# ENGR-UH 4560
# Selected Topics in Information and Computational Systems

## Mini Project -Classification with neural network

Due Date: Refer to NYU Class

# Introduction

Artificial neural networks (NN) or connectionist systems are computing systems vaguely inspired by the biological neural networks that constitute animal brains. The neural network itself is not an algorithm, but rather a framework for many different machine learning algorithms to work together and process complex data inputs. Such systems "learn" to perform tasks by considering examples, generally without being programmed with any task-specific rules. For example, in image recognition, they might learn to identify images that contain cats by analyzing example images that have been manually labeled as "cat" or "no cat" and using the results to identify cats in other images. They do this without any prior knowledge about cats, for example, that they have fur, tails, whiskers and cat- like faces. Instead, they automatically generate identifying characteristics from the learning material that they process.
Dataset

# Data Set

The MNIST database of handwritten digits, available from this page, has a training set of 60,000 examples, and a test set of 10,000 examples. It is a subset of a larger set available from NIST. The digits have been size-normalized and centered in a fixed-size image. It is a good database for people who want to try learning techniques and pattern recognition methods on real-world data while spending minimal efforts on preprocessing and formatting.

# Requirements

1. Implement the forward and backward function for NN.
2. Set the network structure as [64, 50, 30, 10]

   a) Try to use sigmoid function as activation function.

   b) Try using the ReLU activation function.

   c) Try using the tanh activation function
3. Experiment on your own selected different hyper-parameters.
4. Report your findings.

# Deliverables

A .ipynb file containing the following:
   1. source code
   2. detailed description of the project if needed
   3. Answers to the programming questions.

Before submitting your project, please make sure to test your program on the given dataset.

## Notes

*You may discuss the general concepts in this project with other students, but you must implement the program on your own.* **No sharing of code or report is allowed.** *Violation of this policy can result in a grade penalty.*

*Late submission is acceptable with the following penalty policy:*
**10 points deduction for every day after the deadline**