forrestbao add COVID-19 notice to syllabus Latest commit 885ad15 5 days ago History

1 contributor

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Machine Learning

This syllabus is subject to change.

SYNOPSIS

This class will introduce basic machine learning models and concepts, such as linear classifiers, support vector machines (SVMs), decision trees and random forests, neural networks, and deep learning. While most concepts will be on supervised learning, unsupervised learning and reinforcement learning will also be briefly covered.

This class will balance theoretical foundations and hands-on experience. Homework will include mathematical derivations, proofs and calculation, both analytical and numerical. Students are expected to write programs to implement the aforementioned models and use existing APIs (e.g., scikit-learn, TensorFlow, PyTorch, cloud-based APIs of AWS and GCP) to build projects. Exams will be alike to homework problems except the programming part.

INSTRUCTOR

Prof. Dr. Forrest Sheng Bao, fsb at iastate dot edu

OFFICE HOURS: After each meeting of the class, or by appointment.

SUGGESTED TEXTBOOKS AND ONLINE RESOURCES

- Machine Learning – An Algorithmic Perspective, by Stephen Marsland
- Pattern Classification 2nd Edition, by Richard O. Duda, Peter E. Hart and David G. Stork
- PRML by Bishop at Microsoft Research UK
- scikit-learn document
- Machine Learning class by Dr. Andrew Ng

GRADING POLICY

- Homework (including programming assignments): 30% for 574 and 50% for 474, weekly or biweekly depending on the topic
- Exams (middle-term and final): 50%
- Project: 20% for 574 and 20% bonus for 474

MEETING SCHEDULE

Week	Topic
1	Introduction (history, background, simple examples),math and Python warm-up
2	Linear classifiers (Fisher, perceptron, MSE, gradient decent)
3	Regression
4	SVMs

Week	Topic
5	Decision trees, and random forests
	Midterm-exam
6	Neural networks, and deep learning
7	Unsupervised learning, clustering
8	Reinforcement learning
9	Ensemble learning, PCA, regularization, cross-validation
10	ML applications in NLP, SP, and CV
11	ML and hardware (ML from sensory data and ML on microcontrollers)
12	Project demonstration and Q&A
13	Project demonstration and Q&A
finals week	**final exam**

COVID-19 health and safety requirements

Students are responsible for abiding by the university's COVID-19 health and safety expectations. All students attending this class in-person are required to follow university policy regarding health, safety, and face coverings:

- wear a cloth face covering in all university classrooms, laboratories, studios, and other in-person instructional settings and learning spaces. Cloth face coverings are additionally required to be worn indoors in all university buildings, and outdoors when other people are or may be present where physical distancing of at least 6 feet from others is not possible. Students with a documented health or medical condition that prevents them from wearing a cloth face covering should consult with Student Accessibility Services in the Dean of Students Office.
- ensure that the cloth face covering completely covers the nose and mouth and fits snugly against the side of the face.
- practice physical distancing to the extent possible.

- assist in maintaining a clean and sanitary environment.
- not attend class if you are sick or experiencing symptoms of COVID-19.
- not attend class if you have been told to self-isolate or quarantine by a health official.
- follow the instructor's guidance with respect to these requirements. Failure to comply constitutes disruptive classroom conduct. Faculty and teaching assistants have the authority to deny a non-compliant student entry into a classroom, laboratory, studio, conference room, office, or other learning space.