Lecture 1

CS 161 Design and Analysis of Algorithms

Ioannis Panageas

Course staff

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Raj Mohanty (mohantyk at uci dot edu)
Office hours: Friday 1:00-2:00pm (subject to change)

Nikolas Patris (npatris at uci dot edu)
Office hours: Wednesday 3:00-4:00pm

Renascence Tarafder Prapty (rprapty at uci dot edu)
Office hours: Wednesday 3:00-4:00pm

Course material

We will use canvas for announcements. Slide materials will be posted on https://panageas.github.io/algo2023/

We will use gradescope for posting homeworks and grading.

We will be using Piazza for questions of general interest about the course material, the homework, and the tests
https://piazza.com/uci/spring2023/cs161

Required Textbook

- Algorithm Design and Applications, by M. T. Goodrich and R. Tamassia.

Recommended Textbook

- Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.

Grading

- Homeworks: 24%
  - There will be given 4 Homeworks to solve (+5% bonus for using **Latex!**).
- Midterms: 25+25%
  - There will be given 2 midterms, on Thursdays of week 5 and 9. Each midterm will contain topics from all taught previous weeks.
- Final : 25%
  - Material from all weeks.

+1% for Course Evaluation

Letter Grades

- Not a straight scale nor straight curve

- 90% and up guaranteed some sort of A or A-
- 80% and up guaranteed at least B-
- 70% and up guaranteed at least C-

Submitting Assignments

- Written assignments in Gradescope
  - Must be legible
    - If you have messy handwriting, type your homework!
    - Bonus 5% for Latex!
  - Must be on-time.
  - Deadline: Fridays 23:59pm (see syllabus)

- Programming assignments in Gradescope
  - Code must be in python and need to pass test cases

Exam Dates and Rules

- The exams are held on the days listed (syllabus)
  - See policy in syllabus, **no** makeup exams
- Exams will not be excused for reasons within your control.
- If there is a valid reason (needs approval from instructor) for missing an exam, the grade will be **split equally** among the other components.

Academic Integrity Policy

- If you need help, see:
  - Ioannis
  - TAs
- Plagiarism risks an F in the class and more.
- The following are examples of **not okay**:
  - Chegg
  - CourseHero
  - StackOverflow
  - GeeksForGeeks
  - Quora
  - Github (generally)
  - Chatgpt or related platform

Collaboration with classmates

- You can discuss some things freely with others:
    - What a problem is asking
    - How to do a non-homework or non-exam problem
    - How something from lecture worked
- You should **never**:
    - Show your homework assignment to someone else
    - Write your solutions from notes taken outside lecture / discussion
    - Seek homework solutions from outside sources -- especially online!
    - Tell a student specifically how to solve a homework problem
- Penalty for academic dishonesty: F in the course.

Commercial Note Taking

- It is prohibited to be paid to take notes
- It is prohibited to sell your notes from this class
- Do not upload course materials
  - Do not upload handouts
  - Do not upload returned exams
  - Do not upload lecture slides
- Violations are violations of student conduct code

To-Do This Week

- Read the syllabus
  - Treat it as though it’s a reading assignment.
  - Main document plus associated policy documents
- Review Prerequisites
  - Help is available all week, including at all discussion sections
- Programming Assignment 0
  - Get familiar with Gradescope

What is algorithm

- Algorithm is a procedure for solving a task

e.g. how do you sort a cart of books in increasing order of the volume number? (i.e. volume 1, volume 2, volume 3….)

- Bad algorithm: compare all books, put smallest volume in the beginning and repeat.

- Clever algorithm: divide the cart into two, sort the first half, sort the second half, merge them.

What is algorithm

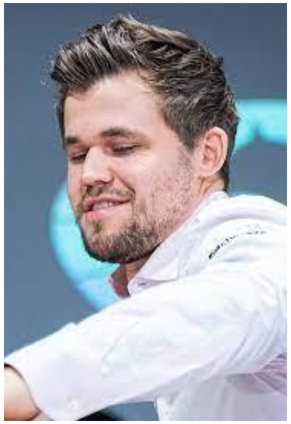
- Algorithm is a procedure for solving a task

e.g. How to find the best travelling time between from a station to any other station?

- Bad algorithm: manually find the travelling between each station.
- Clever algorithm: just record the travelling time between consecutive stations, then use the Dijkstra shortest path algorithm.

Case study: Finding a Celebrity

Since coming to UC Irvine, has anyone met a celebrity?



What is a celebrity?

- Within a group of people *G*,

  we say a person *p* is a celebrity (famous) if:
  - Everyone knows who *p* is

    (celebrities must be known by everyone)
  - Person *p* does not know who anyone else is

- Goal: Find a celebrity from *G* if there exists one.

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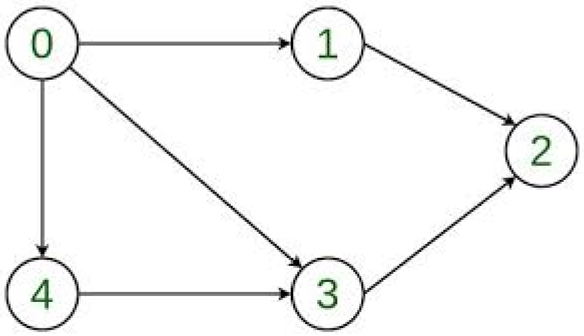
Model the problem as a directed graph:

0 knows 1, 0 knows 3, 0 knows 4

1 knows 2, 3 knows 2, 4 knows 3



Brute force approach

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    - How efficiently can I check if person *p* is a celebrity?

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Can we do better?

Faster approach

- Put all the members in a list (arbitrary order)
    - Pick the first two members of the list, let *p, q.*
    - Check if *p knows q.*

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- Repeat the above process. At every iterate, we remove one person.

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Check if this remaining person is a celebrity.

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