Machine Learning Decal
Fall 2018

Introduction:

Welcome to the Machine Learning Decal! In this course, you will discover how to analyze and manipulate data in Python, go over (and implement!) fundamental and practical statistical and deep learning learning models, as well as learn how to ask the right questions in order to tackle data-driven problems. The course content targets an audience who has experience programming and understand calculus, though motivated and interested students without a strong technical background are encouraged to apply. No matter your background, data science and machine learning are infiltrating your field. More and more data is being created in many different places, and we hope to give you the skills to begin to make sense of it all.

Contact information:

Website : https://github.com/mlberkeley/Machine-Learning-Decal-Fall-2018
Email : decal@ml.berkeley.edu

The website will be our main form of communication and will contain links to extra content and assignments. Please check it regularly.

Units: 2 Units

Time and location:

Time : Tuesday 5-7pm
Location : LeConte 1

Office hours:

Posted weekly on class Piazza; OH for facilitators are also available by appointment

Prerequisites:

This class is a projects-based class with a machine learning bias. You are expected to have some programming or statistics backgrounds and so the material will be of greatest benefit to sophomores or those who have programming experience (CS61A, DATA 8, STAT 133, or equivalent) and understand math fundamentals (Math 53 and Math 54 or equivalent; EE16A or EE16B or equivalent). In the first week of class we will go over the fundamentals of python for data science. By the end of it, you can determine whether you are comfortable continuing through the course.

Note that this is not an easy class. The student facilitators intend to provide you with an overview of deep learning models with the goal of preparing you for industry and, if demonstrated superb interest, future machine learning competitions.

Grading:

In order to pass the class, you **must meet all of the following requirements:**

- 70% average on all homeworks
- Submit a final project
- Sufficient attendance (see attendance section below)

Projects:

At the end of class, there will be 1 final project which students should complete in groups of 3-4. Students can either work on their own time to finish this project, **or** they can attend and do a project during a hackathon period, where there will be mentors to help out. The purpose of the projects is to give you hands on experience manipulating, analyzing, and modeling data, with an emphasis on explaining choices of techniques.

Homeworks:

There will be 7 homework assignments, assigned throughout the semester. Homeworks will be completed individually, with an emphasis on coding.

Attendance

We will be keep track of attendance. In order to pass the course, **you must come to AT LEAST 75% of the lectures (that is, 9 lectures at minimum)**. After your 3rd missed day of class, excused or unexcused, you will automatically be assigned a "no pass".

Method of Instruction:

Lecture

Class Schedule:

Week 1 - Intro to class; data manipulation and visualization

Week 2 - Linear and logistic regression; gradient descent

Week 3 - Feed forward neural nets; backpropogation; bias/variance tradeoff; good training practices

Week 4 - Dimensionality reduction (PCA, autoencoders); Nearest neighbor methods

Week 5 - Convolutional Neural Networks

Week 6 - Computer Vision fundamentals; Style Transfer; GANS

Week 7 - RNNs/LSTM

Week 8 - NLP fundamentals; machine translation

Week 9 - Applications of CV and NLP (Image captioning)

Week 10 - Reinforcement Learning

Week 11 - Guest Lecture (Research)

Week 12 - Guest Lecture (Industry)

Extra Resources:

Most of the material will be in slides and demos. With each lecture, however, we will provide you with a plethora of extra resources for those interested in learning far more than what we can cover. Stay tuned on the class page!

Assignment Schedule:

Assignments will be due at 11:59 PM on their respective due dates. No late work will be accepted.

Homework 1 - "*Python and Data Visualization; Sklearn pipelines*"
Assigned: Week 1
Due: Week 2

Homework 2 - *"Pytorch intro; Feed-forward NN"*
Assigned: Week 2
Due : Week 4

Homework 3 - *"Decision Trees"*
Assigned: Week 4
Due : Week 5

Homework 4 - *"Adversarial Examples"*
Assigned: Week 5
Due : Week 6

Homework 5 - *"Deep Dream"*
Assigned: Week 6
Due : Week 8

Homework 6 - *"Sentiment Analysis"*
Assigned: Week 8
Due : Week 10

Homework 7 - *"Reinforcement Learning"*
Assigned: Week 10
Due : Week 12

Final Project/Hackathon