CSC 461

Machine Learning (Fall 2024)
Lecture 01: Course Logistics

Prof. Marco Alvarez, University of Rhode Island

What is this course about?

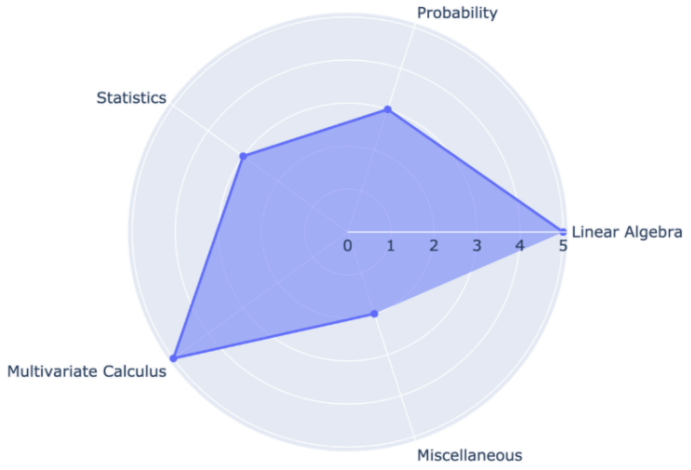
- Understand how ML algorithms work
  - the **learning problem** and limitations
  - theoretical foundations of major techniques
- Be able to develop ML applications
  - problem design, algorithm/platform choice
- Be able to read current papers

Should I take this class?

- Requires more **math** than traditional CS courses
- Programming experience is **required**
- Less emphasis on 'how to use this library'
  - more focus on understanding major algorithms
- High grades require high effort
  - long and challenging assignments/exams

`consider taking this course a later time if necessary`

Math for ML



https://www.analyticsvidhya.com/blog/2019/10/mathematics-behind-machine-learning/

Python tools

Tentative topics (order NOT relevant)

Introduction, Supervised Learning	Neural Networks
Linear Regression, Linear Classifiers, Loss Functions	Convolutional Networks
Generalization, Bias/Variance, Overfitting/ Underfitting, Model Selection, Regularization	Recurrent Neural Networks
K-NN, Curse of Dimensionality	Transformer Architectures
Decision Trees, Bagging, Boosting	k-Means, Hierarchical Clustering
Gradient Descent, Backpropagation	Reinforcement Learning

Course Organization

Course website

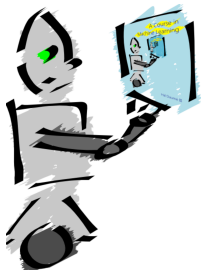
- URL
  - https://homepage.cs.uri.edu/~malvarez/teaching/csc-461

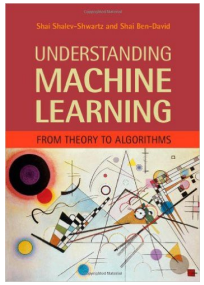
- Syllabus
- Schedule
- Resources
- Projects/Workshop

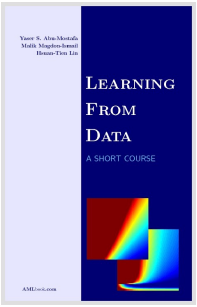
Course information

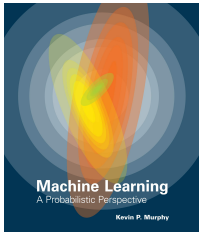
- Lectures
  - MWF 2-2:50p
- Team
  - Marco Alvarez, Instructor
  - Jacob Dauphinais
  - Calvin Higgins
- Office Hours
  - TBA

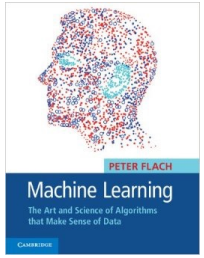
Recommended textbooks

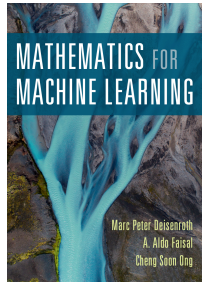












Grading

- Homework assignments (15%)
  - programming and problem sets
- Midterm exam (30%)
  - Oct 11th
- Final exam (30%)
  - Dec 16th
- Final project (25%)
  - Last week of classes

Coursework

- Homework assignments
  - discussions and collaboration are allowed
    - you must write your own code and solutions
  - late submissions **NOT accepted**
    - ample time given to complete (6-9 days)
    - start and submit early, leaving plenty of time for updates
- Exams
  - in-person, open-book (printed materials only)
  - no electronic devices allowed during exams

Coursework

- Final project
  - team work (2-3 members) on real-world machine learning problems
  - deliverables
    - progress report (mid October)
    - final report (end of semester)
    - live presentation (ML Workshop — end of semester)
  - **outstanding projects** will receive extra credit

Academic integrity

- Assignments and projects
  - collaborative discussions encouraged
  - sharing solutions, copying work, or using uncredited AI-generated content **prohibited**
- AI and LLMs
  - AI tools (e.g., ChatGPT, Gemini, Claude, Copilot) allowed as learning aids
  - proper citation required for AI-assisted work
  - students responsible for understanding and verifying AI-generated content

Support tools

Ed Discussion: Academic discussions, polls, quizzes.

Gradescope: Assignment submission and grading.

Zoom: Virtual office hours and remote collaboration.

How to succeed?

- Attend all lectures
  - lectures run **synchronously** and are not being recorded
  - attendance usually correlates with higher grades
- Participate and think critically
  - no laptops, no cellphones, unless taking notes
  - use the online forum (Ed Discussion)
  - use office hours regularly
- Work hard
  - read textbooks and papers (schedule is ambitious)
  - work on your assignments (focus on excellence rather than just “getting a good grade”)
    - start working on assignments early
  - this class is about developing highly-sought skills and competencies