Machine Learning with Networks *ECEN765.600, Fall 2018*

Assignment #3: Artificial Neural Networks

Due date: November 23rd, 2018 (Friday)

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

Signature:

Name:

1. Programming assignment (You are encouraged to program the specific machine learning algorithms by yourself. In case you are using the ones in existing packages, you would at least need to read the code!)

A) Implement one deep network for image classification: Download CIFAR-10 at `https://www.cs.toronto.edu/~kriz/cifar.html`.

1. (10 pts) Read the textbook "Hands-on Machine Learning" and the corresponding Jupyter notebook. Please pick either **AlexNet** or **Inception v3** on either **TensorFlow** or **PyTorch** for the assignment.
2. (20 pts) Create the corresponding deep network model on the selected platform. Train the model using the CIFAR-10 training images. Please display the training and testing accuracy with respect to the number of training epochs. Report the final classification accuracy on the CIFAR-10 testing images. Randomly select one of testing images, display the top five predictions along with the estimated probability.
3. (10 bonus pts) Can you use Support Vector Machines for image classification with CIFAR-10. How its performance compares with your selected deep network?

2. Math assignment

1. (10 pts) Can you design an articial neural network to approximate "XOR" function?
2. (20 pts) Please derive the function form of latent loss in Variational AutoEncoders (VAEs) [Note: Please read the referred paper or tutorial in Chapter 15].