CSE 459: Deep Learning

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Syllabus

- The Perceptron
- Multi-Layer Perceptron
- Backpropagation
- Gradient Descent and its Variants
- Convolutional Neural Networks
- Recurrent Neural Networks
- Attention Models —> Transformer
- Physics-Informed Neural Networks (PINNs)
- Foundational Models (YOLO, SAM2, etc.) —> see Huggingface

Join class on Teams: feg945p

Projets

EJUST-GYM-4

- Annotations:
  - It is a stream of exercises —>
    - Properly name the files (front/side/thermal) or maybe better naming.
    - Mark start & end of each exercise
    - Extract each exercise into a separate clip file
    - Generate GEIs (I’ll provide the code)
    - Generate pose estimates (I’ll provide the code)

Term Projet

Vision -Based Vibration Analysis

- May collect data if possible
- Work on existing data
- Image magnification
- Convert to time-series
- Perform analysis on the generated time-series

Term Project

Lyrics Analysis

- We already published Abdel Halim and Shadia
- Famous singers
- May collect new lyrics of more modern singers
- I have already the code in R (with some Python)
- Use more recent tools such as LLMs
- Data analysis (data mining) of composers, lyricists, frequency/rate, etc.
- Lyrics analysis: sentiment, emotional, TF-IDF, embeddings, etc.

Term Project

Temporal GraphRAG

- Graph Knowledge Base + GraphRAG with dynamical temporal data
- Paper: “Zep: A Temporal Knowledge Graph Architecture for Agent Memory”
- They published their code and system on: https://github.com/getzep/graphiti if some likes to try it
- Choose a domain

Assignments

- Tutorial assignments
- Data collection assignments