Deep Learning Clinic (DLC) Syllabus

Course Description

Welcome to the Deep Learning Clinic (DLC) 2018!

Who DLC Is For

This course is designed for students who are eager to solve complex real world problems with powerful machine learning algorithms, yet need advice on and help with various stages of this process -- what tools to use, how to use them, and practical advice.

What DLC Is About

DLC has meetings with two formats: an instructional session (Friday) focusing on the essential knowledge to get started with real-world examples, and a lab session (Wednesday) that provides hands-on exercises and feedback.

The lectures provide a concise introduction to techniques and tools that are essential in solving practical problems with deep learning algorithms.

In the lab session, students are encouraged to work on their own projects that using deep learning. The instructor will have one-on-one analysis with the students to help them tackle challenges raised, including: feasibility evaluation, modeling and task formulation, network architectures searching and designing, and practical guidance on training and tuning neural network models.

What DLC Is Not

This is *not* a machine learning or deep learning introductory course. Although fundamental materials of those subjects are to be reviewed, they will be covered in a concise manner. Students who are unfamiliar with machine learning or deep learning are encouraged to read the Reference section below for a more comprehensive understanding of the relevant topics.

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Course Specifics

Instructor:

Jin Sun

Contact:

js2625@cornell.edu *Please include the tag 'DLC' in the email subject.

Hours and Locations:

Wed 8:30am-9:30am, Lab Session in Bloomberg 061

Fri 8:30am-10am, Lecture Session in Bloomberg 081

Lectures

9/28 - Course Introduction

Overview of the course and syllabus outlining what students can expect from the course.

Exploration of a simple learning problem TensorFlow Playground to show students the essential steps in solving a machine learning problem.

Class survey on students' background and interested topics.

10/5 - Deep Learning Frameworks

Step-by-step introduction on how to set up a deep learning-ready computing environment and how and when to use popular frameworks and tools, including:

Pytorch

TensorFlow

Keras

Tensorboard for Visualization

After this lecture, the students should have a working DL environment and be ready to explore the usage of these tools.

10/12 - Brief Introduction to Machine Learning

Introduction/review of core machine learning concepts, including: supervised learning, unsupervised learning, classification, regression, loss functions, performance evaluation metrics, and etc.

10/19 - Brief Introduction to Deep Learning

Introduction/review of deep learning topics, including: optimization techniques, network structures (e.g., Fully Connected Nets, Convolutional Nets, Recurrent Nets), Generative Adversarial Networks, Reinforcement Learning, and etc.

10/26 - Deep Learning in Real World: A Case Study

A case study on how to: identify a real world problem, collect data, design models, train and evaluate.

11/2 - Data

How to perform data related tasks such as collection, labeling, and verification.

Details on how to set up data labeling tasks on Amazon Mechanical Turks.

11/9 - Tricks on Training Neural Networks

Practical tips and tricks on how to train a (good) neural network model, including: pre-processing, post-processing, learning rate, batch size, normalization, network depth, choice between architectures, fine-tuning, and etc.

11/16 - Real-World Ready Machine Learning Tools

Introduce machine learning tools that are widely used and proven to be effective in real-world problems, such as: Google Cloud Vision, AutoML for model search, Dlib, Face++ API for face detection, Detectron for object detection, NLTK for natural language processing, and etc.

11/23 - (Thanksgiving, no class)

11/30 - No Lecture - Office Hours

Reference

Online Courses

MIT 6.S191: Introduction to Deep Learning link

Stanford CS231n: Convolutional Neural Networks for Visual Recognition link

Free Textbooks

A Course in Machine Learning by Hal Daume III link

Deep Learning by Ian Goodfellow and Yoshua Bengio and Aaron Courville link