Course Syllabus

STAT 467
Applied Multivariate Analysis
Spring 2022

Instructors: Sijian Wang, Ph.D.
Associate Professor, Departments of Statistics
Email: sijian.wang@stat.rutgers.edu
Office hour: 2-3pm EST on Wednesday
Office hour Zoom link: same as the lecture Zoom link

TA: Mr. Yuanhao Liu
Email: yl1398@stat.rutgers.edu
Office hour: 2-3pm EST on Monday
Office hour Zoom link: https://rutgers.zoom.us/my/yl1398?
pwd=eVY0aE9oeDU0NIBESIVPRl9sZz09
Meeting ID: 792 073 8652 Password: 086636

Prerequisite: Level II Statistics or permission of instructor.


[Recommended Text (more mathematical)] *Deep Learning*, by Ian Goodfellow, Yoshua Bengio and Aaron Courville.
Lectures: Tuesday 5:40-8:40pm EST

Lecture Zoom link: https://rutgers.zoom.us/j/91619927719?pwd=ZEhmK2Vpb2pySWhSS1VaVIUrUnIPZz09 (you need to login using your Rutgers Zoom account to join)

Meeting ID: 916 1992 7719 Password: 320504

All lectures will be recorded and made available in Canvas.

Grading: Homework: 30%; Midterm: 30%; Final: 40%.

Homework: Homework will be assigned and collected on Canvas. Late homework will NOT be accepted. The homework with lowest score will be dropped when calculating your final score. DO NOT COPY from other sources. Computer generated output without detailed explanations and remarks will NOT receive any credit.

Course outline (tentative):

This course introduces state-of-art deep learning models with application to computer vision (CV), natural language processing (NLP), graph/network problems and other selected scientific problems. Each model is illustrated and demonstrated by analyzing a real dataset. The Python (and Keras library) will be used for all implementations. The online platform colab (https://colab.research.google.com/?utm_source=scs-index) will be used to run all codes.

1. Introduction
2. Single layer perceptron, multilayer perceptron (generic deep learning models)
3. Optimization for deep learning: feed-forward, backpropagation, gradient descent,
momentum, regularization, dropout.

3. Convolutional Neural Network (CNN), Graph Convolutional Network (GCN)
4. Word embedding, document embedding, graph/network embedding
5. Recurrent Neural Network (RNN), Long short-term memory (LSTM), Attention based model, machine translation (sequence-to-sequence model)
6. Generative deep learning models: variational autoencoder, generative adversarial network (GAN)
7. Deep reinforcement learning (if time permitting)

Course Summary:

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