0. Course Details

COMP3314
Machine Learning

Dr. Hengshuang Zhao

Slides adapted from Dr. Dirk Schnieders

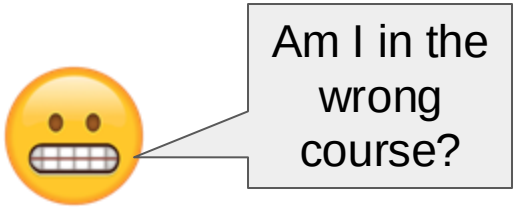
Personal Information

- Dr. Hengshuang Zhao
  - Assistant Professor at HKU CS department
  - Previously at CUHK, Oxford and MIT
  - Homepage: https://www.cs.hku.hk/~hszhao
  - Research: Computer vision, machine learning, artificial intelligence
  - Interested Topics:
    - Visual scene understanding, perception, reconstruction
      - Image/video/3d recognition like classification, segmentation, and detection, neural radiance fields (NeRF), 3d Gaussian splatting
    - Representation learning, multimodal learning, unified vision system
      - Un-/weakly-/semi-supervised learning, transfer learning, open-world learning, advanced architecture design
    - Artificial intelligence generated content (AIGC)
      - Visual content creation, generation, and manipulation (image/video/3d)
    - Autonomous driving, embodied ai, robot learning, LLM applications etc.

Course Staff

- Lecture
  - Friday 02:30 pm - 05:20 pm, at CYPP4
- Instructor
  - Dr. Hengshuang Zhao (email: hszhao@cs.hku.hk)
  - Research: Computer vision, machine learning, artificial intelligence
  - Office: CB424 or Zoom (https://hku.zoom.us/my/hszhao)
  - Consultation hours: Tuesday, 1:00 pm - 2:00 pm
- TA
  - Mr. Yixing Lao (email: laoyx@connect.hku.hk)
  - Office: HW-335A or Zoom (https://hku.zoom.us/my/laoyixing)
  - Consultation hours: Monday, 2:00 pm - 4:00 pm
  - Mr. Lihe Yang (email: liheyang@connect.hku.hk)
  - Office: HW-335A or Zoom (https://hku.zoom.us/my/liheyang)
  - Consultation hours : Wednesday, 10:00 am - 12:00 pm
  - Please make an appointment in advance to avoid waiting

In this course (comp3314) you will **not** learn ...



- Reinforcement Learning (RL)
  - Consider taking: comp3270 AI
- Deep Learning (RNN, GAN, Deep RL)
  - Consider taking: comp3340 Applied deep learning, and/or
  - Consider taking: comp3317 Computer vision
- To work on bigger applied projects
  - Consider taking: comp3362 Hands-on AI: experimentation and applications, and/or
  - Consider taking: comp3414 Experiential learning on AI and robotics
- R language with a focus on statistical modeling
  - Consider taking: comp3354 Statistical learning

Tentative Schedule*

*subject to change

Date	Topic*	Date	Topic*
6 Sep	Canceled (Typhoon)	25 Oct	Evaluation & Tuning
13 Sep	Course Details, Introduction, Perceptron	1 Nov	Ensemble Learning
20 Sep	Adaline, Logistic Regression	8 Nov	Regression
27 Sep	SVM, Decision Tree Learning, KNN	15 Nov	Clustering
4 Oct	Data Preprocessing, Dimensionality Reduction	22 Nov	Multilayer ANN
11 Oct	Holiday (no class)	29 Nov	Convolutional Neural Network
18 Oct	Reading Week (no class)		

*subject to change

Assessment

- Assignments (50 %)
  - 4 equally weighted assignments
  - Written and/or programming
  - Release schedule (subject to change)
    - A1: scheduled on 20 Sep
    - A2: scheduled on 4 Oct
    - A3: scheduled on 8 Nov
    - A4: scheduled on 29 Nov
  - Late submission policy
    - 20% deduction within 24 hours, 50% deduction within 48 hours
    - no accept beyond 48 hours, unless extreme emergency
- Final examination (50 %)
  - Written exam, closed-book
  - Candidates are permitted to bring to the examination ONE sheet(s) of A4-sized paper with printed/written notes on both sides

Plagiarism

- What is Plagiarism ?
  - http://www.hku.hk/plagiarism
- If a student commits plagiarism, with evidence after investigation, no matter whether the student concerned admits or not, a penalty will be imposed
- First Attempt: the student shall be warned in writing and receive zero mark for the whole assignment or the whole test; if the student does not agree, s/he can appeal to the Programme Director within a week
- Subsequent Attempt: May impose any of the following penalties: a published reprimand, suspension of study for a period of time, fine, or expulsion from the University
- Both the student who copies and the student who offers his/her work for copying shall be penalized

Prevent Plagiarism

- Never copy/paste anything **without citing**
  - If you copy existing work you must clearly state and cite appropriately
  - Solutions to assignments may be found on the internet
    - To prevent plagiarism, don’t search for them
- Never look at existing solutions
  - Work on the problem yourself
- Never ask your friend to see his/her solution
  - Note that the source will also be punished with 0 marks

Course Materials

- Available (before lecture) on Moodle
  - Slides in PDF
    - Install on mobile device to view materials
    - Save paper, don’t print
- Use the provided materials responsibly
  - For your own research and private study only
  - Don’t distributed to others without the appropriate authorization
    - If you do so you could face consequences based on copyright or even academic misconduct issues
    - I do not hold copyright for most materials

Reference Textbook

- Python Machine Learning (PML), Third Edition, Sebastian Raschka & Vahid Mirjalili [amazon, publisher]

Lecture Slide Chapter	Corresponding PML Chapter(s)
1. Introduction	1
2. Perceptron & Adaline	2
3. Logistic Regression, SVM, Decision Trees, KNN	3
4. Data Preprocessing	4
5. Dimensionality Reduction	5
6. Evaluation & Tuning	6
7. Ensemble Learning	7
8. Regression	10
9. Clustering	11
10. Multilayer Artificial Neural Network	12
11. CNN	15

References and Acknowledgements

- Textbooks
  - Introduction to Machine Learning (IML), Third Edition, Ethem Alpaydin
  - Machine Learning: An Algorithmic Perspective, Second Edition, Stephen Marsland
  - An Introduction to Statistical Learning, Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani
- Other Courses
  - Machine Learning Crash Course, Google
  - Machine Learning, Coursera
- Additional references (if any) will be listed on the lecture slides

Tools

- Provided examples and exercises will use the following tools
  - Python 3
  - NumPy
  - SciPy library
  - scikit-learn
  - Matplotlib
  - Pandas
  - Tensorflow / PyTorch
  - Jupyter Notebook
- All of the above can be installed conveniently with Anaconda
- You can also directly start coding here: colab.research.google.com

Feedback

- **Don’t send us an email** unless personal or individual information is involved
  - Example
    - Not OK
      - What is the answer to the assignment on slide 17 of chapter 2
        - Please use the forum for this kind of questions
    - OK
      - I would like to make an appointment for consultation outside your office hours
- If you contact us by email, please use your university email and include your university number in the email
- If you have general questions about course materials, please **use the forum**
  - We will answer within 3 working days
  - Please help to answer questions by others

Q & A