CS 229A – Winter 2019
Syllabus

Instructor: Professor Andrew Ng
Teaching Assistants: Younes Bensouda Mourri, Paul de La Villehuchet, Ferdinand Legros

Course description

You will learn to implement and apply Machine Learning algorithms. This course emphasizes practical skills, and focuses on giving you skills to make these algorithms work. You will learn about commonly used learning techniques including supervised learning algorithms (logistic regression, linear regression, support vector machines, neural networks, deep learning), unsupervised learning algorithms (k-means, principal component analysis), as well as learn about specific applications such as anomaly detection and building recommender systems. This class is taught in the flipped-classroom format. You will watch videos and complete in-depth programming assignments, online quizzes, problem sets at home and then come to class for discussion sections. This class will culminate in an open-ended final project, which the teaching team will help you on.

Logistics

Prerequisites: Programming at the level of CS106B or 106X, and basic linear algebra such as Math 51.

Grade breakdown:

- Problem Sets: 20%
- Programming Assignments: 20%
- Quizzes: 5%
- Attendance: 5% (you can miss one section for free)
- Midterm: 20%
- Project: 30%

Late day policy: Homeworks for this class can be divided in two categories:

- Coursera related (Programming Assignments, Quizzes): no late days allowed
- Problem Sets, Project related items: you will submit 4 Problem Sets, 1 Project Proposal, 1 Project Milestone, 1 Project Final Report and 1 Project Poster. All these submissions will be due on Grade-scope at 11:59pm on Tuesdays. You have two late days over the quarter. Late days extend the deadline to the following Friday (at 11:59pm). Late days cannot be used on the Project Final Report/Project Poster. Elements submitted after the late day will not be graded. You can not use two late days on the same assignment.
Note: the class uses Gradescope to grade Problem Sets and Projects. Enroll using code: M7D3RE

Midterm: Monday 4th of March 2019 (6:00-7:30pm, location: TBD)
Final Project Presentation: Wednesday 20th of March 2019 (3:30-6:30pm, location: TBD)

Office Hours (location: Huang Basement)

- Younes: Tuesday 10am-1pm (Come for either Project OH or Regular OH)
- Paul: Wednesday 9-11am (Regular OH); Wednesday 11-12 am (Project OH)
- Ferdinand: Thursday 9-12am (come for either)

Note: 4 sections will be proposed every week. All sections will cover the same content, but you should stay in one throughout the quarter. Deadlines remain the same no matter what section you are attending. The syllabus is divided by sections and mentions only the first one (Monday). However, the same thing applies to all sections. For the first day of class we are all meeting on Monday January 14th 2019 in Mc Murty Oshman 102. For the following weeks, you will be assigned to a section. If you are assigned to a section on Monday and that Monday is a holiday, then come to the Tuesday section.

Section Times:

- Monday 1:30-2:50pm, McMurty 360 (if Monday is a holiday come to Tuesday’s)
- Tuesday 1:30-2:50pm, Thornton 110 (Monday section can come to the Tuesday section if Monday is a holiday)
- Wednesday 1:30-2:50pm, McMurty 360
- Friday 1:30-2:50pm, McMurty 360

Session 1: Monday January 14th 2019

Content: Overview of Machine Learning and models
Homework: Week 1 & 2 on Coursera due 11:59pm Sunday 20th of January 2019
  - Quizzes: Introduction, Linear regression with one variable, Linear algebra, Linear regression with multiple variables, Octave/Matlab tutorial.
  - Programming Assignments: Linear regression (both assignments including optional)

Session 2: Monday January 21st 2019 (applies to all sections)

Content: Linear regression
Homework: Week 3 on Coursera due 11:59pm Sunday 27th of January 2019
  - Quizzes: Logistic regression/Regularization
  - Programming Assignments: Logistic regression
Session 3: Monday January 28th 2019 (applies to all sections)

**Content**: Logistic regression, Regularization

**Homework**: Week 4 on Coursera due 11:59pm Sunday 3rd of February 2019

- **Quizzes**: Neural Networks
- **Programming Assignments**: Multi-class classification, Neural Networks

**Problem Sets**: Problem Set 1 due 11:59pm Tuesday 29th of January 2019

Session 4: Monday February 4th 2019 (applies to all sections)

**Content**: Neural Networks

**Homework**: Week 5 on Coursera due 11:59pm Sunday 10th of February 2019

- **Quizzes**: Neural network learning
- **Programming Assignments**: Neural network learning

**Project**: Project Proposal due 11:59pm Tuesday 5th of February 2019

Session 5: Monday February 11th 2019 (applies to all sections)

**Content**: Neural Networks

**Homework**: Week 6 on Coursera due 11:59pm Sunday 17th of February 2019

- **Quizzes**: Advice for applying Machine Learning, Machine learning system design
- **Programming Assignments**: Regularized linear regression and Bias/Variance

**Problem Sets**: Problem Set 2 due 11:59pm Tuesday 12th of February 2019

Session 6: Monday February 18th 2019 (applies to all sections)

**Content**: Bias/Variance

**Homework**: Week 7 & 8 on Coursera due 11:59pm Sunday 24th of February 2019

- **Quizzes**: Support Vector Machines, Unsupervised Learning, Principal Component Analysis
- **Programming Assignments**: Support Vector Machines, K-means clustering and PCA

Session 7: Monday February 25th 2019 (applies to all sections)

**Content**: Advice on Machine Learning systems

**Homework**: None. Prepare for the midterm and work on the project

**Problem Sets**: Problem Set 3 due 11:59pm Tuesday 26th of February 2019
Session 8: Monday March 4\textsuperscript{th} 2019 (applies to all sections)

Midterm: covers everything seen in sessions 1 to 7 (inclusive)
Content: Support Vector Machines, Principal Component Analysis, K-Means Clustering
Homework: Week 9 on Coursera due 11:59pm Sunday 10\textsuperscript{th} of March 2019
  • Quizzes: Anomaly Detection, Recommender Systems
  • Programming Assignments: Anomaly Detection, Recommender Systems
Project: Project Milestone due 11:59pm Tuesday 5\textsuperscript{th} of March 2019

Session 9: Monday March 11\textsuperscript{th} 2019 (applies to all sections)

Content: Anomaly Detection, Recommender Systems
Homework: Week 10 & 11 on Coursera due 11:59pm Sunday 17\textsuperscript{th} of March 2019
  • Quizzes: Large scale Machine Learning, application photo OCR
  • Programming Assignments: None
Problem Sets: Problem Set 4 due 11:59pm Tuesday 12\textsuperscript{th} of March 2019

Session 10: Monday March 18\textsuperscript{th} 2019 (applies to all sections)

Content: No classes - exam week
Final Project Presentation: Wednesday 20\textsuperscript{th} of March 2019 (3:30-6:30pm, location: TBD)
Homework: None
Project: Project Final Report & Project Poster due 11:59pm Tuesday 19\textsuperscript{th} of March 2019