

## Computer Science 6915 - Winter 2019

### Assignment 4

In this assignment you will get familiar with TensorFlow and construct a deep neural network model for image classification.

1. Follow and complete the five sections of the TensorFlow tutorial “Learn and use machine learning” available at <https://www.tensorflow.org/tutorials/keras>. It is recommended that each team member completes this tutorial on their own.
2. Using TensorFlow **create a deep neural network model** to **classify house numbers**. For this task, use the images provided in the Street View House Numbers (SVHN) Dataset (Format 2) available at <http://ufldl.stanford.edu/housenumbers/>. Use the train data set to train your network and the test dataset to evaluate your network performance.  
For ideas of network architectures used for image classification you can take a look at <https://github.com/zalandoresearch/fashion-mnist#benchmark>

For this task, submit through D2L the following (one submission per team):

1. Your python code to process the data, build and train the network, and evaluate its accuracy on the test dataset.
2. [Optional: worth 8 bonus participation points] A link to github repository containing a Jupyter Notebook (ipynb file) (<https://jupyter.readthedocs.io/en/latest/index.html>) describing your code.
3. A three-page description including:
  1. A description of the network architecture used including number of units on each layer, number and type of layers, activation function, regularization, etc.
  2. A short justification of why this architecture was selected.
  3. A description of how the network was trained including loss function, optimizer, metric, number of epochs, etc.
  4. A description of any data pre-processing steps.
  5. A description of the classification performance of the network on the test dataset including a figure with at least six images with their predictions (similar to the one shown in the TensorFlow tutorial).
4. An HDF5 file with your final model.

This assignment will be graded based on whether correct practices for model construction were followed (40%), quality of the description (40%), and whether the final model was correctly created and saved (20%).