Mini Project (EE6347 Fall 2023)

Demonstrate image classification using a spiking neural network

- Objective – Show as high a test accuracy as possible
- Dataset – EMNIST
    - This dataset is an extended version of MNIST that contains handwritten letters in addition to digits. There are 6 splits possible for this dataset. Use the 'balanced' split.
    - More info at http://pytorch.org/vision/main/generated/torchvision.datasets.EMNIST.html
- Guidelines
    - Project to be done in teams of two
    - Create a separate function for performing inference on test dataset. You may be asked to demonstrate during viva.
    - The learning will be done using 'Backprop through Time using Surrogate Gradients' algorithms.
    - Since test dataset will be used to check final test accuracy, it cannot be used for training. You may do a train: validation split of your original training dataset.
    - Show training loss vs epoch and accuracy vs epoch graphs
    - You are free to choose the model, encoding method, loss functions and surrogate functions to meet the objective
    - You are expected to utilize a gpu as the runs would take long
    - Recommended way is to use the snnTorch library. There are many tutorials available for reference on training SNNs.
      Look at https://snntorch.readthedocs.io/en/latest/tutorials/index.html
- Grading Scheme

	Score	
Total	30	
Code	12	Implementation of dataset prep, model, optimization and final test inference
Viva	8	Communicate understanding of problem statement and explain approach
Performance	4 + 6	- 4 marks awarded if test accuracy > 60% (i.e. model is better than coin toss) - Groups will be ranked according to test accuracy and awarded remaining 6 marks relatively. Top group gets full 6 marks