CSIE1212: Data Structures and Algorithms

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Course Introduction, February 20, 2024

Agenda

Todo

- introduction by Hsuan-Tien
- introduction by Hsin-Mu
- motivation to DSA

Three Warnings Before (Signing for) the Course (1/3)

警告: High Expectations

- goal of NTU DSA class:
  as good as the best ones in the world
- tentatively, 1+4 homework sets, 12 mini homeworks, 3 activities, midterm exam, final exam
  (`https://cool.ntu.edu.tw/courses/36558`)
- writing assignments and time-consuming programming assignments

be prepared to **work hard**!

Three Warnings Before (Signing for) the Course (2/3)

警告: Strict Instructors

- 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 1/2 rule? No.
- Will you change my score from *F* to *C*? No.

be prepared to **follow the rules**!

Three Warnings Before (Signing for) the Course (3/3)

警告: Uncertain Outcome

- fourth time co-teaching a super big class together
- keep experimenting to scale
- still uncertainty post-pandemic
- How many people will not pass?
  We don't know yet.
- Will your investment (time) get good return (knowledge)?
  No guarantees, but we'll try our best.

be prepared to **take some risks**!

Wise Words

給資訊系的同學們：努力加油

給想加選的同學們：審慎考慮

Some Historical Notes

A while ago, when I was (we were) a freshman in NTU CSIE (1997).....

- 「計程」有兩學期，上學期教C，下學期教C++
- 大二上學期教「資料結構」
- 大二下學期教「演算法」

Then, in my senior year (2001).....

- 「計程」變成一學期，大一下學期教「物件導向程式設計」(Java)
- 大二上學期教「資料結構與演算法上」
- 大二下學期教「資料結構與演算法下」

Then, starting 2010.....

- 物件導向程式設計變爲選修
- 大一下學期教「資料結構與演算法」
- 大二上學期教「演算法設計與分析」

Reasons

- 兩學期的「計程」變成一學期、「物件導向程式設計」變成選修：
  相信同學們可以有自己學習不同語言的能力。
- 把「資料結構」及「演算法」合成一門課：
  兩者互相依賴，其實不容易分散來教。
- 把「資料結構與演算法上/下」區分成「資料結構與演算法」和
  「演算法設計與分析」：
  - 前者以實作爲主，銜接計程做更深入的程式練習
  - 後者以分析爲主，建立在前者的基礎上探討更多不同的演算法

Co-Teaching Information

- instructor:
  蔡欣穆 Michael Hsin-Mu Tsai (hsinmu@csie.ntu.edu.tw)
  林軒田 Hsuan-Tien Lin (htlin@csie.ntu.edu.tw)
- course webpage, announcement:
  https://cool.ntu.edu.tw/courses/36558/ (NTU COOL)
- casual (but interactive) discussion:
  discord (invite link in NTU COOL)
- course time: Tuesdays 13:20–16:20
  - first half (taught by Hsuan-Tien)
    - 20-min break in total liberally in the middle
    - 10-min earlier ending (i.e. usually ends 16:10) to be fair
    - office hour after class or by appointment
  - second half (taught by Michael): see next presentation

rule of thumb to facilitate passing:
interact with teaching team early and frequently

Co-Teaching: Enrollment and Classrooms

- type 3 with big upper-bound: effectively unlimited (?)
- rooms
  - main classroom: CSIE R103
  - other classrooms
    - CSIE R102
    - CSIE R104
  - absence: most lectures will be recorded and put on NTU COOL
  - auditing: welcomed (to sit) only if there is an empty chair

please think about loading before you choose to enroll

Teaching Assistants

- TAs: see NTU COOL for full list
- TA email: `dsa_ta@csie.ntu.edu.tw`
  - 23 TAs and 2 instructors around, usually faster than sending to individual
  - for homework questions, please tag your email (as instructed in the homework PDFs) for efficient processing
- office hours and formats: TBA

very friendly TAs; ask them more questions!

Three New Experiments this Semester (1/3)

12 mini-homeworks

- issue: big gap between (easy) course materials and challenging homework sets
- 12 mini-homeworks: practice course materials before solving homework sets
  - released weekly (for most weeks)
  - less pushing deadlines:
    first half: due 1 week after midterm exam;
    second half: due 1 week after final exam
  - 20 points each, maximum total of 200 points
    —only needs to solve 10 out of 12 to achieve maximum
  - equivalent to programming part of one homework set (to be explained)

mini-homework: more chances to get **basic score** even if you cannot fully solve other challenging homework problems

Three New Experiments this Semester (2/3)

more diverse TA hours

- issue: basement TA hours can be dreadful to some students
- encourage TA hours with different formats
  - some basement ones, as usual
  - some seminar-room ones that can facilitate discussion
  - possibly some topic-specific ones (TBA)
  - possibly some beginner-friendly ones (TBA)

diverse TA hours: more chances to connect with TAs **with your preferred style**—fewer excuses to keep yourself away from TAs

Three New Experiments this Semester (3/3)

clear expectation communication

- issue: expectations not clearly communicated
- early allocation announcement
  programming:writing:activity:midterm:final=20:20:10:25:25
- reasons:
  - every part counts: programming is not the only emphasis
  - every part capped: encourage balanced performance
  - expectation (assuming we teach well): A : 90. Usually this threshold is fine-tuned to a lower value in the end
  - beyond-expectation: $A+$: 95. We decided not to change this threshold this year to set a clear goal for top students.

clear expectation communication: **eliminate uncertainty and unnecessary anxiety**—towards better learning atmosphere

More About Grade

- programming
  - homework 0: two programming problems, 50 points each
  - homework homework 1-4: two programming problems each, 100 points each
    - one extended problem
    - one comprehensive problem
  - some regular homework may contain a few bonus points
  - mini-homeworks: 200 points max

```
prog = min(20, (total - min(hw1 prog, hw2 prog, ..., hw4 prog, mini-hw)) / 900 * 20)
```

—okay to not finish mini-homework if you do well on regular homework sets

- except A+ (95) and A ($\leq$ 90), other ranks are decided by sending the raw score through some post-decided thresholds, not just using default thresholds of university

no individual score change

Homework 0

- due within two weeks
- help us communicate expected background
- help you evaluate whether to take the course
- students enrolled: `https://dsa2024.csie.org/` judge account will be created and sent to you today
- students waiting/evaluating:
  - join NTU COOL as auditor (TAs can help) first to view homework
  - apply account with http://tinyurl.com/dsa24judge if you want to start submitting to judge

THE Principle

Taking any unfair advantages over other class members is not allowed.
It is everyone's responsibility to maximize the level of fairness.

Honesty

NO CHEATING

NO LYING

NO PLAGIARISM

very very very very serious consequences

Collaboration and Open-Book

- homework discussions: encouraged
- but fairness?
  write the final solutions alone and understand them fully
- references (books, notes, Internet, chatGPT):
  consulted, but **not copied from**
- no need to lend/borrow solutions

to maximize fairness (everyone's responsibility),
lending/borrowing/buying/selling/trading not allowed

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Deal? If your classmate wants to borrow homework from you, what do you say?

Plagirism vs. Safe

Plagiarism

- copy others' code, directly or replacing the variables with your own names
- ask another student to tell you her/his solution/code or debug your solution/code line by line
- copying some lines/summarizing from the shared discussion note of some students (online or offline)
- imitate an Internet solution

Safe

- ask classmate to give you solution hints, write down your solution with your own understanding of the hints
- ask classmate to share their ideas in debugging, and debug on your own
- find an Internet solution (e.g. via chatGPT), read thoroughly, and write down your understanding in your own words

line-by-line similarity $\Longrightarrow$ plagiarism

Homework

- students: justify solutions clearly
- TAs: evaluate solutions fairly
- no individual extension unless not violating the principle (e.g. institute-established cases of illness or emergency)

late penalty: linear increase from 0% to 100% after five days (e.g. lose 20% of value every day)

Textbook

Introduction to Algorithms, 4th edition, 2022, MIT Press by Cormen, Leiserson, Rivest, and Stein.

- the 'bible' to learn about algorithms
- **learning to read a textbook** can help you deepen your knowledge
- getting the book:
  - NTU Library: reserved copy in the shared course material area
  - R536: will put one shared copy to be read in the room
  - do not use a pirated copy (**respect copyright**!)
  - If the book is not affordable to you: email me (`htlin@csie.ntu.edu.tw`) privately and I'll see how I can help.

Mandarin and English

- Mandarin: main language
- English: often encountered
  —coding, website, assignments, some teaching . . .
  —important for your future and you are recommended to practice

don't be afraid of English

How to Pass the Class?

- interact with our friendly TA team!!!
  - keep interacting with TAs
  - interact casually through discord
  - email questions (with tags) welcomed too
- catch up from day 1
- ask questions (inside and outside class)!
- have fun writing programs
- understand writing proof
- face the difficulty gap between teaching and homework bravely and smartly
- be confident: yes, you can; yes, we can!

Enjoy the Class! Questions?