Intro to CSIE1212-01: Data Structures and Algorithms 資料結構與演算法

Jyh-Shing Roger Jang (張智星)
CSIE Dept, National Taiwan University

What You Need to Do in DSA

- 5 questions to be raised in class
- Weekly quizzes (You can safely skip one of them)
- Reading assignments for flipped learning
- 6 homework sets: Hand-written and programming
- Midterm exam: Hand-written and programming
- Final project: Programming

Time consuming!

DSA at NTU As good as the best ones in the world
➔ Be prepared to work hard!

If you finish all of the above, it's hard not to pass!

Course Goals and Prerequisites

- Goal
  - Use software to synergize two resources effectively
    - Computation: CPU, GPU, etc.
    - Storage: memory, disk, network, etc.
- A program is…
  - Algorithms + Data Structures = Programs
- Prerequisites
  - C: required
  - C++: preferred (You need to catch up soon!)
  - High-school math

Course Outline

For Evaluation…

- C++ basics
- Arrays, linked lists, recursion
- Analysis tools
- Stacks, queues, and deques
- Trees
- Heaps and priority queues
- Hash tables, maps, and skip lists
- Search trees
- Sorting
- Strings and dynamic programming
- Graphs

Textbook and Reference

- Textbook: Data Structures and Algorithms in C++, 2nd edition by Goodrich, Tamassia, and Mount.
  - Only selected topics will be covered
  - Learning to read a textbook is part of the course
- Reference: Fundamentals of Data Structures in C++, 2nd edition by Horowitz, Sahni, and Mehta
  - Some supplementary material comes from this reference
  - It is also a popular textbook for DSA

About the Instructor

- J.-S. Roger Jang 張智星
  - Email: jang@mirlab.org
  - Skype: roger_jang
  - Mobile: 0953-154-045
  - Office: 德田館 509
- Office hours
  - Right before/after our class, or by appointments
- Research
  - Applications of AI/ML to real-world problems, including music analysis & retrieval, speech scoring, speaker recognition, image recognition, fintech, etc.
- Teaching
  - Has taught DSA 7 times

More about the Instructor

- The instructor is friendly and willing to help...
  - Will you repeat the previous code/slide? Yes!
  - Will you discuss with me after class if necessary? Yes!
  - Will you pardon my silly questions? No question is silly at all!
- He is also ambitious and willing to experiment with new ways of teaching!
  - Flipped learning/classroom
  - Group learning

Any feedbacks and suggestions for effective learning/teaching are highly welcome!

About TAs

- TAs
  - 學士班：蔡昀達、張凱捷、施長元
  - 碩士班：李岳庭、蕭勝興、陳宣伯、傅皓群、翁仲威
- Mailing alias: ta4dsa@mirlab.org
  - All the TAs and instructor receive emails to this account.
- Office hours
  - One hour per week for each TA (To be announced on FB)
- TAs will try their best to help your learning in DSA, and you should pay due respect to them too!

Important Links

- Websites for DSA
  - DSA websites: for schedule and homework, etc.
  - DSA on Facebook: for announcements and discussions, etc.
  - CEIBA: for mailing list, records of scores, etc.
    - https://ceiba.ntu.edu.tw/1062dsa
- Recordings for DSA
  - Since 2015, see DSA website

Rules of the Course

- Will you give me a second chance if I copy homework from other people? No.
- Could you let me pass because I will be kicked out by the ½ rule? No.
- Will you change my score upon my request? No, unless it is a mistake on our part

Be prepared to follow the rules if you take the course!

No cheating!
No lying!
No plagiarism!

Grading Policy

- 10% for course participation
  - 2% for each in-class question/answers
  - 2% for each FB answering
- Quizzes: 15%
- Homework: 25%
- Midterm exam: 25%
- Final project: 25%

Don't miss this part!

Final grades are based on scores and ranking.
The instructor reserve the rights to
- Adjust percentage of each categories if necessary
- Determine the way to combine scores and ranking

More about Grading

- Grade statistics
  - Usually we have 30%~40% of A+ and A
- Grade computation
  - Raw score computation in double ➔ rounding to integers ➔ final letter grades
- The final grade won't be modified unless it is due to mistakes on our part
- Only A+ students are qualified for recommendation letters from me (for advanced study, etc.)

About Homework

- All programming homework are to be carried out in C++.
- Draft of homework will be given 2 weeks before the deadline. Final specs will be given 1 week before the deadline
- Discussions are encouraged. Plagiarism is strictly prohibited!
- About deadlines
  - No extension allowed unless you have legitimate reasons
  - Overdue penalty for homework, up to a delay of 7 days
    - 80% weighting for overdue of 0-24 hours
    - $(80\%)^2$ weighting for overdue of 24-48 hours
    - $(80\%)^3$ weighting for overdue of 48-72 hours
    - …

About Flipped Learning

- Before you come to the class
  - Watch assigned videos
  - Read assigned material
  - Try out related examples and understand them
- During the class
  - Coverage of hard-to-understand parts
  - Questions and answering
  - Quiz
- After the class
  - TA office hours and 演習課
  - Homework

Due diligence!

Golden Rule to Pass the Class

- Catch up from day 1!
- Ask questions (in class or on FB)
- Discuss with classmates and TAs
- Have fun (and spend hours) writing programs
- Understand theorems and proofs

If you try your best to finish all the requirements, it's hard not to pass!

Do I Need to Take the Course?

- I want to major in CS ➔ Yes!
- I want to find a job related to core CS ➔ Yes!
- I want to know basic programming ➔ No!
  - You should consider NTU micro courses of CS+X
- I want to do programming for my research ➔ No!
  - You should consider
    - Scientific Computing (MATLAB)
    - Courses of Machine Learning offered at NTU/CSIE

About Enrollment

- Ask yourself why you want to take this class (See prev slide)
- Extra enrollment will be taken up to the classroom's limit
- Auditing is also welcome.

Think before you choose to enroll.
If you have chosen to do so, welcome aboard!

Todo List for Week 1

- Make sure you are well connected
  - Understand the class policy thoroughly.
  - Make sure your email on CEIBA is good.
- Homework for week 1
  - See our DSA schedule page

Welcome aboard!
Any questions?