ECE/CS 559 Lecture 1 8/27

Mesrob Ohannessian M 1-2pm (Zoom)
T 11-12noon (SEO 1050)

TAs:

Alperen Gormez Q&A M 10-12 pm
Kenya Andrews Tutorials Th 1-3 pm
Runxuan Miao Q&A T 3-5 pm

Homeworks: due on Tuesdays 9pm Gradescope
next day noon - no penalty
after that → grade = 0
plagiarism → grade = -100
Homework 1 is out! Due T Sept.

Grading
Homework 20%
Midterm } min 30%
Final } max 40%
Participation / Attendance 10%
repeat plagiarism → 0

Material
- Mostly: notes (handwritten)
recorded lectures
recorded tutorials

Reference books: in syllabus.

Topics Covered:
- Models of artificial / mathematical neurons
- Single and multilayer neural networks.
- Perceptron
- Supervise learning (intro)
- Backpropagation algorithm
- Convolutional Neural Networks (CNNs)
- Unsupervised Learning (intro)
- k-Means, Hebbian, contrastive, GANs
- Reinforcement Learning (intro)
- RNNs, Attention and Transformers
- Diffusion models

Timeline of NN Research

- 1943 McCulloch and Pitts (at UIC!)
Linear threshold "neuron"
- 1962 Rosenblatt "Hebbian" learning
→ strengthen used connections
Novikoff: "perceptron" algorithm converges
- 1969. Minsky & Papert publish "Perceptrons"
↓
discourages work in artificial neural networks

But... some people continued working and "machine learning" (with other methods) was born:

- 1980 Fukushima : CNNs
- 1984 Valiant : PAC Learning
- 1985 Hinton & Sejnowski : Boltzmann machines
- 1986 same lab : success with back propagation (existed since 1961)
- 1997 LSTMs
- 1998 LeCunn reforms on CNNs

2003 Bengio neural language models

Modern Era : Deep Learning

2012 AlexNet
speech recognition

2014 VAEs, GANs, GNNs
computer vision

2015 Diffusion Models

2016 AlphaGo

2017 Transformers

2018 Pretraining, Contrastive

2021 GPT-3, DALL-E

2023 GPT-4, ChatGPT
RLHF