared with your questions.
- Office hours will be like the usual office hours during the semester,

Here are the times for the **office hours**. They will all be in the usual place: **Salvador Lounge**

- Monday, Dec 9
 - 11am- noon: *Chinmayee*
 - noon- 1pm: *Hans*
 - 1-2pm: *Priyanka*
- Tuesday, Dec 10
 - 10-11am: *Tom*
 - 11am- noon: *Elijah*

Here are the times for the **Q&A sessions**. They will all be in **Davis 113A**:

- Wednesday, Dec 11
 - 2-3pm: *Nick*
 - 3-4 pm: *Supratik*

#pin

No undecidability on final

note ☆ stop following 87 views

No undecidability on the final exam

Since we covered undecidability in a grand total of 10 mins and even though I think it is an absolutely fascinating topic, I do not think it would be fair to ask y'all questions on a topic that we just spent 10 mins on. So the final exam will be up to all the topics we covered until NP-completeness of k-colorability.

The final exam post ([@1359](#)) has been updated with this information.

final

edit · good note | 0

Updated 1 day ago by Atri Rudra

All you need to know about final...

Final exam post

I'll start off with some generic comments:

- The final exam will be based on all the material we will see in class up to NP-completeness of k-colorability the Undecidability stuff (we'll most likely finish that stuff by Wednesday, Dec 4).
 - In case you want a head-start we will cover Sections 8.1-8.4 and Section 8.7 in the textbook. The undecidability stuff will be presented in the lecture only. For the rest the [schedule page](#) details what sections of the book we have already covered.
- Exam will be from **12:00pm to 2:30pm** on Friday, **Dec 13** in class (**Norton 112**). Note that the exam will be for 2.5 hours and *not 3 hours* as it says on HUB.
 - If you have **three or more exams scheduled on Dec 13**, please contact me **NO later than 5PM on Wednesday, DECEMBER 4**. *If you contact me after Dec 4, I won't be able to accommodate any re-scheduling request.*
- **DO NOT FORGET TO BRING YOUR UB CARD TO THE EXAM (@1360)**

Next are comments related to **preparing for the finals**:

1. Take a look at the sample final ([@1354](#)) and spend some quality time solving it. Unlike the homeworks, it might be better to try to do this on your own. Unlike the sample mid-term, this one is an actual 331 final exam so in addition to the format, you can also gauge how hard the final exam is going to be (your final exam will be the same ballpark). However as with the sample mid-term, you make deductions about the coverage of topics at your own peril (but see points below). Once you have spent time on it on your own, take a look at the sample final solutions ([@1354](#)).
2. We will have some extra OHs on Mon Dec 9 to Wed Dec 11 ([@1417](#)).
3. The actual final will have the same format as the sample final: The first question will be T/F, 2nd will be T/F with justification, the rest of the three will be longer questions and will ask you to design algorithms (parts of them might be just *analyzing* an algorithm.)
4. For the T/F questions (i.e. the first two questions), anything that was covered in class or recitations is fair game. If you want to refresh your memory on what was covered, take a look at the [schedule page](#). If you want quick summaries of (almost all) the lectures, review the [lecture notes or slides or videos](#).
5. To get more practice for the T/F questions, review all the T/F polls on piazza.
6. For the remaining 3 questions, one will be on greedy algorithms, one will be on divide and conquer algorithms and one will be on dynamic programming. However, note that Chapter 2 and 3 in the book are basic stuff and almost any question in the final could fall under the purview of those two chapters. There will be **at least** one T/F and one T/F

Bring our UB card to the final

note ☆

stop following

122 views

Assigned seating for final exam

Your seating for the final in Norton 112 will be assigned (and you won't be able to sit wherever you find a spot as it was for the mid-term).

I will release more details by Wednesday, Dec 11. In the meantime, two important things to remember:

- **You will HAVE to have your UB card on you during the exam**
 - A TA will come and verify that you are seated in the correct row
- To facilitate the TAs checking your UB IDs, **please keep your bag in the front of the room** (i.e. not with you).

final

edit

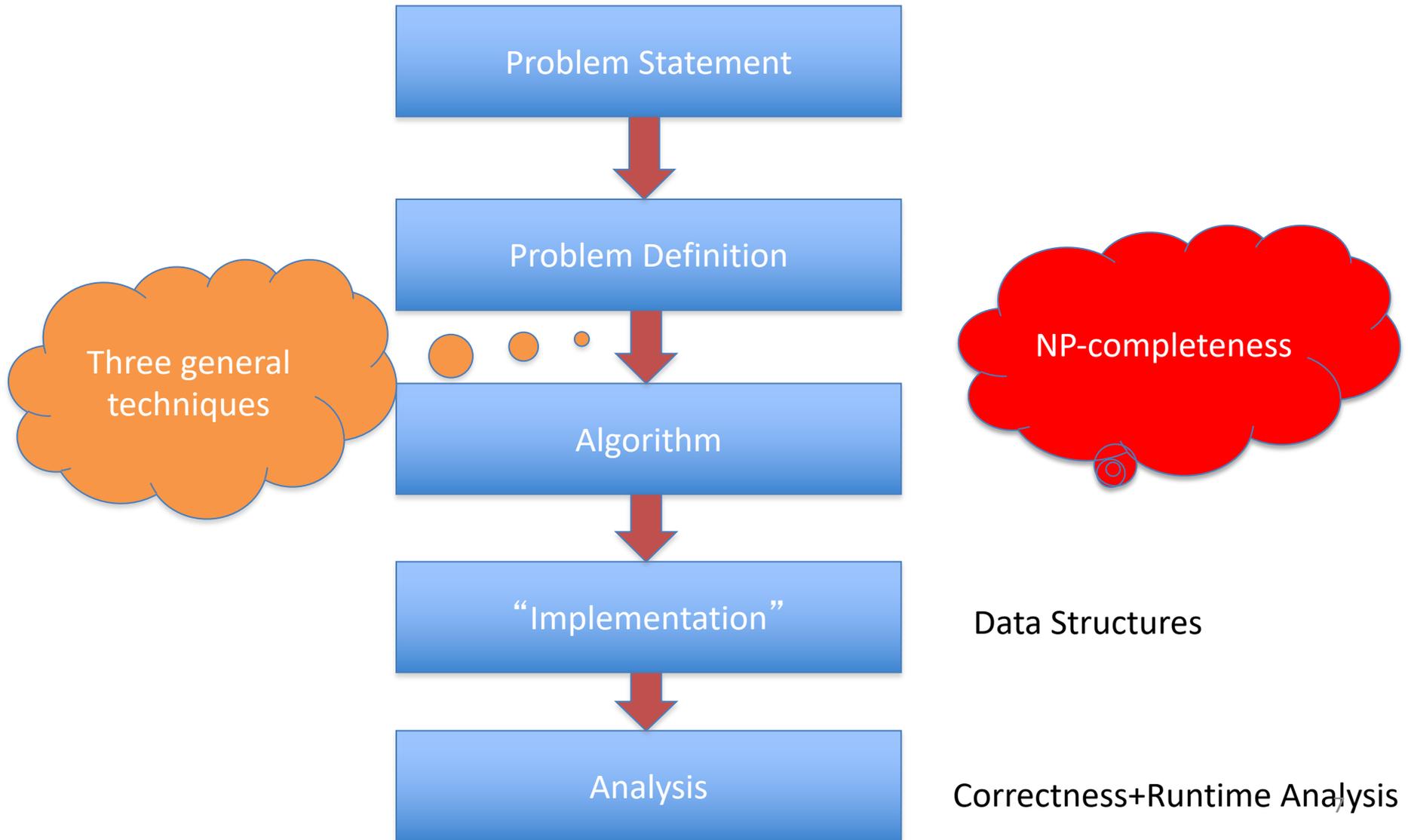
good note | 0

Updated 10 days ago by Atri Rudra

HW 10 solutions

After the *end* of the lecture

High level view of CSE 331



Now relax...



Randomized algorithms

What is different?

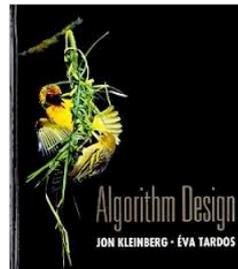
Algorithms can toss coins and make decisions

A Representative Problem

Hashing

Further Reading

Chapter 13 of the textbook



<http://calculator.mathcaptain.com/coin-toss-probability-calculator.html>

CSE 432 in Spring
20!

Approximation algorithms

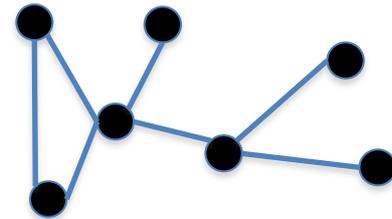
What is different?

Cool twist: NP-hardness of approximations!

Algorithms can output a solution that is say 50% as good as the optimal

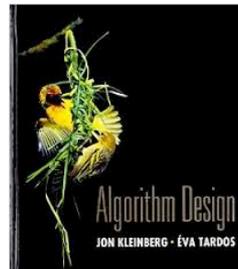
A Representative Problem

Vertex Cover



Further Reading

Chapter 12 of the textbook



Online algorithms

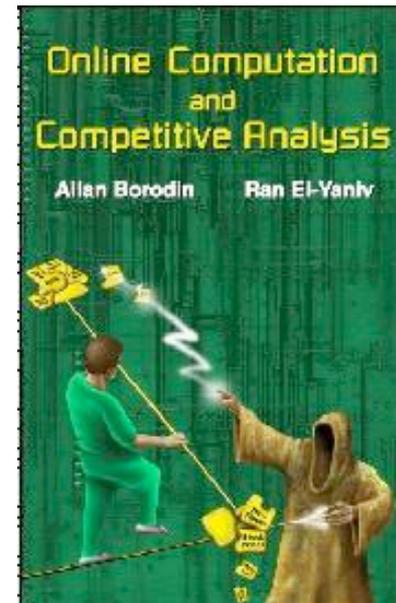
What is different?

Algorithms have to make decisions before they see all the input

A Representative Problem

Secretary Problem

Further Reading



Data streaming algorithms

What is different?



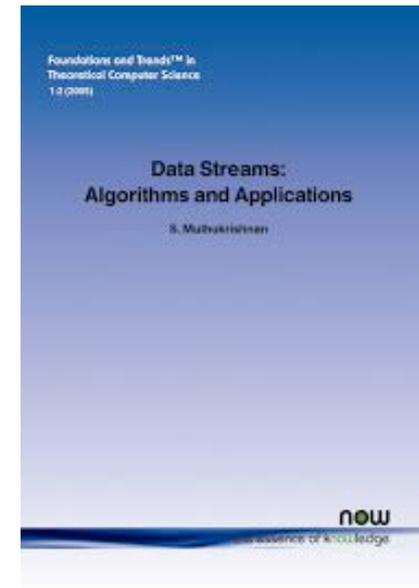
<https://www.flickr.com/photos/midom/2134991985/>

One pass on the input with severely limited memory

A Representative Problem

Compute the top-10 source IP addresses

Further Reading



Distributed algorithms

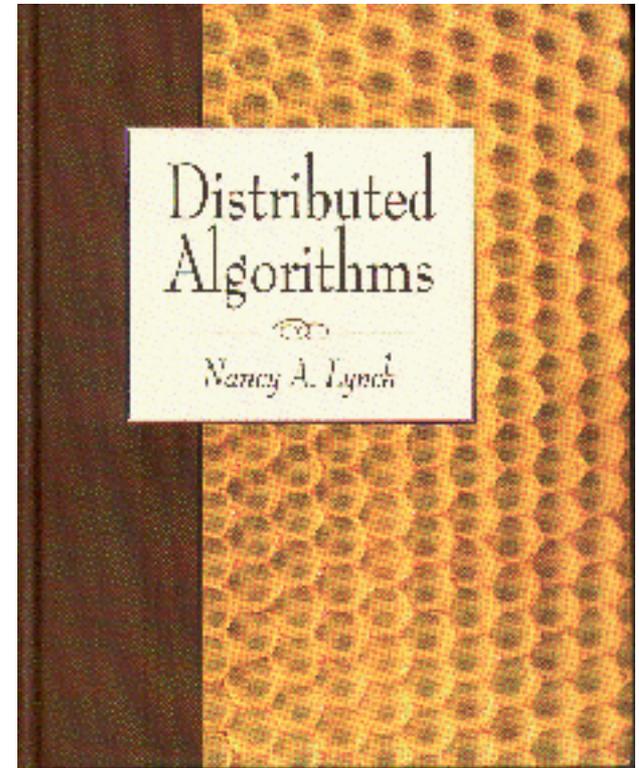
What is different?

Input is distributed over a network

A Representative Problem

Consensus

Further Reading



Beyond-worst case analysis

What is different?

Analyze algorithms in a more instance specific way

A Representative Problem

Intersect two sorted sets

Further Reading



<http://timroughgarden.org/f14/f14.html>

Algorithms for Data Science

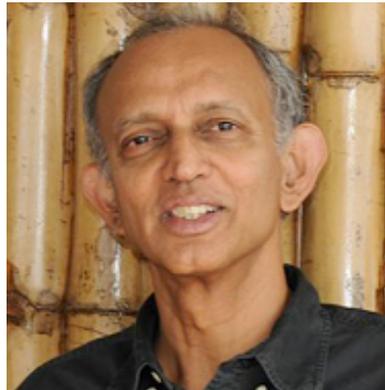
What is different?

Algorithms for non-discrete inputs

A Representative Problem

Compute Eigenvalues

Further Reading



Algorithms and Society

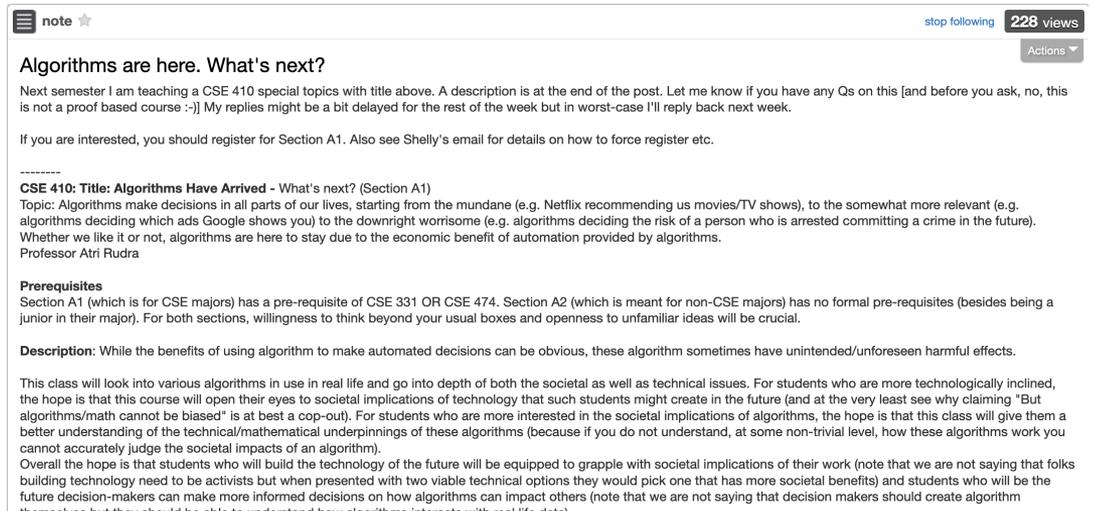
What is different?

Measuring and correcting for harms caused by Algorithms

A Representative Problem

Bias in ML

Further Reading



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Algorithms are here. What's next?

Next semester I am teaching a CSE 410 special topics with title above. A description is at the end of the post. Let me know if you have any Qs on this [and before you ask, no, this is not a proof based course :-)] My replies might be a bit delayed for the rest of the week but in worst-case I'll reply back next week.

If you are interested, you should register for Section A1. Also see Shelly's email for details on how to force register etc.

CSE 410: Title: Algorithms Have Arrived - What's next? (Section A1)
Topic: Algorithms make decisions in all parts of our lives, starting from the mundane (e.g. Netflix recommending us movies/TV shows), to the somewhat more relevant (e.g. algorithms deciding which ads Google shows you) to the downright worrisome (e.g. algorithms deciding the risk of a person who is arrested committing a crime in the future). Whether we like it or not, algorithms are here to stay due to the economic benefit of automation provided by algorithms.
Professor Atri Rudra

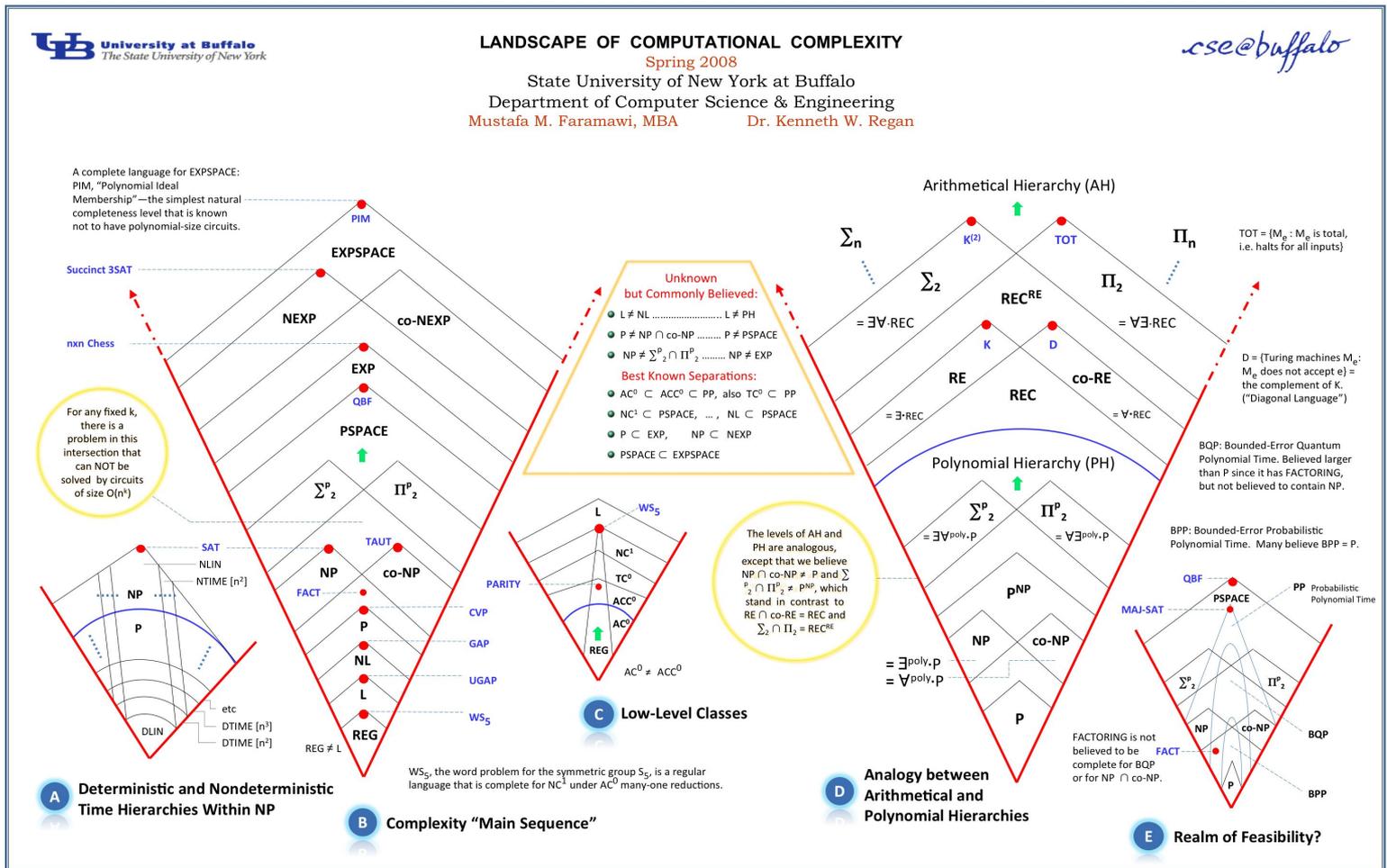
Prerequisites
Section A1 (which is for CSE majors) has a pre-requisite of CSE 331 OR CSE 474. Section A2 (which is meant for non-CSE majors) has no formal pre-requisites (besides being a junior in their major). For both sections, willingness to think beyond your usual boxes and openness to unfamiliar ideas will be crucial.

Description: While the benefits of using algorithm to make automated decisions can be obvious, these algorithm sometimes have unintended/unforeseen harmful effects.

This class will look into various algorithms in use in real life and go into depth of both the societal as well as technical issues. For students who are more technologically inclined, the hope is that this course will open their eyes to societal implications of technology that such students might create in the future (and at the very least see why claiming "But algorithms/math cannot be biased" is at best a cop-out). For students who are more interested in the societal implications of algorithms, the hope is that this class will give them a better understanding of the technical/mathematical underpinnings of these algorithms (because if you do not understand, at some non-trivial level, how these algorithms work you cannot accurately judge the societal impacts of an algorithm).

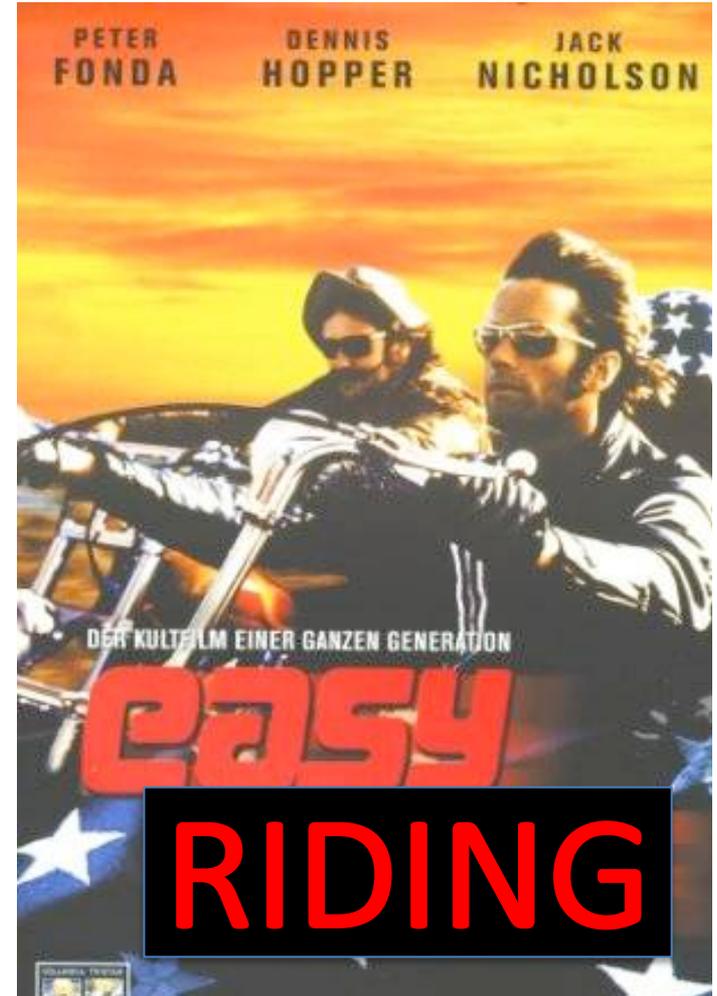
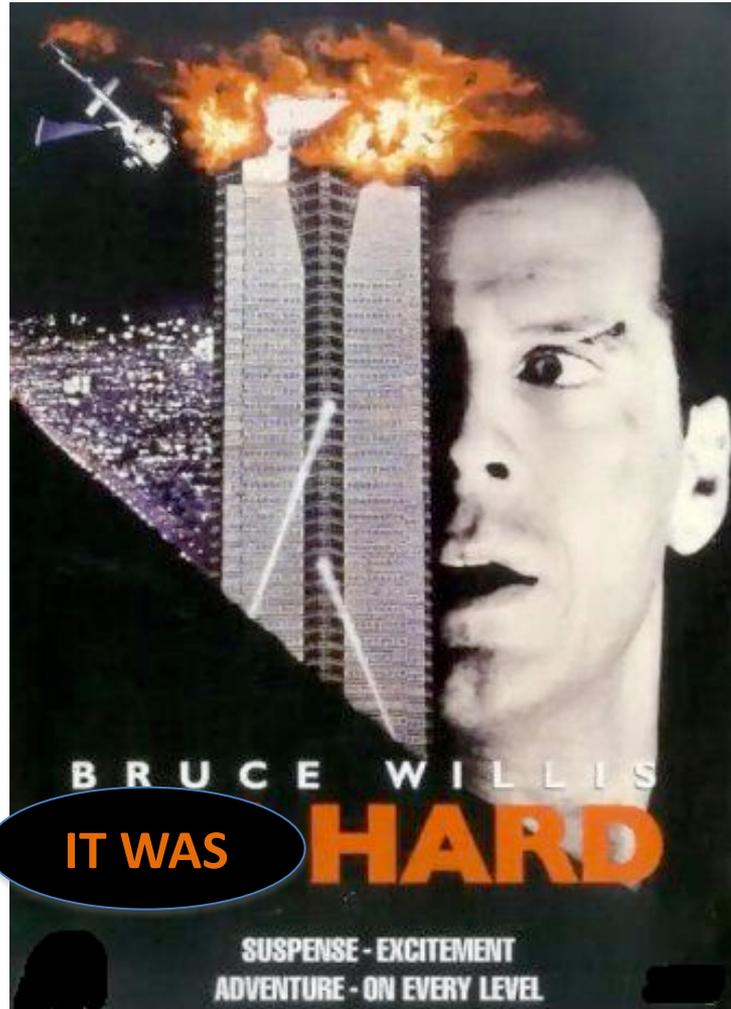
Overall the hope is that students who will build the technology of the future will be equipped to grapple with societal implications of their work (note that we are not saying that folks building technology need to be activists but when presented with two viable technical options they would pick one that has more societal benefits) and students who will be the future decision-makers can make more informed decisions on how algorithms can impact others (note that we are not saying that decision makers should create algorithm themselves but they should be able to understand how algorithms interact with real life data).

Anything > NP and < undecidability?

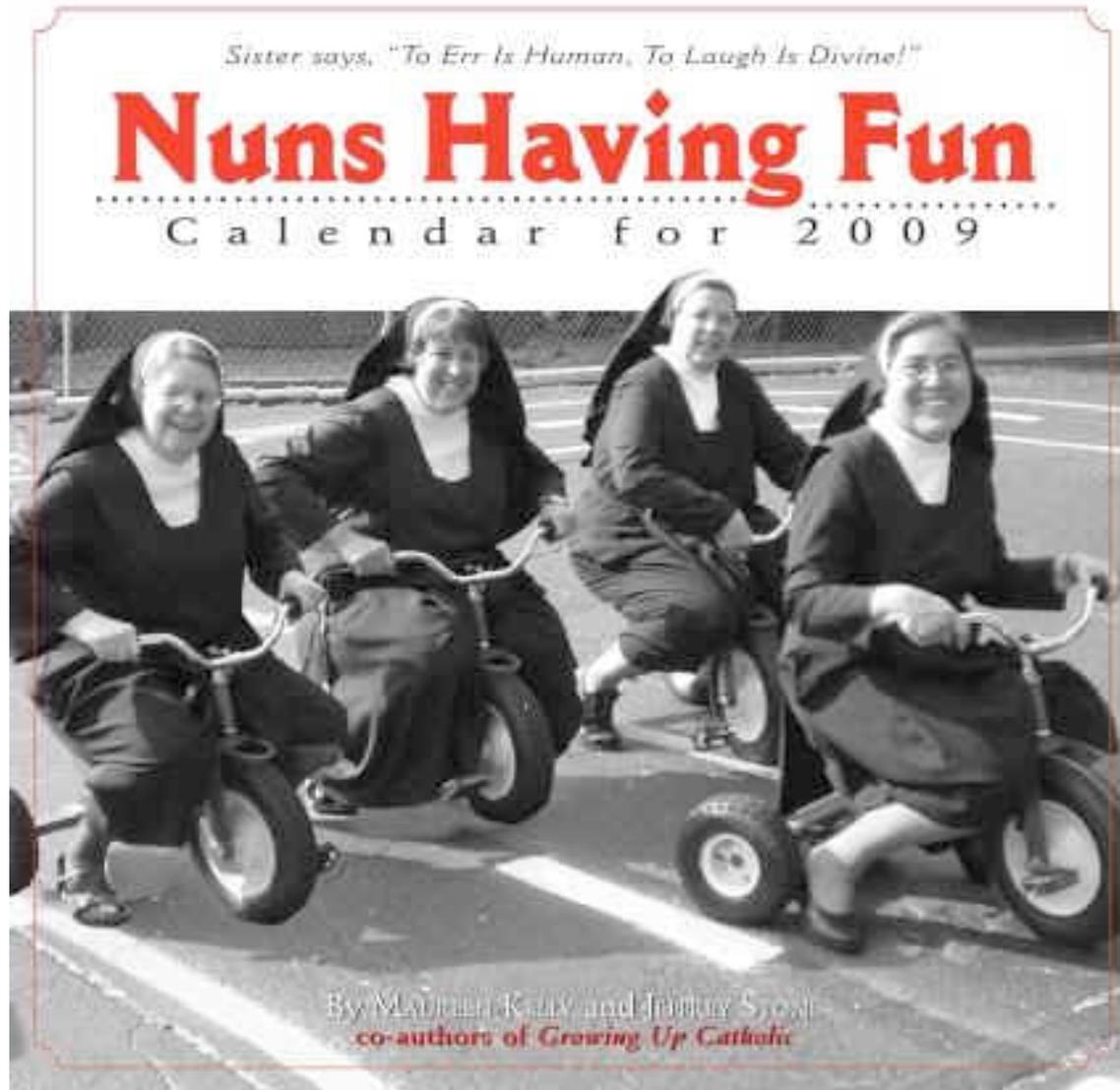


Q & A session

Whatever your impression of the 331



Hopefully it was fun!



Thanks!



Except of course the final exam