CS578 – Interactive and Transparent Machine Learning

Topic: Syllabus

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Course Information

- Date and location:
  - Tuesdays & Thursdays, 3:15pm – 4:30pm
  - Stuart Building 113
- Instructor:
  - Dr. Mustafa Bilgic
    - Research interests: machine learning, interactive learning, transparency, recommender systems
- Office location and hours:
    - SB 217C – Tuesdays 11am-12pm (or by appointment)
- TA:
  - None at the moment

3) Interactive
2) Transparent
1) Machine Learning

1. Machine Learning

- Algorithms that learn from data / experience
- Three subcategories
  - Supervised learning
  - Unsupervised learning
  - Reinforcement learning

Examples

- Supervised learning (from data)
  - Suggest news articles, movies, restaurants
  - Diagnose patients
  - Predict the traffic
  - Recognize faces
  - Fraud detection
  - Sentiment classification
- Unsupervised learning (in data)
  - Topic discovery in documents
  - Cluster genes based on their expression levels
- Reinforcement learning (from experience)
  - Learn to play games
  - Learn to navigate (robots inside a building, vehicles on the road, etc.)

2. Transparent

- Explain
  - The model
  - The model's prediction
- Examples
  - Movie recommendation
    - The model: "The model thinks you like action movies, movies by …, "
    - The prediction: "The model recommends you to watch …, because …"
  - Medical diagnosis:
    - The model: "The model believes high cholesterol levels and old age are strongly correlated with heart disease."
    - The prediction: "The model diagnosed you with …, because …"

3. Interactive

- Provide feedback and explanations to the model
- Examples
  - You explain why you like a specific movie (because it is an action movie by …)
  - You confirm or correct the model: the model believes you like action movies; you agree / or disagree and correct it

GRADING

Assignments (~5)	15%
Quizzes (3)	15%
Project (4)	35%
Final exam	35%

Assignments (15%)

- Coding and analysis
- Python and Jupyter Notebooks
- Two types of assignments:
  - Transparency
    - For e.g., given a dataset, train a model, and explain what the model learned and explain some of its predictions
  - Interaction
    - Implement a few active learning approaches

Python Packages

- Python 3.6, 64bit https://www.python.org/
- Jupyter notebook https://jupyter.org/
- Pandas https://pandas.pydata.org/
- Scikit-learn http://scikit-learn.org/stable/
- TensorFlow https://www.tensorflow.org/
- Keras https://keras.io/

Git and GitHub

- We'll use Git and GitHub for assignments and project submissions
- If you are not familiar with these tools, there are many video tutorials that you can watch

Quizzes (15%)

- Think of them as short exams where you have access to your notes and a computer
- Three quizzes, 5% each
  - Mid February, mid March, mid April
- Quizzes will be proctored
  - In class if you are in section 01, or via IIT Online if you are in sections 02 and 03

Project (35%)

- Interactive and transparent ML application
- Several phases and deliverables
  - Proposals (February)
  - Milestone report (March)
  - Presentation (April)
  - Final report (April/May)

Final Exam (35%)

- A proctored, regular exam
- It will be on the final exam date set by the university

CS578 vs CS584

- Similarities
  - Same algorithms: decision trees, naïve Bayes, logistic regression, etc.
- Differences
  - Additional topics
    - Active learning, transparency, interaction
  - Each algorithm discussion will have three components:
    - Foundations
    - Transparency
    - Interaction

Online tools

- Questions, discussions
  - Piazza
  - https://piazza.com/iit/spring2019/cs578/
- Assignments
  - GitHub
  - https://classroom.github.com/classrooms/46386925-cs578-spring-2019

Late Submission policy

- Add/commit/push early
- Late submissions will be penalized 1 point per minute
- Exceptions are given *only* when you have a *documented* emergency

Academic honesty

- If you violate the academic honesty (such as unauthorized/undocumented collaboration, cheating, etc.), then I will report it to the university
  - Just FYI: I reported several cases to the university in the past
- Depending on the severity of the violation, it can result in
  - zero points on the respective assignment,
  - E in the course,
  - suspension of your enrollment at the university,
  - expulsion from the university.
- Full guidelines are available at: https://web.iit.edu/student-affairs/handbook/fine-print/code-academic-honesty

Americans with Disabilities Act (ADA) Policy

- Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources. The Center for Disability Resources (CDR) is located in 3424 S. State St., room 1C3-2 (on the first floor), telephone: 312.567.5744 or disabilities@iit.edu

Topics

- https://github.com/CS578-S19/cs578#topics

Next Class

- What is ML?
- TEDxIIT 2016 Talk
  - https://www.youtube.com/watch?v=Tx3yuKG9wwY