EE63050: Deep Learning, Fall 2023 (E Slot)
Indian Institute of Technology Hyderabad

Location & class times: A-LH1, E Slot (Tuesday 10 am, Thursday 12 noon, Friday 9 am).

Office hours: Thursday 2:30 pm – 3:00 pm. C-509.

Google classroom code: 2tsclr2.

Prerequisites: Probability & Random Variables, Foundations of Machine Learning.

References:

1. I. Goodfellow, Y. Bengio and A. Courville. Deep Learning, MIT Press.

2. A Zhang, Z. C. Lipton, M. Li, and A. J. Smola. Dive into Deep Learning.

3. K. Murphy, Probabilistic Machine Learning: Advanced Topics, MIT Press.

Grading Policy: 20% homework (programming assignments to be done in PyTorch), 30% project, 30% quiz (every other work), 20% final. The lowest HW and quiz score will be dropped.

HW/Project Late Submission Policy: Roughly 2% deducted every hour beyond the deadline. Work turned in more than 48 hours beyond the deadline will not be graded.

Attendance Policy: Mandatory. No makeup quizzes will be given.

Tentative topical outline:

- Preliminaries: Metric, Normed, Vector Spaces, Linear Algebra, Probability and Information Theory, ML Basics: Unsupervised and Supervised Learning, A Representative Model: The Multi-layer Perceptron, Optimization Theory, Performance Measures, Dimensionality Reduction and Data Visualization.

- Basic Models and Methods: Deep Feedforward Networks, Regularization for Deep Learning, Convolutional Neural Networks, Sequential Models: Recursive and Recurrent Nets.

- Modern Models:

    - Attention Mechanisms and the Transformer Model

    - Deep Convolutional Neural Networks: ResNet, DenseNet etc.

    - Recurrent Neural Networks: Gated Recurrent Unit (GRU), Long Short Term Memory (LSTM), Deep RNN, Encoder-Decoder Architecture

    - Applications to Vision, Speech, and Natural Language Processing

- Generative Models: Variational Autoencoders, Diffusion Models, Generative Adversarial Networks.