Welcome

CS 556

Instructor

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Office Hours: Mon 2 PM - 3 PM

https://stevens.zoom.us/j/95935794301

Course Assistants

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Required Software

- **Jupyter Notebook** - https://jupyter.org/
- **Google Colab** - https://colab.research.google.com/
- **Latex** - Introductory Videos
  - https://www.youtube.com/watch?v=Jp0lPj2-DQA
  - https://www.youtube.com/watch?v=-HvRvBjBAvg

More Logistics

- Textbook: Multiple, see syllabus in Canvas.
- Homework assigned/submitted in Canvas.
- Late Submission: 20% off up to 3 days late.
- Honor code: Individual work unless stated otherwise.

Grading

- **Homework**: 40%
- **Exam 1**: 25%
- **Exam 2**: 25%
- **Project:** 10%

Letter Grades

- A 100% to 94%
- A- < 94% to 90%
- B+ < 90% to 87%
- B < 87% to 84%
- B- < 84% to 80%
- C+ < 80% to 77%
- C < 77% to 70%
- F < 70% to 0%

Homework

- The assignments should be completed on your own time.
- The assignment and submissions, is via Canvas.
- No Plagiarism.

Exams

- Exam 1 (March 10, 2025, 3 PM).
- Exam 2 (April 21, 2025, 3 PM).
- No make-up for exams.
- Zoom Review session will be held for both exams.

Learning Accommodations

- Stevens is dedicated to providing appropriate accommodations to students with documented disabilities.
- Contact: Office of Disability Services (ODS)

Inclusion Statement

In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

Respect and Love

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

Machine Learning

Machine learning is a branch of artificial intelligence which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy.

Why Math for ML?

- To understand fundamental principles upon which more complicated ML systems are built.
- Help creating new machine learning solutions.
- Helps in understanding and debugging existing approaches.
- Helps in understanding the assumptions and limitations of the methodologies we are working with.

CS 556 Overview

This course will give you a rigorous introduction to the mathematical foundations of machine learning, including but not limited to frequently used tools in linear algebra, calculus, probability, and widely applied methods such as linear regression and logistic regression. In addition, this course provides hands-on training on implementing these algorithms via Python. You will be trained to use popular python libraries such as numpy, sklearn and matplotlib.

Course Outcomes

- Apply basic concepts in linear algebra to problems in machine learning.
- Apply principal component analysis to analyze high-dimensional data.
- Apply gradient descent to solve general optimization problems.
- Apply linear regression to solve real-world problems.
- Use numpy to solve machine learning problems.

Week	Topics	Date
0	Introduction and Course Overview	01/27/2025
1	Vectors and Matrices	01/27/2025
2	System of Linear Equations	02/03/2025
3	Vector Spaces and Subspaces	02/10/2025
4	Orthogonality and Projections	02/18/2025
5	Matrix Decomposition	02/24/2025
6	Principle Component Analysis	03/03/2025
7	Exam 1	03/10/2025
8	Derivatives + Optimization	03/24/2025
9	Gradient Descent	03/31/2025
10	Probability Theory	04/07/2025
11	Probability Distributions	04/14/2025
12	Exam 2	04/21/2025
13	Linear Regression	04/28/2025
14	Logistic Regression	05/05/2025

Questions?
Email me at :
eterolli@stevens.edu