MATH/LING 289: Introduction to Data Science, Fall 2018
Tuesday, Thursday 13:30-14:45 PURH G13

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Course Website:	`https://statsmaths.github.io/stat289-f18`

Overview:

Data science is an interdisciplinary field concerned with extracting knowledge from data and communicating those results to some public audience. Data science needs to be learned *by doing* data science. There are no short-cuts and the process cannot be learned by simply working our way methodically through a textbook of disconnected topics.

Therefore, this course will be taught using a problem-based learning model. As a class, we will be addressing an open ended research question and learning various skills that will assist our inquiry. Both individually and in small groups, students will take responsibility for particular subtasks that drive our research forward. At the end of the semester students will have acquired a toolkit of methods, and the knowledge of how to use them in practice, to address important social, cultural, and scientific questions with data-driven techniques.

We will make heavy use of computing throughout the semester, but *no prior programming experience is required*. Also note that this course has a MATH designation because statistics is currently housed in the mathematics department. The topics of this course do *not* fall within the traditional disciplinary boundaries of mathematics.

Research Question:

Our object of study for this semester (Fall 2018) concerns the edit history of pages on Wikipedia. Our research for the semester will be guided by several related questions:

- How is knowledge being represented through the works of an anonymous, decentralized collective of users connected across the internet?
- What role does memory play in the representation of current and semi-current events?
- What kinds of knowledge are privileged, or taken for granted, by citation patterns on the interent?
- How do cultural and linguistic factors play into the structure of Wikipedia pages (by looking at pages across different languages)?
- What role do images and other media play in the structure and development of encyclopedic pages? has this changed over time?

These questions can be studied from a number of disciplinary perspectives. For example, one might draw on methods from from one or more of: psychology, sociology, linguistics, political science, American studies, media studies, and critical theory. In this course we will see how the methods of data science provide a new set of tools that are able to engage with, rather than against, these disciplinary techniques while opening the possibility of producing knowledge through the study of large unstructured data sets.

Grades:

Your final grade will consist of three elements:

- Class Participation, 20%
- Short Paper (1500-2000 words), 20%
- Final Paper (2500-3500 words), 60%

Course expectations and community standards will be discussed, developed and distributed in the first week of the course. This will include policies for class participation, attendance, and late work.

Weekly Topics:

Typically, we will spend Tuesdays discussing the course readings and introducing new concepts. Thursday will be spent working on coding exercises and small group discussions.

Week 1: Introduction, What is Data Science, Set-up

- Reading #1: "Data Analysis and Statistics: An Expository Overview." J. W. Tukey and M. B. Wilk. *AFIPS Conference Proceedings*. Volume 29, 1966.

Week 2: Keywords in Context and Basic Search

- Reading #1:

Week 3: Corpus Construction

- Reading #1:

Week 4: Term-Frequency Matrices

- Reading #1:

Week 5: Dimensionality Reduction

- Reading #1:

Week 6: Network Analysis

- Reading #1:

Week 7: Token Annotations

- Reading #1:

Week 8: Phrase-level Linguistic Annotations

- Reading #1:

Week 9: Topic Models and Document Clustering

- Reading #1:

Week 10: Image Processing

- Reading #1: