

CS Digital Builder / CS220

Introduction

Department of Computer Sciences
University of Wisconsin-Madison

Today's Topics

- Introductions
 - Who are we?
 - Who are you?
- Course overview
 - Why?
 - What?
 - How?

Who are we?

Instructor: Ashwin Maran

- Email: amaran@wisc.edu
- Fifth year PhD student at UW-Madison
- Specialize in Algorithms and Computational complexity



- Head TA of CS 220 for 5 semesters
- Associated with CS 220 for 8 semesters

Who are we?

Teaching Assistant: Jane Zhang

- Email: zhang2752@wisc.edu
- Graduate student at UW-Madison
- Second year Graduate student at UW-Madison
- Research interests: deep learning and large language models
- 5th time as TA CS 220
- 3rd time as TA for the AmFam section.



Who are you?

Introduce yourselves

- Name
- Where you are
- What you are working on
- Experience with coding
- Hobbies

Turn on your video, if
you can!

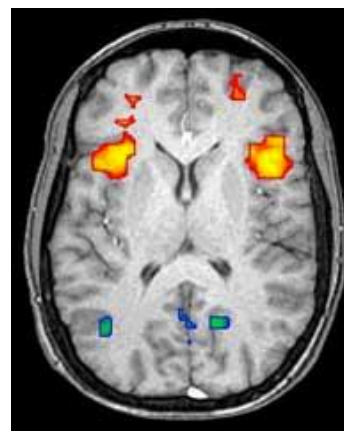
Why learn Data Science?

Data is now integrated into many fields

- Journalism
- Biology, physics, chemistry
- Psychology, sociology, economics, business
- Engineering (mechanical, electrical, industrial, etc)



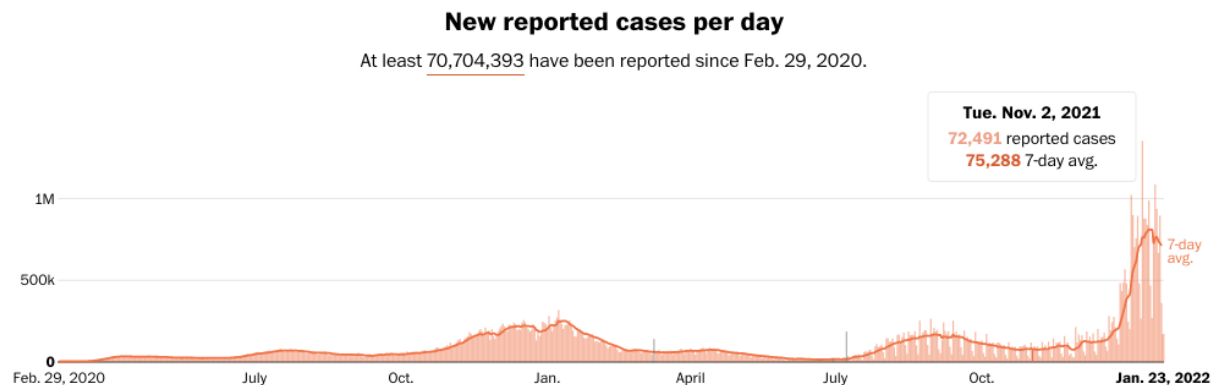
<https://fivethirtyeight.com/features/the-midwest-is-getting-drenched-and-its-causing-big-problems/>



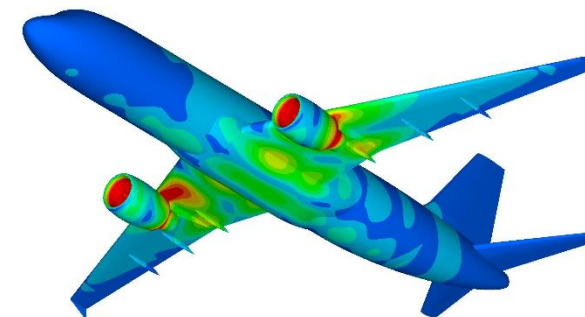
<https://en.wikipedia.org/wiki/Neuroimaging>



<https://science.howstuffsworks.com/life/genetic/gattaca-gattacaz-a-ding-letters-the-genetic-alphabet.htm>



<https://www.washingtonpost.com/graphics/2020/national/coronavirus-us-cases-deaths/>



<http://www.stressebook.com/finite-element-analysis-in-a-nut-shell/>

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How can we gain insights from that data?

- With computation

Approach 1: human computation



https://en.wikipedia.org/wiki/Human_computer

Approach 2: machine computation



<http://fortune.com/2015/11/15/intel-super-7/>

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Why CS 220?

CS 220 is about approach 2

- Faster, more **reliable**, can churn through more data
- Automate to save human effort
- Requires being able to tell computers what to do!

society needs more **domain experts**
in specific fields **who can write code**



Goal: become "bilingual"

- Speak the language of **X** (biology, mech eng, journalism, etc)
- Speak the language of **computing**

Data Science:

- Combines inquiry, statistics, **programming**, and communication skills to provide actionable insights from **real** data sets

Why CS 220?

People use Data to solve the world's problems



Measuring progress towards the Sustainable Development Goals

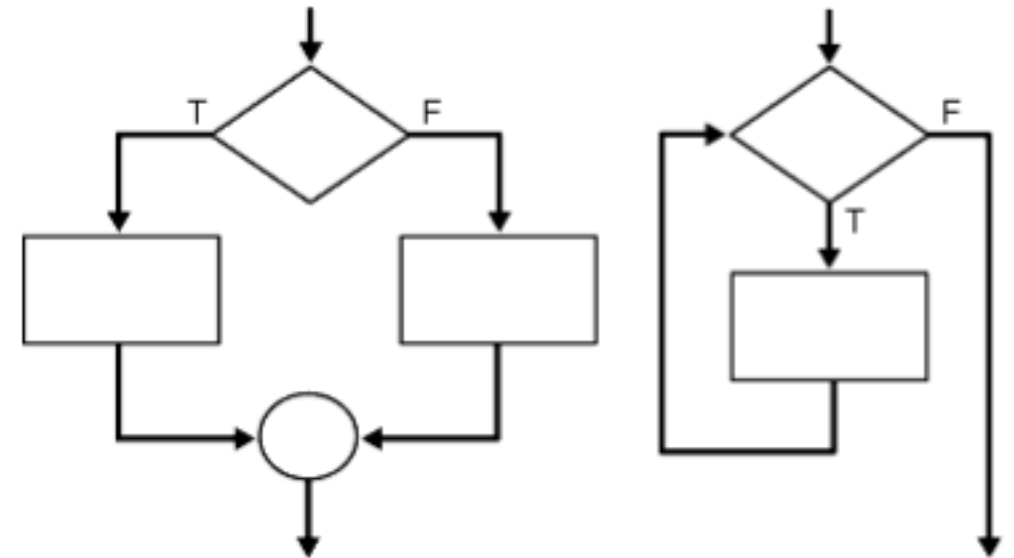
<https://ourworldindata.org/>

<https://sdg-tracker.org/>

What will we learn?

Part 1: Control Flow

- What step is currently executing?
- How to write functions?
- How to conditionally do something?
- How to repeat steps?



Part 2: State

- How to structure lots of data?
- How to save data in files?



Part 3: Data Science

- Tabular data
- Internet
- Databases
- Plotting



How will we learn?

Lectures

- Three lectures a week
- Two live lectures – Monday and Wednesday: 10 am – 11 am
- One recorded lecture – to be posted on Friday: 10 am (hopefully!)
- All lectures will be recorded

All lectures will be accessible via Canvas

You can find the links under the **Zoom** tab

How will we learn?

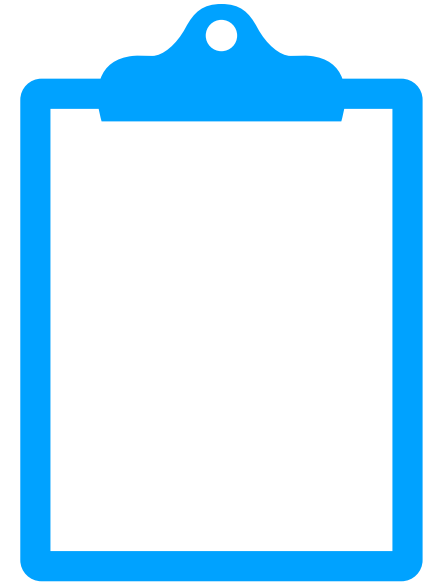
Lectures



general concepts



live coding



worksheet practice

Your role



- Do **readings** before or after
- Download the **template file** and code along in lecture
- Ask **questions** during the lectures + office hour
- **Stop** me if I go too fast!

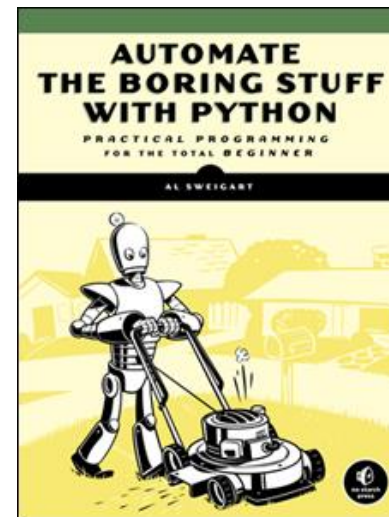
How will we learn?

Readings (all free!)



Think Python, 2nd Edition

- Allen B. Downey
- Assumes no programming background
- It's very concise
- Get the 2nd edition, which is for **Python 3**!



Automate the Boring Stuff

- Al Sweigart
- Useful for some more advanced topics related to using data



Python for Everyone – Interactive

- Barb Ericson
- Allows you to practice coding as you learn

CS 220
Notes

Course Notes

- 220 / 319 instructors
- Mostly for data science part of class

How will we learn?

Lab

- 60 minutes on **Wednesday: 11am – 12pm**
- led by Jane (TA)
- Lab document will be posted each week on Wednesday
- Labs will be due on the **next Wednesday** at **11:59:00 pm**
- **Meant to help you succeed on your project**

Partnership

- We strongly encourage you to find a lab / project partner
- If you chose to do lab with a partner, make sure they are your project partner

we will have lab today!!!

(also, get any help needed installing Python during this one)

How will we learn?

Projects

- All projects will relate to some **real-world** data set
- Project document will be posted each week on Wednesday
- Projects will be due on the **next Wednesday** at **11:59:00 pm**
- You get a bank of 12 late days, but can use only 3 on one project
- After late days, 5% deduction per day late
 - 7 days after the project deadline, project submission won't be accepted

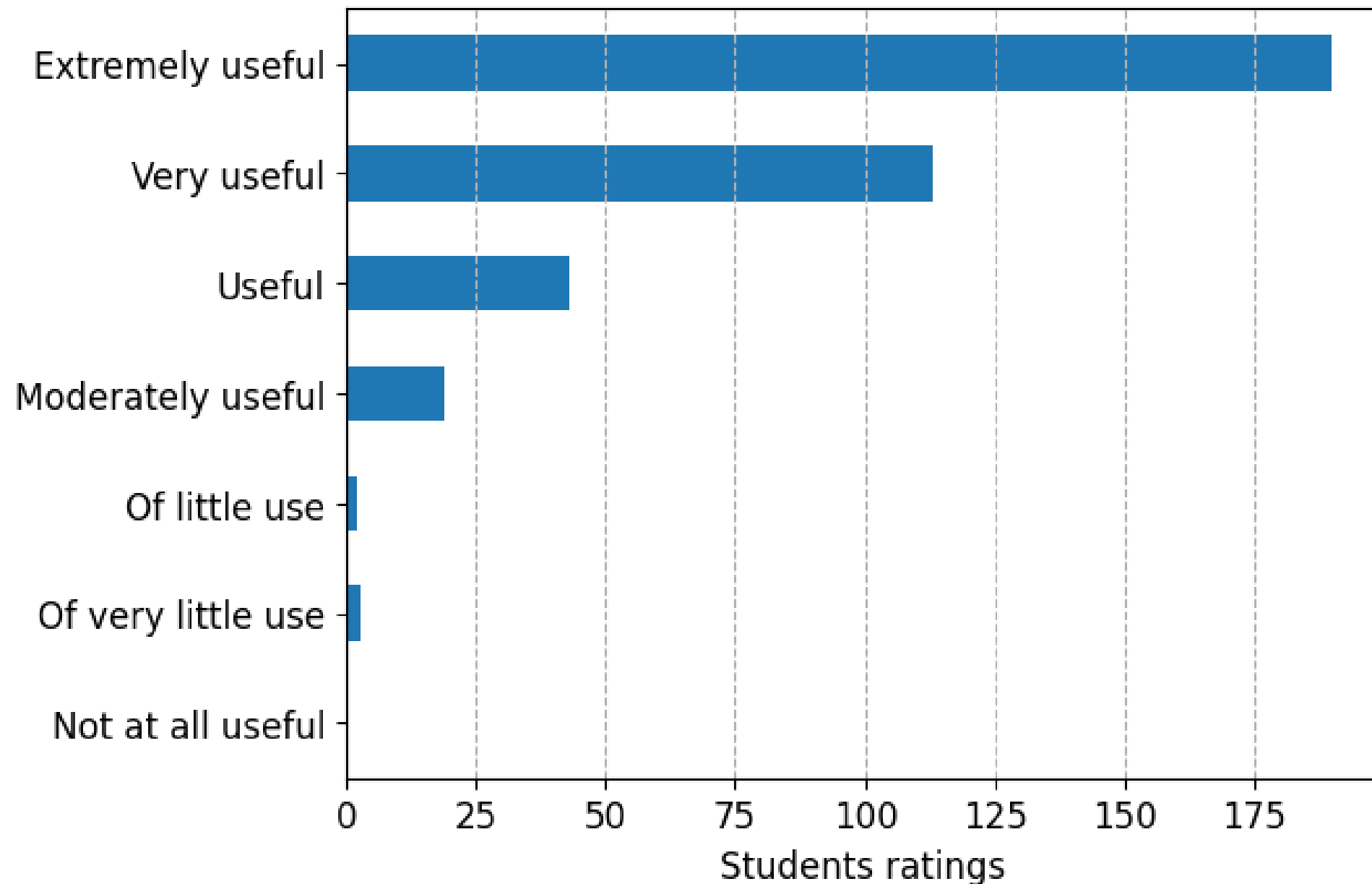
Getting help

- Lab
- Office Hours
- Piazza

How will we learn?

Projects

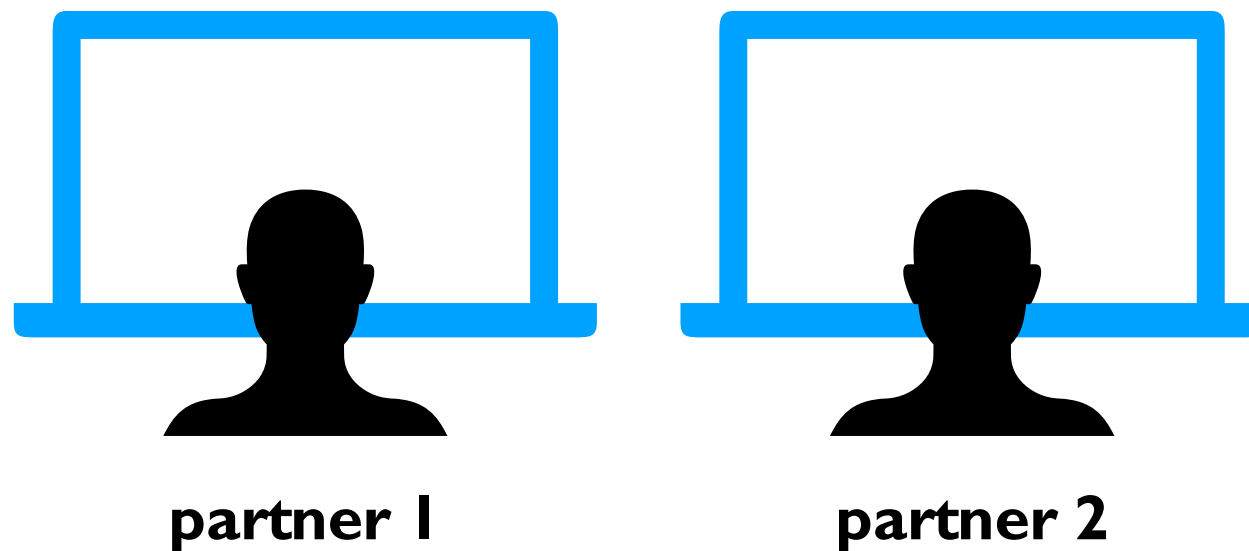
Projects: How useful were projects to your learning?



How will we learn?

Projects

- Pair Programming: You can optionally work in pairs of **two**
- You can choose to keep the same partner, for multiple projects or choose to **switch partners**

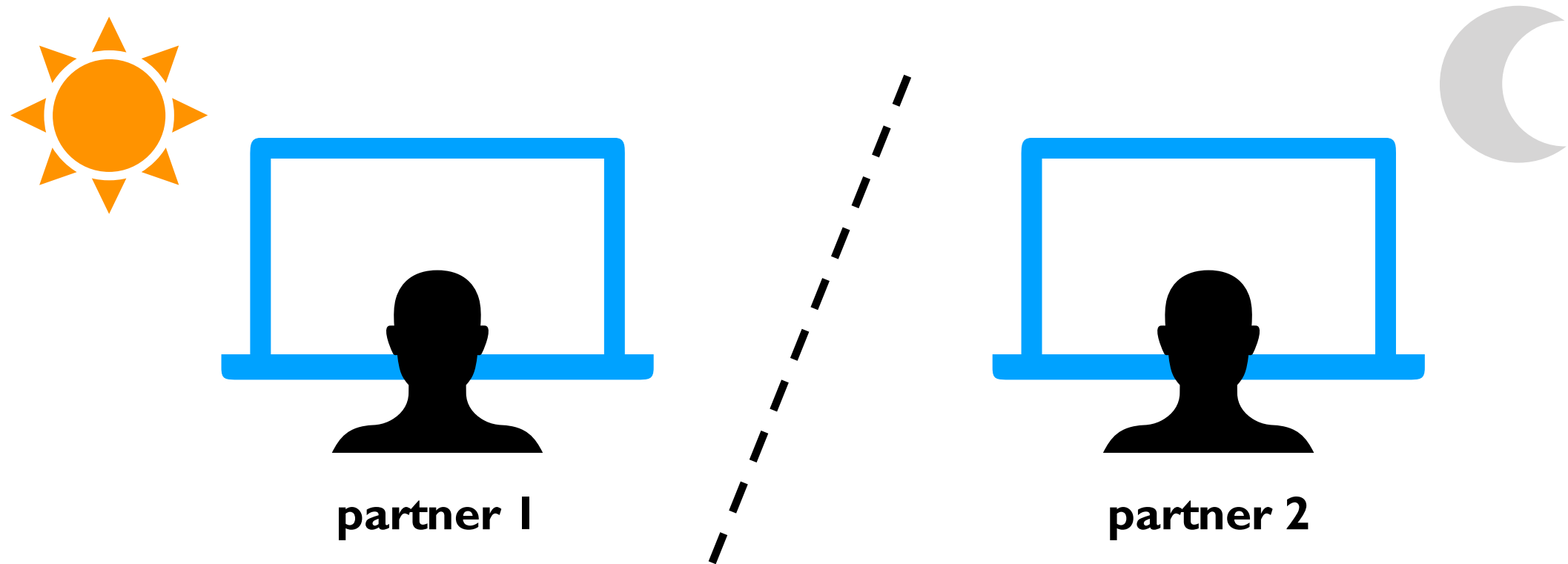


Best practice: working alongside each other

How will we learn?

Projects

- Pair Programming: You can optionally work in pairs of **two**



Breaks syllabus rules: working on different parts at different times

Breaks syllabus rules: working on alternate projects individually

How will we learn?

Projects

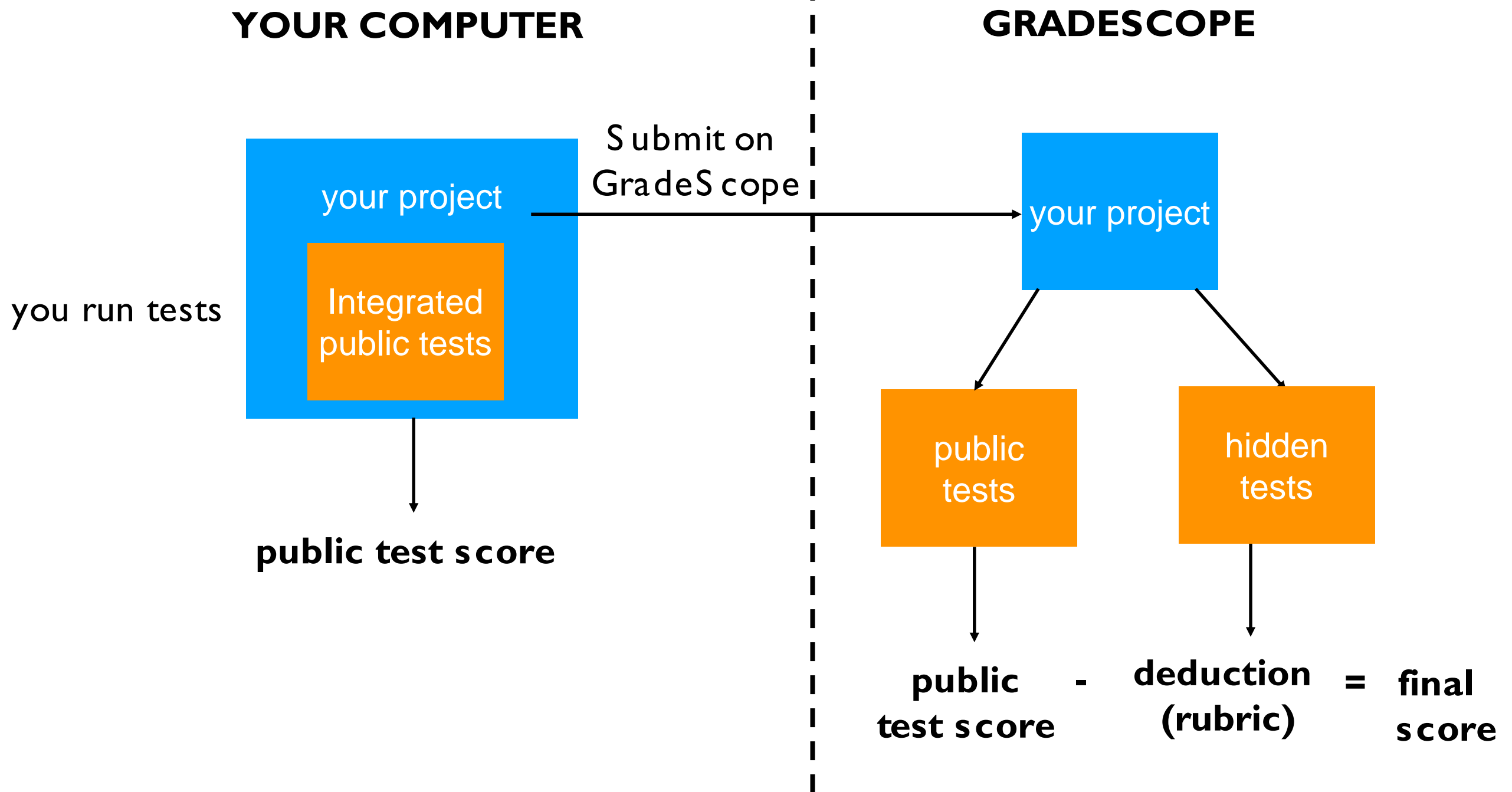
- Use of ChatGPT or other generative AI to solve project questions is **prohibited!**
 - ChatGPT cannot be used to write proprietary code
 - ChatGPT cannot write code that is too complicated
 - Code generated by AI still needs human verification



How will we learn?

Projects

- Grading:



How will we learn?

Quizzes

- Will be due most weeks, on **Monday, at 11:59:00 pm**
- Focus on recent lectures so you stay current and check your knowledge

projects → writing and testing code with a computer

quizzes → reading and interpreting code with a computer

How will we learn?

Grading

- For your own benefit
- Grades don't really matter for CS Digital Builder

Breakdown:

- 12 Labs (numbered Lab-P2 to Lab-P13): 5% (13 labs scheduled in total)
 - Lab-P1 is not graded,
 - Lab-P2 to Lab-P13 will be worth 100 points.
- 13 Projects (numbered P1 to P13) - 75%
 - P1 will be worth 25 points,
 - P2 to P13, with the exception of P9 will be worth 100 points,
 - P9 will be worth 50 points.
- 10 quizzes (numbered Q1 to Q10): 20%
 - Each quiz will be worth 20 points.

How will we stay in touch?

Canvas

- Projects and Quizzes
- Lecture videos and recordings
- Lecture slides, code and other course content
- Class Forms
 - Feedback form (to give anonymous feedback)
 - Thank you form

Piazza

- General questions about labs, projects, and course content
 - Rule 1: don't post more than 5 lines of code
 - Rule 2: check other posts before posting

Email me directly **only** if you have any **specific** requests that apply only to you

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Piazza

Office Hours

- One-on-one help from TA

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What to do before the next class?

- Read Syllabus carefully
- Setup Anaconda (Python) on your computer
- Attend Lab after the class and complete Lab-P I
- Sign up for GradeScope
- Submit P I (Project I) after attending lab: due next Wednesday