Fall 2023

MA 721 Selected Topics in Numerical Analysis - Deep Learning Algorithms.

MWF 1:00-1:50pm - CB 343

Instructor: Dr. Qiang Ye
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Syllabus: We study theory and algorithms for deep learning. Based on neural network models, deep learning has become a widely applicable class of machine learning methods. The course will emphasize understanding of the deep learning models and algorithms and highlight recent developments. The following topics will be covered.

- Introduction to Machine Learning and Linear Models
- Fully Connected Neural Networks
- Regularization
- Convolutional Neural Networks
- Recurrent Neural Networks
- Graph Convolutional Networks
- Transformer and GPT Models
- Generative Adversarial Networks; Denoising Diffusion Probabilistic Models.

Selected materials from optimization and probability and information theory will be covered as needed. There will be no required text, but the following book will be a good reference:

- Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016. Available at http://www.deeplearningbook.org/

Grading: Grading will be based on either programming projects or in-class presentations.

Please contact Dr. Ye for more details or any question.