EE5184 Machine Learning Syllabus
2021 Fall
Instructors: Pei-Yuan Wu, Hung-Yi Lee, Tsungnan Lin
National Taiwan University

General Information
Class Time and place: 09:10-13:10, Friday, Fuli Building 113
Contact Hours: 4hours per week, with a total of 16 weeks, equivalent to 64 hours
Course Website(PPT Slides/ Course Videos): https://ntueeml.github.io/ml-website
Facebook group: Machine Learning (2021, Fall):
https://www.facebook.com/groups/1029900681122058

Instructors
- Major Instructor: Pei-Yuan Wu
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- Office Hours: 14:00 - 15:30 Friday
- Other instructors: Hung-Yi Lee
    - Tsungnan Lin

Taching Assistants
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Grading(Tentative)
- Programming Assignments 7% x 5
- Written Assignments 3% x 5
- Final Project 20%
- Final Exam 30%

Intended Learning Outcome:
This course aims to introduce the basic machine learning theories, methods and tools that machine learning users should know. It is hoped that through this course, students will have a more systematic understanding of machine learning technologies and have the skills to implement these technologies. And students can acquire basic capabilities, with a view to applying these technologies to their respective fields of expertise in the future.

Course Outline:
1. Regression; Bias and Variance Errors
2. Probabilistic Generative Model; Logistic Regression
3. Dimensionality Reduction: Principle Component Analysis; Auto-Encoder; Neighbor Embedding
4. Semi-Supervised Learning
5. Neural Network Introduction: Gradient Decent; Back Propogation
6. Convolutional/Recurrent Neural Network
7. Ensemble

8. Support Vector Machine; Lagrange Duality
9. Expectation Maximization
10. Probability Approximately Correct Learning

Reference Books:

- Introduction to Machine Learning, Ethem Alpaydin, 2009, MIT Press
- Pattern Recognition and Machine Learning, Christopher M. Bishop, 2006, Springer
- Foundations of Machine Learning, M. Mohri, A. Rostamizadeh, and A. Talwalkar, MI

Schedule (Tentative)

Week	Date	Lecture	Assignments
1	09/24	Introduction; Regression; Bias and Variance Errors	
2	10/01	Linear Model Classification: Probabilistic Generative Model, Logistic Regression	
3	10/08	Neural Networks: Introduction, Gradient Decent and Back Propagation, Tips, Implementation	HW1 out
4	10/15	Convolutional Neural Network (CNN) Dimensionality Reduction: Principle Component Analysis	HW1 due HW2 out
5	10/22	Auto encoder, Neighbor Embedding	
6	10/29	Ensemble: Random forest, AdaBoost	HW2 due HW3 out
7	11/05	Recurrent Neural Network	Final Project out
8	11/12	Expectation Maximization	HW3 due HW4 out
9	11/19	Semi-Supervised Learning	
10	11/26	Variational Auto-Encoder Support Vector Machine - Introduction	Final Proposal due
11	12/03	PE day - Class Suspend	
12	12/10	Support Vector Machine - Optimization and Kernel Duality Theory of Constrained Optimization - Introduction	HW4 due HW5 out
13	12/17	Strong Duality Theorem Support Vector Machine: Formal dual form	
14	12/24	Probably Approximately Correct Learning	HW5 due
15	12/31	Holiday - Class Suspend	
16	01/07	Final Exam	
17	01/14	Final Project presentation	
18	01/21	Guest Lecture	