DEPARTMENT OF COMPUTER SCIENCE

COLORADOSCHOOLOFMINES
EARTH • ENERGY • ENVIRONMENT

Machine Learning in Practice

June 10th – 14th, 2019

https://csmspace.com/events/machinelearn/

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Machine learning was born from pattern recognition and the theory that computers can learn without being programmed to perform specific tasks. Machine learning is able to automatically apply complex mathematical calculations to big data — over and over, faster and faster, which now has broad applications to solve real-life problems, such as the heavily hyped self-driving Google cars, online recommendations on Amazon and Netflix, fraud detection, to name a few. To expose the engineers in industry and the undergraduate and graduate students in science and engineering disciplines to machine learning in practice at the era of big data, this summer short course will introduce the fundamentals of machine learning theories and hands-on experiences to using machine learning techniques to solve practical problems.

Goals

After course completion, students should expect to:

1. Understand the different types of machine learning and some popular methods in each.
2. Be able to use machine learning methods in real-world applications.
3. Be able to determine applicable machine learning techniques for different datasets.
4. Understand how to use machine learning to learn features from high dimensional or complex data.
5. Understand the ethical implications of machine learning models.

Course Structure

The course will take place over the span of 5 days with each day containing two 3-hour lecture sessions, morning and afternoon, with a break in the middle. Each 3-hour lecture consists of 3 sub-lectures each of which involves a short lecture followed by an exercise where students apply what they learned then a discussion of the solution.

In addition to the in-class exercises that students will complete throughout the course, students can complete an optional project within one month of course completion and receive instructor feedback.

Course Content & Tentative Schedule

The instructors will provide course materials, including handouts and presentation slides, that are sufficient for the course. Students can find further details about the content covered in the following references:

- Pattern Recognition and Machine Learning, by Christopher M. Bishop.
- Machine Learning: a Probabilistic Perspective, by Kevin Patrick Murphy.
- The Elements of Statistical Learning: Data Mining, Inference, and Prediction, 2nd Edition, by T. Hastie, R. Tibshirani, J. H. Friedman.
- The Proceedings of the International Conference on Machine Learning (ICML)
- The Proceedings of the Annual Conference on Neural Information Processing Systems (NeurIPS)

Day 1	Morning: Afternoon:	Introduction & review of Python and Git Supervised learning – regression
Day 2	Morning: Afternoon:	Supervised learning – classification Unsupervised learning – clustering & anomaly detection
Day 3	Morning: Afternoon:	Feature selection & dimensionality reduction Deep learning – introduction
Day 4	Morning: Afternoon:	Deep learning – convolutional neural networks and Computer Vision Deep learning – recurrent neural networks and Natural Language Processing
Day 5	Morning: Afternoon:	Deep learning – generative adversarial networks Deep learning – deep reinforcement learning

Course Location

This course will take place in the conference room at Catalyst HTI, located in the Rino Art District of Denver, CO at 3513 Brighton Blvd Denver, CO 80216.