EECE 371- Embedded Learning Systems

Due date: Wed., March 4th 2019 **5 points**

You can pair up to solve this assignment.

Problem 1:

This assignment is based on the PWM lab. The data needed was captured from NI VirtualBench

https://github.com/bthib3/labdata1

Each CSV file in this repository represents a PWM signal with a different Duty cycle. The data can be extracted as a value for each time sample.

The target is to use this data in MATLAB accompanied with the DC-DC converter model.

Do the following:

- Use The model file attached in Simulink
    - Boost_CM_Switching (Double Click on the Boost_DC_DC)
        - Boost_DC_DC: In this file you will find a MATLAB function block and a clock, learn how to use both. Write a function inside the MATLAB function block that gets CSV values from the data file and feed it as an output (Note you will need to figure out how to sample the data from Column D and the function written can help you with the first step.
- Run your model before making any further changes and track the output of the current setup. (Change the duty cycle in the pulse generator to see how it behaves as well)
- Replace the pulse generator with the two blocks designed in the first step.
- Run the model again and test different CSV data files and make sure the different duty cycles are giving the expected behavior.
    - (How to read CSV in Matlab https://www.mathworks.com/help/matlab/ref/csvread.html)
- Write a reflection on how this problem can help you further in Embedded Systems Design process.

Problem 2:

In MATLAB use Genetic Algorithm Example to learn more about this concept.

To open the example run:

- openExample('global'optim/traveling_salesman_demo')

Track the code and try to understand how the cost function is designed.

Report what you understood for this model along with your conclusion when you play with those parameters:

On line 133 of demo m file change the value of those options:

- Population Size
- Number of Generations

On line 53 of demo m file, it shows the distances "Cost" function. Modify it to an absolute difference instead of root mean square and track the difference in performance as well.

Problem 3: (Include this in your project report later-on)

Follow the machine learning design process on your project idea and report the following:

- Data Collection
  - What kind of data will you collect for your project
  - What would be the source of your data
  - Do you think your data will be sufficient to build the machine learning model
- Feature Selection
  - What kind of features would you use in your machine learning model
  - How easy is it to acquire such features