CS 4602

Introduction to Machine Learning

NTHU / Autumn 2023-2024

Instructor: Po-Chih Kuo (郭柏志)

Human-Centered Machine Intelligence Lab
https://pochihkuo.github.io/

Logistics

- **Instructor:** Po-Chih Kuo (郭柏志)
  - Email: kuopc@cs.nthu.edu.tw
  - Office: Delta 630
  - Office hours: Wednesdays 11:00-12:00

- **TA:**
  - TA hours: Thursday 17:00-18:00, EECS 639
  - Make a reservation via google doc by Thursday 10am

HMI

Our TA Team


林家合

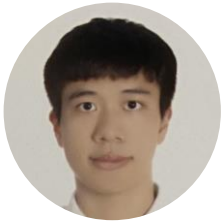

陳怡汝


林晁璿


曾微絲


張亞錫


黃謹緯


黃允暘


李佳芸


蘇芮筠


林育頡


吳聲宏


呂佳恩

Communication

- We will use **eeclass** for all communications: announcements and questions related to lectures, labs, and projects.
  - You should be added to the eeclass automatically
- Teams will be used for remote lectures if necessary.

Prerequisites

- This course covers a lot of ground
  - Calculus
  - Probability/Statistics
  - **Programming: Python**

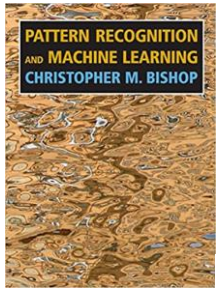
Rules

- Mainly physical lecture
- English is the official language (some mandarin)
- Food allowed? Maybe.
- Turn your phone to silent mode
- You are allowed to leave anytime (Chat with your friends outside)
- No roll call but there might be bonus for attendance
- Ask and answer questions! (Mandarin is acceptable)
- Cheating or plagiarism on exams/labs will result in zero score

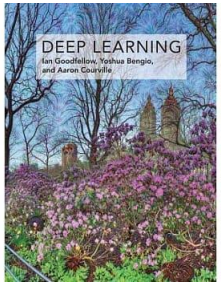
~~Textbook~~

- There is no required textbook for this class
- You should be able to learn everything from the lecture slides and homework
- Lecture slides will be uploaded to eeclass before the class

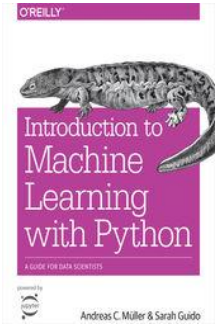
References



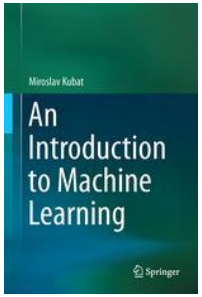
- “Pattern Recognition and Machine Learning”
- Christopher Bishop
- ISBN: 978-0387310732



- “Deep Learning”
- Ian Goodfellow, Yoshua Bengio, and Aaron Courville
- ISBN: 978-0262035613



- “Introduction to Machine Learning with Python”
- Andreas C. Müller, Sarah Guido
- ISBN: 978-1449369415



- “An Introduction to Machine Learning”
- Miroslav Kubat
- ISBN: 978-3319200101
- (Electronic version is available from the library)

Goals

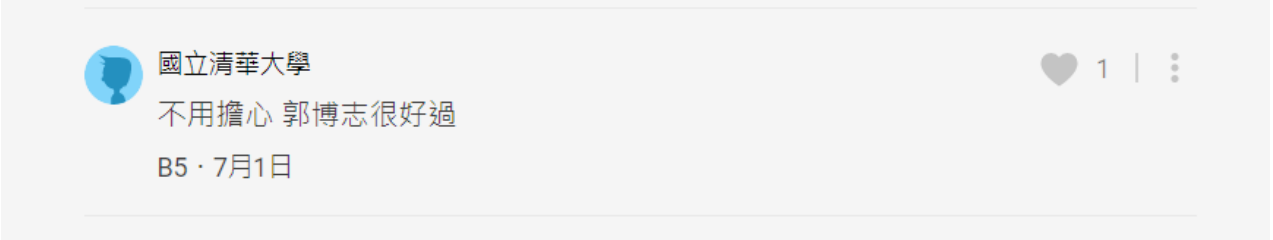
- To understand the basic principles of machine learning
- To become familiar with widely used machine learning algorithms
- To learn how to use machine learning algorithms to solve real problems
- To properly evaluate the model performance
- Little math or proof of theory

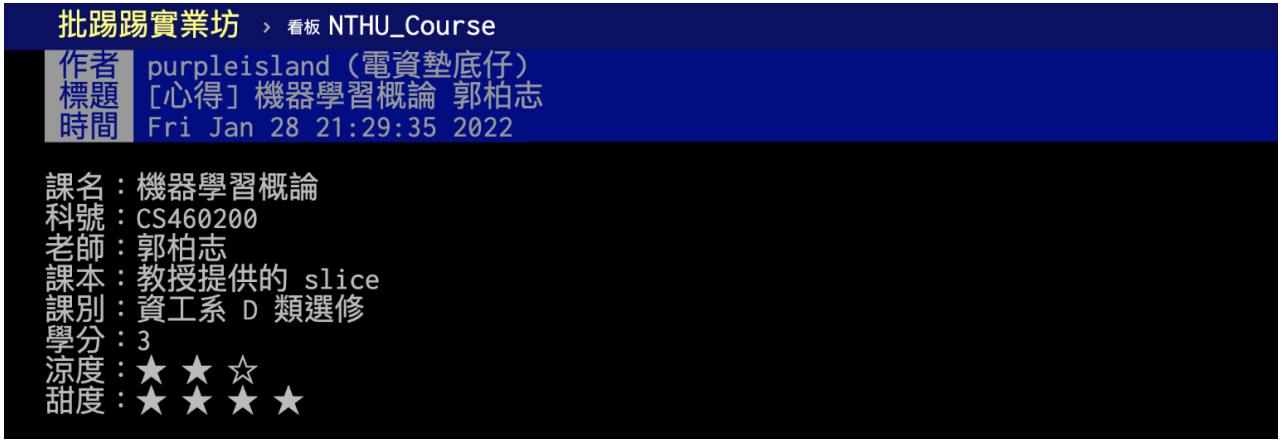
HMI

Evaluation

- Exams: 30%
- Assignments: 40%
- Term project: 30%

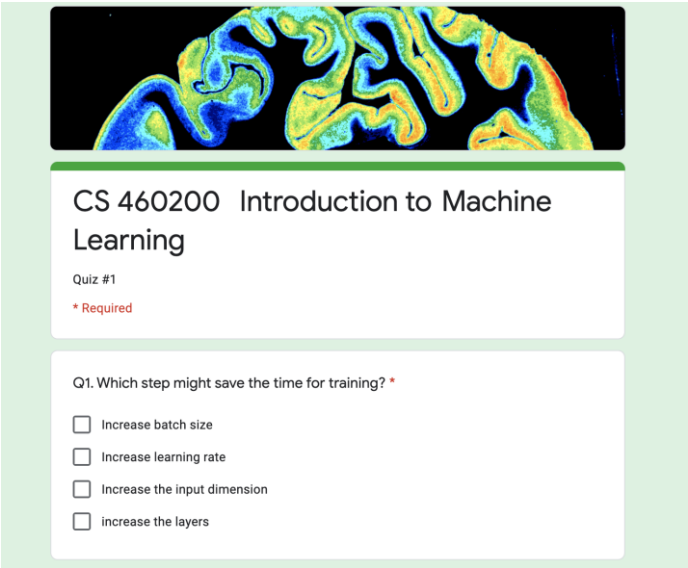
To note that, those are the maximum points you will get for each category. For example, you will receive 40 at the end for the homework part although you get a total of 42 from 5 assignments





Evaluation (Cont.)

- 4 Exams: 30%
  - In classroom
  - Answer by your smartphone or laptop



Evaluation (Cont.)

- 4 labs: 40%
  - Due two weeks after the announcement
  - Google Colab is recommended. 
  - The scores will be given based on your model's performance on testing data, which are held in our hands (35%).
  - Hand in a brief report (5%)
  - Avoid plagiarism

Evaluation (Cont.)

- Term project: 30%
  - More than 10 projects are given by us
  - You can propose your own project by 9/30
  - 3-6 members per team
  - Rank your preferences by 10/7
  - Teammates are assigned by us
  - Each team will have a mentor
  - Missions for every teammate may be different
    - PM, UX, RD, QA…
  - Grading for each of you is based on your contribution
  - Meet with your team/mentor every week/two weeks
  - Hand in meeting minutes (with photos) every two weeks

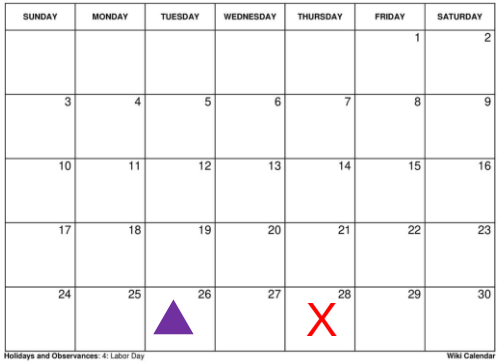
Evaluation (Cont.)

- Create a repo (e.g., on Github) for your team
- Submit your proposal during mid-term
  - Give a brief presentation in English on your project
    - 3 mins for each team by video.
    - Introduce your topics and team members.
- Final presentation (in English, 5 mins presentation + 3 min QA) at the end of the semester
- Hand in a report (2-8 pages) in the format of an IEEE paper, including Introduction, Methods, Results, and Conclusions
- Avoid plagiarism
- Push your code.
- Evaluated by TAs, mentors, and instructors (Maybe committee outside NTHU)

Syllabus

- Introduction and Basic Concepts
- Regression — Error-Based Learning
- Bayesian Classifiers — Probability-Based Learning
- Decision Trees — Information-Based Learning
- KNN — Similarity-Based Learning
- Linear Classifier
- Neural Networks
- Deep learning
- Reinforcement Learning
- Model Selection and Evaluation
- Clustering — Unsupervised Learning
- Dimensionality reduction

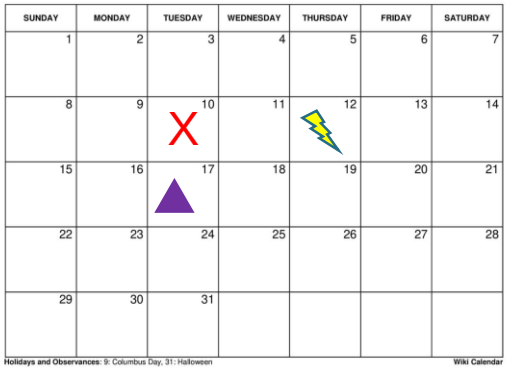
September 2023



Introduction and Basic Concepts

Regression

October 2023

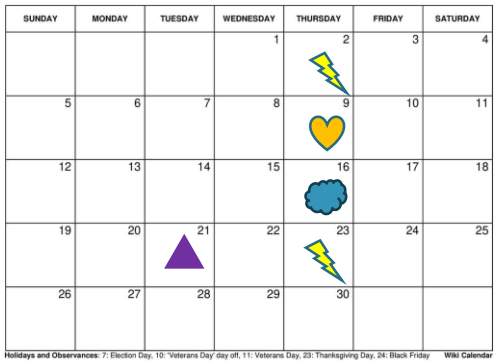


Bayesian Classifiers

Decision Trees

Linear Classifier

November 2023

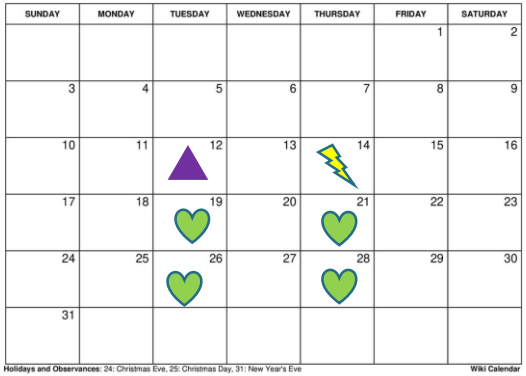


Neural Networks

Deep learning

Reinforcement learning

December 2023



Model Selection & Evaluation

Clustering

Dim. Reduction

- Online
- Exam
- Assignment
- Holiday
- Upload proposal presentation
- Project presentation

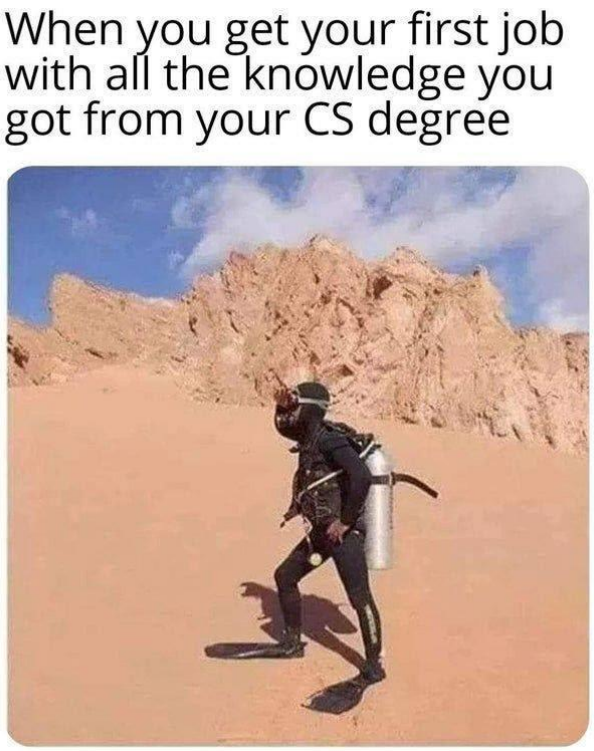
HMI

Extra selection

No more approval after 11:59am

Quiz time!

Questions?


When you get your first job with all the knowledge you got from your CS degree