

**ECE 9603/9063b – Data Analytics Foundations**

**Assignment 2: Neural Networks**

Deadline:

Thursday, November 15<sup>th</sup>, 2020

In this assignment you will build and tune a deep neural network.

1. Select a problem for which there is an open source dataset or for which you have data from other sources. You can use the same problem and the same data set as in Assignment 1. If you have used a limited number of features in Assignment 1 and are using the same data set in Assignment 2, you must add new features. There must be several independent variables. If you have been working with time series data, you need to engineer features from dates and times. You can change the problem and data set.
2. Select deep learning architecture suitable for your problem. Consider different network architectures for your problem.
3. Tune the selected network(s). At a minimum, tune the number of layers, number of neurons, and two other parameters. Depending on your problem, you should consider tuning additional parameters. Some of the networks you consider should have at least five hidden layers with exception of RNN for which three hidden layers are sufficient.
4. Assess the accuracy of the tuned deep learning model(s) and compare its accuracy with accuracy achieved for models from Assignment 1. If you are using a different data set, compare the tuned neural network with another model (does not have to be tuned) of your choice.

**Deliverables:**

- The report in **pdf** format submitted in OWL (total 20 points). It is suggested that you format the report according to the following:
  - Description of the forecasting problem and data. This may be the same as in Assignment 1. If there were issues with this section in Assignment 1, you must fix them. (2 points)
  - Overview of the network architecture(s) you have used including important parameters that affect the network operation. Discuss the reasons for selecting a specific architecture. Make sure you include parameters you will tune. (4 points)
  - Description of the process you have used including data pre-processing, feature generation, model training/testing, and evaluation. (7 points)

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- Results. This should include accuracy measures (more than one) achieved through the training process, graphs demonstrating final accuracy as well as the accuracy through the tuning process. (7 points)
- Code. Although there are no marks for the code itself, marks will be deducted if the code does not match the rest of the report.

**IMPORTANT:** The report itself should not contain any code. The code is submitted as an appendix or a separate file. The report should describe what you have done in general terms – the same process and algorithms could be implemented in different languages.