WELCOME TO CIS 679

MACHINE LEARNING

SYLLABUS

https://github.com/cis678-w20/class-material/blob/master/syllabus.pdf

- You will need to create a github account at some point (might as well just do it now)

WHAT IS ML?

- Programming computers to optimize performance using data or experience

WHEN TO LEARN

- Cannot describe, explain, or quantify how to do something
  - Example: speech recognition
- Learning often isn't (and shouldn't be perfect)
  - Want a good and useful approximation to the data

MACHINE LEARNING PARTS

- General Idea: Optimizing some form of performance criteria
- Construct general models from specific samples (inference)
- Search large space to find best one
  - Solving optimization problem
- Represent and evaluate the model

MACHINE LEARNING APPLICATIONS

- Retail
- Financial
- Manufacturing
- Medicine
- Data mining

TYPES OF ML

- Association Learning (basket analysis)
- Supervised Learning
  - Classification
  - Regression
- Unsupervised Learning
  - Clustering
- Reinforcment Learning
- Evolutionary Learning

APPROACHES

- Decision trees
- Clustering algorithms
- Neural networks
- SVM
- Bayesian networks
- Regression

ISSUES TO CONSIDER

- When to use what algorithm?
- How much training data do you have/need? Is it labeled?
- What computational resources do you have?
- What function are you trying to optimize?
- Does explainability matter? (active research area)
- What about bias? Is it fair? (active research area)