Lab Assignment 9. Music Genre Classification

Problem Statement: Classify Music in Different Genres"

Aim:
1. Understand Audio components: notes, chords
2. Audio Data Pre-processing for Deep Learning
3. Feature Extraction: example: Mel-Frequency Cepstral Coefficients
4. Classify Music with respect to genres

Steps

1. Create a dataset of short audio files (like 1 sec to 3 sec), 10 for "Pear" and 10 for "Pair". You can use your mobile to record the audio samples and further upload to your PC/Laptop. The format of the audio can be anything such as .wav, .mp3.

2. You can use the online available datasets also:

   1. https://www.kaggle.com/andradaolteanu/gtzan-dataset-music-genre-classification/tasks GTZAN: The dataset consists of 10 genres i.e Blues, Classical, Country, Disco, Hiphop, Jazz, Metal, Pop, Reggae, Rock, Each genre contains 100 songs. Total dataset: 1000 songs
   2. http://millionsongdataset.com/
   3. https://www.kaggle.com/davids1992/speech-representation-and-data-exploration

3. Read the audio using any library (sklearn/librosa). Extract the STFT features from the audio. STFT (Short Term Fourier Transform) is a frequency feature representation for audio. Since audio samples differ in length, STFT will have differing lengths. Hence extra entries of matrix can be removed from the STFT features.

4. Split the dataset (75% training and 25% testing) into training and testing sets with STFT audio features as input, audio class as target label.

5. Train a Neural Network model of your choice (NN/CNN) to do the classification.

6. Run different Neural Network model with different number of nodes and different number of layers such as 2, 3, 4 etc. For all the models plot the number of parameters learned, training accuracy, testing accuracy and running time for testing in bar chart. Analyse the results and discuss what you discovered!

Toolkits:
Music21 is a Python toolkit
Keras (Tensorflow)
librosa (v 0.7.2)

scipy (v 1.1.0)
sklearn (v 0.20.1)
sounddevice (v 0.3.14)
tensorflow (v 1.13.1)
numpy (v 1.17.2)