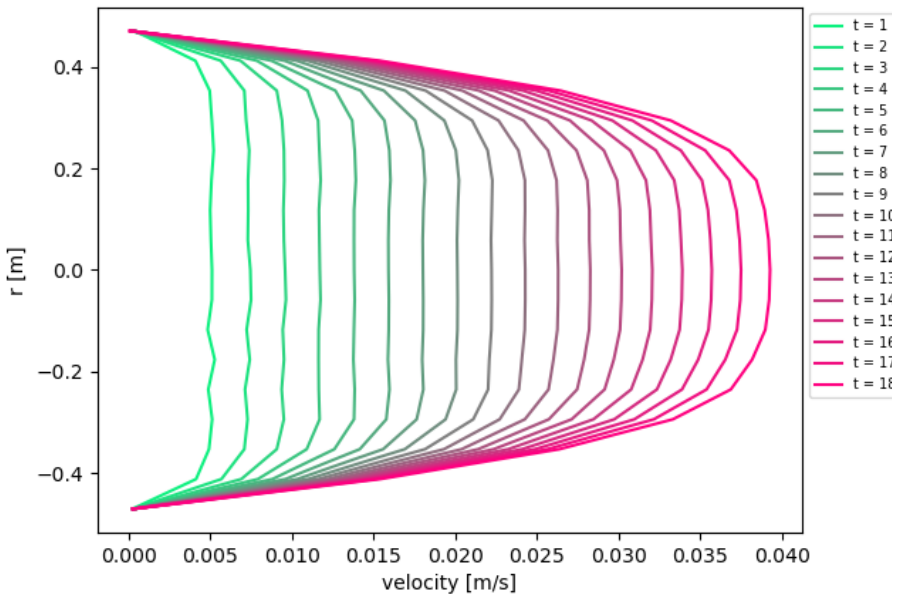
Q1

Structure of Model:

After some tuning I settled up with the following model for my LSTM:
One LSTM Cell of hidden size 128 neurons. The input size is defined to be 17 as per the dataset and so the lstm output was passed through a fully connected layer of input size 128 (the same as the hidden size) and the output size as 17 which is the input size of the dataset.
The model was trained using the adam optimizer for 20 epochs which yielded good results.

Hyperparameters:

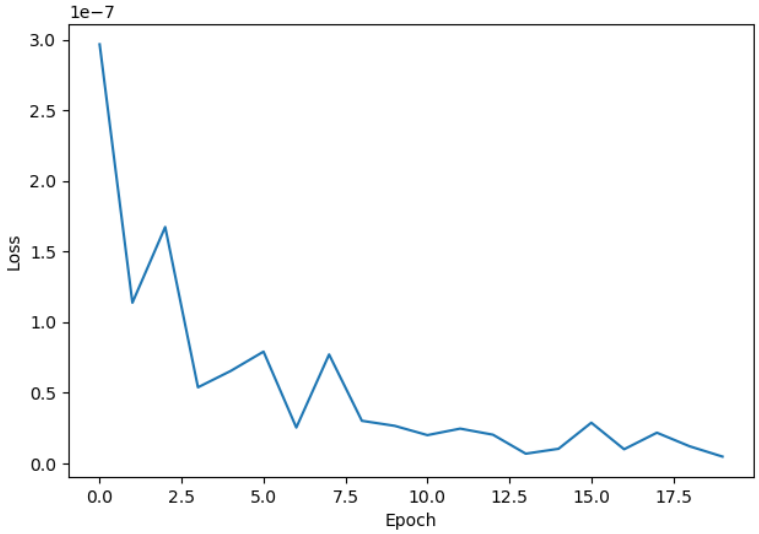
For finding the optimal hyper-parameters I carried out various tuning operations to optimize the output. I tried increasing the learning rate to 0.01 but this gave very bad results in terms of the flow prediction. Hence I kept the learning rate to 0.001 and tried using different loss functions. I first tried using cross-entropy loss however that was resulting in errors in the code likely due to the definition of the loss function. Hence I used the Mean squared error as the loss function. The optimizer used was the adam optimizer with default parameters. Finally, I tried changing the number of epochs to see where the optimal was being achieved. I tried initially using 5 epochs but this did not result in accurate predictions as can be seen in the image below.



Hence I increased the number of epochs to 20 which gave good results. Furthermore, the loss value flattened out for 20 epochs suggesting that the model was trained on the input data well.

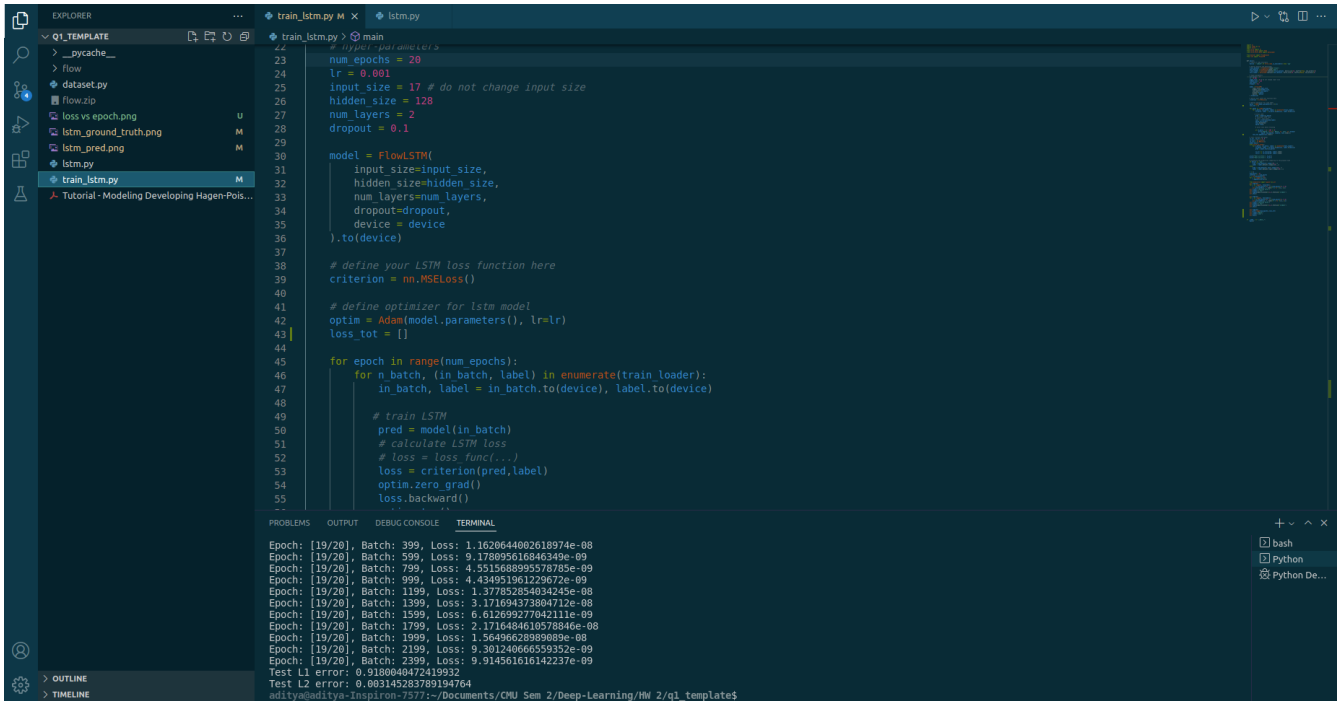
Visualization of loss versus epochs

The plot of loss versus epochs that I obtained is as follows. The y axis is the loss and the x axis is the epochs



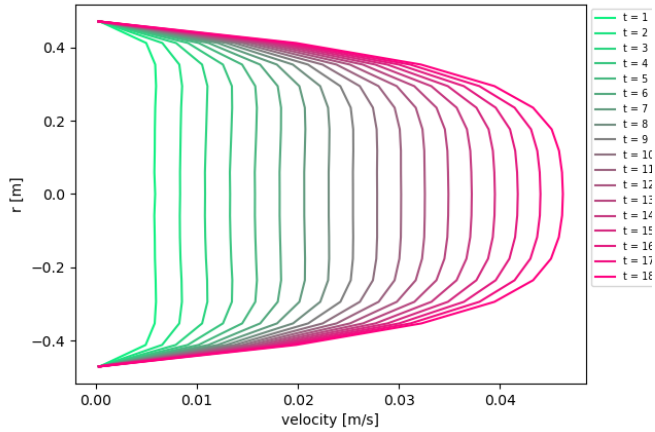
L1 and L2 Error

The L1 error is 0.918 and the L2 error 0.003 as seen in the image below.



Prediction Visualization

LSTM Prediction (20 Epochs)



LSTM Ground Truth