Fall 2020

CSE 353 : Machine Learning

LECTURE 0 – COURSE INTRODUCTION

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Course Information

CSE353 : Machine Learning

Course webpage: https://ppawar.github.io/Fall2020/CSE353-F20/index.html

Lectures: Mon/Wed 2:00 PM - 3:20 PM

Place: B103 or Online via Zoom (Alternate weeks)

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Staff

Instructor

- Pravin Pawar
- Office: B424
- Email: Pravin.pawar@sunykorea.ac.kr
- Phone: +82-032-626-1227 / +82-010-8692-4908
- Office Hours: *Tue/Thu 10:30 AM - 12:30 PM in person or online by Zoom*
- *Skype: pravin.pawar*
- *Kakao talk: pravinpawar*

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Announcements

- Zoom meeting invitation will be sent in advance for the specific class times.
- The zoom meeting session will be recorded and will be made available for viewing later online.
- It is expected that you attend each lecture online (unless medical situation).
- The instructor will record your attendance in-between the lecture break on blackboard.
- Please bring a laptop to each class
  - Classes will involve lecture segments, demos
  - Labs will involve student exercises
- Additional video lectures are noted in the syllabus. These are strongly recommended for extra instruction to help understand various technologies we will learn in this course.

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Prerequisite

- CSE 216 or CSE 219 or CSE 260; CSE major
- Pre- or Co-requisite: AMS 310 or AMS 311 or AMS 312

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Course Overview

- Covers fundamental concepts for intelligent systems that autonomously learn to perform a task and improve with experience
- Problem formulations (e.g., selecting input features and outputs)
- Learning frameworks (e.g., supervised vs. unsupervised)
- Standard models, methods, computational tools, algorithms and modern ML techniques
- Methodologies to evaluate learning ability and to automatically select optimal models
- Applications to areas such as computer vision (e.g., character and digit recognition), natural-language processing (e.g., spam filtering) and robotics (e.g., navigating complex environments) will motivate the coursework and material

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Major Course Topics

- The machine learning landscape
- Supervised learning vs. unsupervised learning
- Machine learning models such as:
  - Linear regression
  - Decision trees
  - Random forests
  - Support vector machines
  - Association rule mining
- Dimensionality reduction
- Principal components analysis
- Clustering
- Neural networks
- Deep learning frameworks – CNN, RNN
- ML frameworks such as Keras, TensorFlow
- ML tools such as Weka

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Handson ML Course Project

- A comprehensive course project that aims at giving students a first-hand experience on a substantial ML project
- Tasks involved in course project:
  - Problem formulation
  - State of the art study
  - Data collection
  - Data preprocessing
  - Selection of ML algorithms
  - Conduct experiments for evaluating performance of around 3 ML algorithms
  - Results and conclusion
- Projects could be related to classification, clustering, time-series forecasting, NLP, image processing etc.
- Already several topics are available and possibility to be guided by industry/university mentor
- 50% weightage of the total course
- A project will be conducted by a group of 2-3 students

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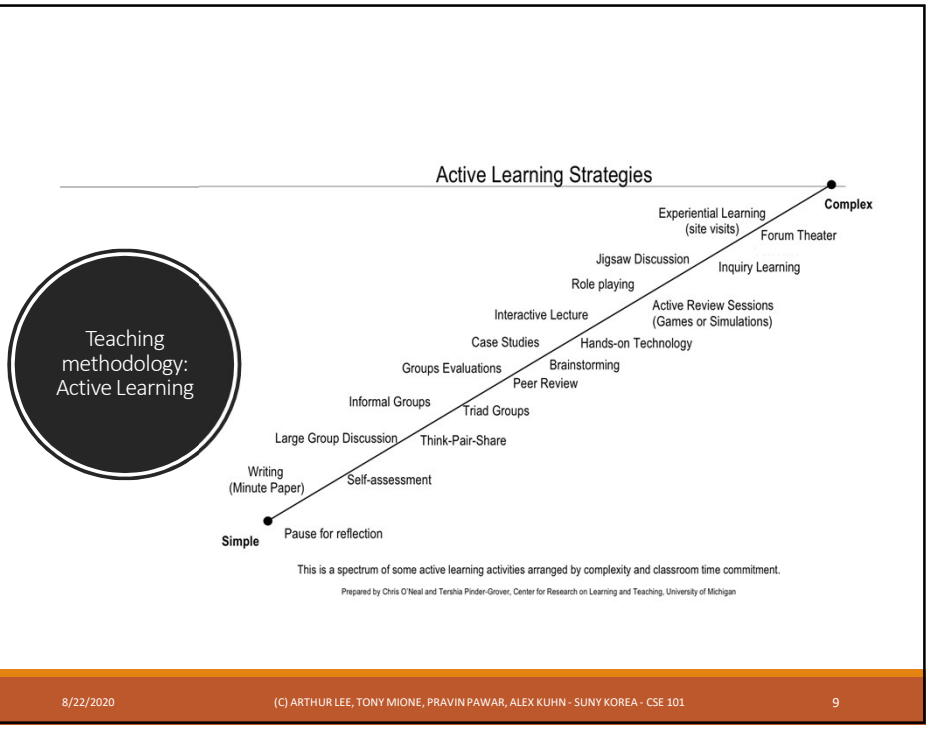

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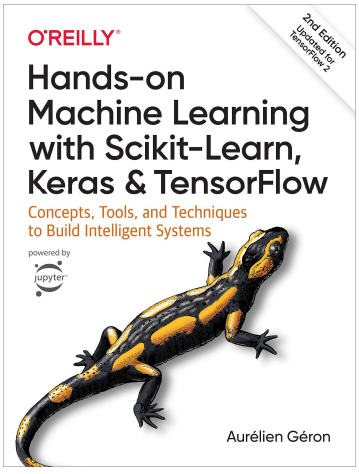

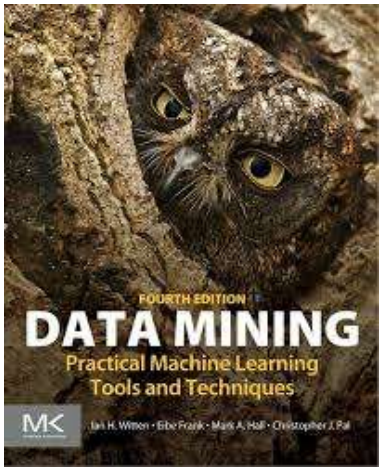

Textbooks

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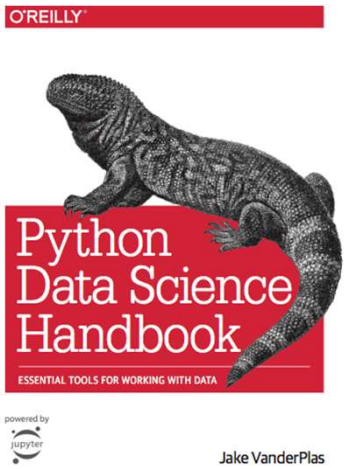

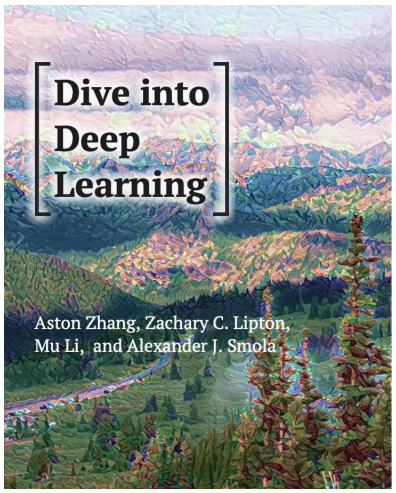

Reference books

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Homework Assignments

- These homework assignments will reinforce concepts from class and have you explore new concepts, too
- All work will due on fixed dates and times
- All work will be completed on an individual basis (write your own code) *unless otherwise instructed*!
- You will use **Blackboard** to submit your completed assignments
- Please start early on the assignments! Most students find that completing the homework assignments for CSE353 takes **a lot** longer than they anticipated

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Examinations

- Examination dates are posted on the schedule page of the course website. Tentative dates are:
  - Midterm exam 1: Mon 12 Oct
  - Midterm exam 2: Mon 9 Nov
  - Final exam (course project presentations): Mon 07 Dec, 12:30 PM – 03:00 PM
- Do not miss exams
- Arrange your work and travel schedules as needed to be present for examinations
- Makeup exams will only be given for verified, officially sanctioned university activities

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Grading

- Assignments – Handson machine learning assignments (4 assignments, 5% each) = 20% (100 points)
- Surprise quizzes (5 quizzes, 3% each) = 15% (75 points)
  - The quizzes are intended to make sure students are keeping up with the material
- Mid-term exams (2 exams, 7.5% each) = 15% (75 points)
  - These will be written exams
- Course Project = 50% (250 points)
  - A group project guided by industry/academia mentors covering end-to-end ML project lifecycle
- Extra Credit Research Paper = 5% (25 points)
  - If you submit a paper to an academic conference towards the end of the course project, you will receive 5% extra credit.
- Policies
  - Makeup exams will only be given for verified, officially sanctioned university activities
- Grades will be given at the discretion of the instructor!

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Late Homework Policy

- Assignments must be turned in by the due date and time.
  - Any part of an assignment that's late means the entire assignment is late.
  - If your assignment is incomplete or not entirely working by the due date, turn in what you have to get some partial credit.
- If you have an emergency situation, email me before the due date and I may be able to work something out
- Bottom line: Plan ahead, start early!

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Re-Grading

- For the assignments, quizzes and mid-term exams, request for re-grading must be made within one week from after the announcement of grades.

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Pair/Group Programming

- Identify your programming buddy
- Sit next to each other in a class as much as possible
- Discuss your problems with him/her
- Solve exercises available online and from the books together
- Help each other to learn the course in a cooperative way!!

Benefits:

- Fewer bugs
- Spreads code understanding
- Higher quality code
- Can learn from partner
- Two heads are better than one
- Creativity and brainstorming
- Better testing and debugging
- Improved morale

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Cooperation vs. Copying

- Cooperation (talking over problems) is a good way to learn and is encouraged
- ***Do not copy code. Do not let others look at or copy your code.***
- Copying is not allowed on homework or exams no matter the source
- When you submit your homework or tests, **you are pledging that the work is your own and you have not copied it.**
  - **You are also pledging that you have not allowed others to copy it**.

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Electronics in Class

- Cell phones should be put away during class
- Laptops may be used during periods where you are asked to work on an exercise during class
- Lecture slides are available on the course website for study before class
- Talk to me after class if there's an issue with this policy

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Disability

If you have a physical, psychological, medical or learning disability, please contact the Student Services and Career Team.

- Location: Academic Building A208
- Phone: 626-1190

The DSS will determine with you what accommodations, if any, are necessary and appropriate

All information and documentation of disability is confidential

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How to Succeed in this Class

- Attend class and be on time!
  - Not all information is in my lecture notes or in the book
  - I sometimes do in-class demos that emphasize non-obvious details
- The assigned work will take a lot of your time, so practice good time management
- Read the reading assignments and review the lecture notes and try out example code
  - Practice is the only way to become proficient at coding
  - Very often your first, second, or third attempt at solving a problem will not be successful. It is **essential** that you give yourself enough time to try different ideas, taking breaks along the way!
  - Those who write extra code for problems not assigned ("for fun") generally do best in this class
  - Learning to code involves learning to read other people's code
- Ask questions right away if confused. Ask in class, ask a TA, come to my office hours or send email. Don't stay confused and don't get behind!
- This is not an easy class! Be prepared to work hard and produce great output!
- Welcome and I hope you enjoy the class!

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Questions?

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Inspirations

Geoffrey Hinton
(Deep Learning)

Michael Jordan
(Deep Learning)

Andrew Ng
(Deep Learning)

Yann LeCun
(Deep Learning)

See more: https://www.analyticsvidhya.com/blog/2019/07/heroes-of-machine-learning-experts-researchers/