

# RNN LAB REPORT

Sai Srinadhu K

## Part 1:

Firstly I will describe the train, validation, test split. The test set is same as given. For the validation part, the previous 20 of test set block is taken i.e., 961 to 980 block, 1961 to 1980 block, 2961 to 2980 block, 3961 to 3980 block and 4961 to 4980 block. For both the parts, the optimizer used is Adam with learning rate 0.001. Both models were run for 500 epochs. The data is normalized using only the mean and standard deviation of train split i.e., the train split's mean and standard deviation is used while normalizing the validation and test part. The best model on validation is taken for testing.

A: A single layer RNN is used. The hidden dimension size is 20. The input dimension size is 1. The idea is to see the previous 20 and predict the next 21st one. Furthermore, during the test time, predicted one is fed into the model to predict the next timestep ones. The architecture comes under the class of Many to one, meaning many inputs and one output. The recurrent layers last time-step output is then given as input to a single FC layer to predict the next value. The model is trained end to end using backpropagation. The best model achieved test loss of 0.032.

B: Same as above replaced by LSTM layer. The best model achieved test loss of 0.030. As expected this was a bit better than the RNN layer.

## Part 2:

First, the data is normalized between -1 to 1 using mean and standard deviation. Two models are used one with LSTM layer and RNN layer. The model is a single LSTM layer, the model is the same as from above expect for now we are predicting a 4 valued vector instead of single value like in the previous one. The idea taken was same as from above, look at a block of 20 previous data points and predict the next one. While testing there were some negative numbers they were replaced with 0. Both the files are present in the code section. The audio file is in the code folder followed by the music folder. Same above-discussed model with a RNN layer is used as well for audio prediction. It's also present in the above-mentioned location. The LSTM audio seemed better compared to RNN one.