Fall 2020 Syllabus for CSE 544A Special Topics in Artificial Intelligence

Equity and Fairness in Estimation and Classification

Instructor: Neal Patwari, Professor in ESE and CSE, npatwari@wustl.edu

Course website: Canvas

Meetings: Tue/Thu 2:30-3:50pm Central time

Prerequisites: ESE 326 (Probability and Statistics) and CSE 417T (Machine Learning), or equivalent


Other Readings: Readings include excerpts from books, the recent manuscripts and publications from conferences (FAccT, NeurIPS, arXiv), videos from tutorials and presentations, journal papers and book chapters.

Course objective: This course is designed to introduce graduate engineering students to research at the intersection of engineered algorithms (such as estimators, detectors, classifiers, and control systems) and the problems of bias, unfairness, inequity, and oppression. The objective is both to use engineering tools to analyze and quantify problems, as well as to study the problems introduced by engineering tools including detectors, estimators, classifiers, and control systems. Topics include critical race and feminist theory, measurement theory, estimation bias, limitations on detection fairness, and random process models used for control systems.

Topics:
- Introduction to critical science: systemic oppression, power, bias, (in)equity, and (un)fairness
- Measurement theory
- Fairness issues in detection and limitations on fair detectors
- Meanings of estimation “bias”, study of word embeddings
- Studying up: use of data science to confront power systems
- Feedback and game theory in systems with control loops; random process models with reinforcement

Grading: This course will be graded based on participation, quizzes, student writing, and student projects. Students will present a project on a research topic of their choosing, which will involve leading a discussion, and a written report.
Meetings: This course will meet twice per week on Zoom (Tue/Thu 2:30-3:50pm CT). Meetings will be used both for lecture and for discussion; it is critical that students are prepared to participate in a synchronous discussion during the meeting time.