EE5353 NEURAL NETWORKS and DEEP LEARNING

Fall 2020, Time: 11:00 AM-12:20 PM T-Th

Neural networks are widely used in nonlinear estimation and pattern recognition applications by most US companies. Example applications include mail sorting, **remote sensing**, **license plate recognition, face recognition, automatic target recognition,** and **forecasting of weather,** utility **power loads**, and financial variables.

Deep Learners (DL) comprise the most popular category of neural nets, because they solve both the feature extraction and classification tasks of pattern recognition systems. For example, NHV Technologies in Fort Worth uses a DL system **designed and constructed by UTA graduate students** to classify conveyer belt images of metal scrap.

Material Covered/Skills Gained

In this course, students will learn how neural nets and Deep Learners work and how to apply them to real world applications. Specifically students will
(1) Gain technical skills in 1st and 2nd order optimization, linear algebra, and machine learning that are useful in a wide variety of applications and disciplines.
(2) Learn neural network architectures, their training algorithms, their relationships to optimal processors, and methods for predicting their capabilities.
(3) Learn how neural nets can approximate and outperform many popular nonlinear machines.
(4) Attain some basic skills in python and **Keras.**
(5) Learn how Deep Learners such as convolutional neural nets **(CNNs)** are constructed and trained.
(6) Understand why **CNNs** work and how to **choose their size for a variety of applications.**

Some Companies Using Neural Nets and Deep Learners

Mathworks, Delphi, **Google**, Siemens, Netflix, Fidelity Investments, National Weather Service, Intel, **Microsoft**, Philips Electronics, TXU, General Electric, The Prediction Company, BioImagene, ABB Network Management, Click Forensics, Exxon Mobil, and **Lockheed**.

Student Qualifications

Graduate students from all engineering departments are qualified, if they know Matlab and have a basic knowledge of linear algebra. **Let me know if you have problems registering**.