Data Science for Health

CS 89/189 - Spring 2019
Instructor: Temiloluwa Prioleau (CS)
Office Location: Sudikoff 109
Class Meetings: 10A

Course Description

Data science is being employed across diverse fields to improve human sensing and health. However, there are still many untapped opportunities. This course will cover state-of-the-art methods for data acquisition and analysis, with an emphasis on interpretation of behavioral and physiological data. Students will develop their skills by reading, presenting, and critiquing seminal research papers in the health space. The course will also include assignments and a group project to reinforce concepts and methods widely used in data science.

Prerequisites:

CS 74 (Machine Learning and Statistical Data Analysis) or instructor's permission

Course Learning Outcomes

In this course, students will:
- Study seminal data science papers with health applications
- Identify gaps in the research and brainstorm for new solutions
- Write computer programs that apply data analytics method to real datasets
- Present in written and oral format project results and learnings

Teaching Methods & Philosophy

This course will implement a variety of learning methods including: self-learning through reading of research papers, traditional lectures by the instructor and students, group/class discussions, and active learning through assignments and a project.

Expectations & Norms

It is expected that students will read and critique two research papers on a weekly basis prior to class meeting times. In person attendance and participation in group discussions is required to

support a thriving learning environment. Students are invited to visit my office hours for further discussions of assignments, projects, and other class related matters. Students can reach me by email using the class title (CS 89/189: Data Science for Health) in the subject line.

Class Climate & Inclusivity

It is my goal to create a safe, respectful, and fun learning environment that supports diversity of thoughts, perspectives, and experiences. As a participant of the class, you should also strive to encourage and support this goal. Please contact me, in person or electronically or submit anonymous feedback, if you have any suggestions that can improve the course material and/or learning environment.

Reference Textbooks

1. Data Science from Scratch *by Joel Grus*
2. Data Mining, Concepts and Techniques *by Jiawei Han, Micheline Kamber, & Jian Pei*
3. Pattern Recognition and Machine Learning *by Christopher Bishop*

Assessment & Grading

- Readings/Critique – 25%
- Class Participation – 15%
- Group Project & Presentation – 35%
- Final Paper – 25%

Dartmouth Policies

Student Accessibility and Accommodations

Students with disabilities who may need disability-related academic adjustments and services for this course are encouraged to see me privately as early in the term as possible. Students requiring disability-related academic adjustments and services must consult the Student Accessibility Services office in Carson Hall 125 or by phone: 646-9900 or email: Student.Accessibility.Services@Dartmouth.edu.

Once SAS has authorized services, students must show the originally signed SAS Services and Consent Form and/or a letter on SAS letterhead to me. As a first step, if you have questions about whether you qualify to receive academic adjustments and services, you should contact the SAS office. All inquiries and discussions will remain confidential.

Religious Observances

Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me before the end of the second week of the term to discuss appropriate accommodations.

Other Learning Resources

1. How to Read a Paper
2. Introduction to Basic Concepts in Statistics

Course Schedule and Topics

- Week 1: Introduction, Challenges in Health
- Week 2: Statistical Testing & Theory-Guided Data Science
- Week 3: Group Projects: Open Problems in Health
- Week 4: Activity Recognition
- Week 5: Human Behavior Sensing
- Week 6: Physiological Sensing
- Week 7: Data Visualization
- Week 8: Interventions and Persuasions
- Week 9: Final Paper and Presentation