MLPR Lab-15

# This assignment is to LSTMs for Human Activity Recognition Time Series Classification

**Instructions:**

* Due time: 1:30 PM
* Submit all the generated outputs.
* Approx. program execution time – 15 minutes

Dataset location: <https://archive.ics.uci.edu/ml/machine-learning-databases/00240/UCI%20HAR%20Dataset.zip>

The data was collected from 30 subjects aged between 19 and 48 years old performing one of six standard activities while wearing a waist-mounted smartphone that recorded the movement data. Video was recorded of each subject performing the activities and the movement data was labeled manually from these videos. The six activities performed were as follows:

1. Walking
2. Walking Upstairs
3. Walking Downstairs
4. Sitting
5. Standing
6. Laying

Step 1: Import libraries

* from numpy import mean
* from numpy import std
* from numpy import dstack
* from pandas import read\_csv
* from keras.models import Sequential
* from keras.layers import Dense
* from keras.layers import Flatten
* from keras.layers import Dropout
* from keras.layers import LSTM
* from keras.utils import to\_categorical
* from matplotlib import pyplot

Step 2: load a single file as a numpy array.

Step 3: load a list of files and return as a 3d numpy array.

Step 4: load a dataset group, such as train or test.

* + load all 9 files as a single array
  + total acceleration
  + body acceleration
  + body gyroscope
  + load input data
  + load class output

Step 5: load the dataset, returns train and test X and y elements.

* + load all train
  + load all test
  + zero-offset class values
  + one hot encode y

Step 6: fit and evaluate an LSTM model (do 10-fold cross-validation)

Step 7: summarize scores (accuracy values should be about 89%)

Step 8: run an experiment

Step 9: summarize results.

1. Why was this problem suitable for LSTM and not just any other machine learning algorithm?
2. How do changing number of neurons in LSTM affect its performance?
3. Is a many-to-many model a more real-world scenario for this problem or a many-to-one model?