NLP - Assignment 2

1. Snippet of one or two data samples prepared in Part 1A and Part 1B. Describe if any additional pre-processing is performed on the text.
2. All 48 plots generated in the subtasks, along with their analysis.
3. Two tables containing the performance of all the 12 models on test data of Dataset_1

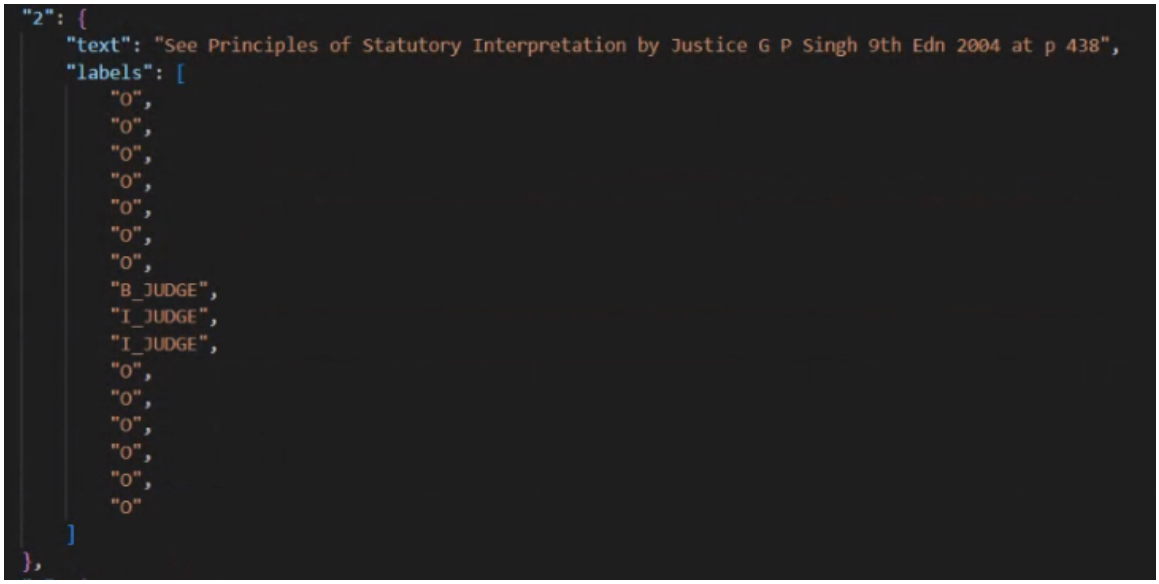
and Dataset_2, respectively, in this format:

<Model_No, Embedding_used, Accuracy, Macro_F1>

4. Plot of the label-wise F1 scores (13 labels) on test data of Dataset_1 using best model.
5. Contribution of each team member to this assignment

Snippet of one or two data samples prepared in Part 1A and Part 1B. Describe if any additional pre-processing is performed on the text.

Snippet Part 1 A



Snippet Part 1 B

All 48 plots generated in the subtasks, along with their analysis:-

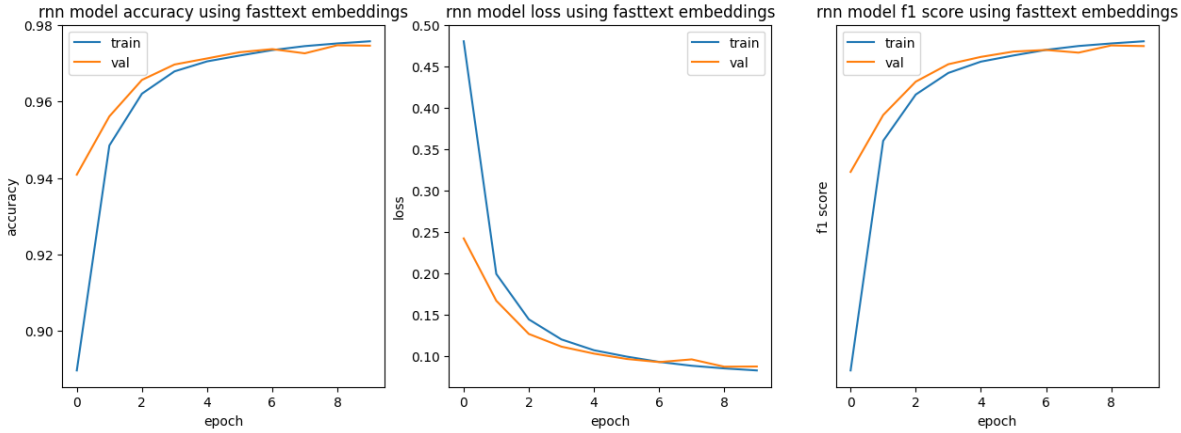
Task_1

As per plotted graphs for accuracy and loss vs epochs, we can observe that training and validation accuracy increase together and there is no divergence between the curves in the case of RNN, LSTM, or GRU which indicates an overall good training of the model and there is no overfitting at all, same is the case with loss curves

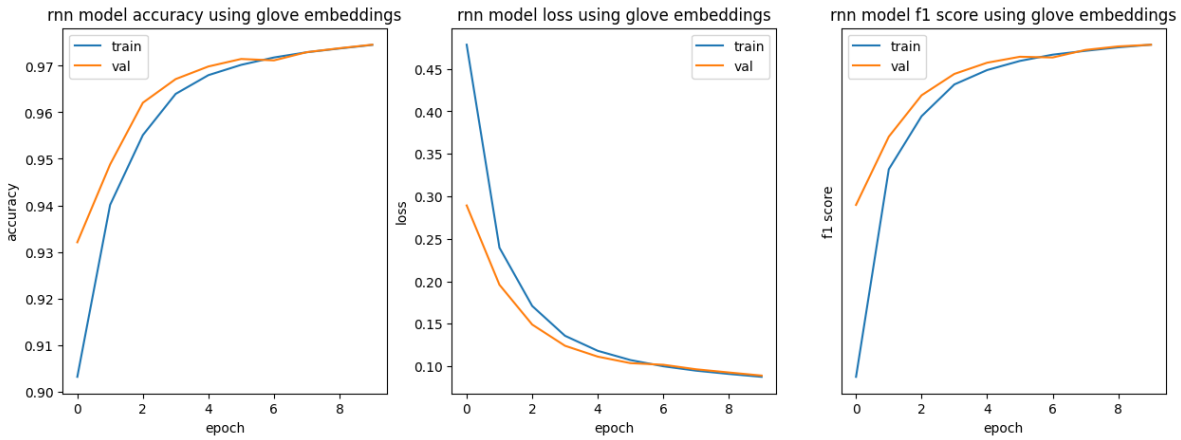
RNN (Model 1):

1. word2vec

2. fasttext

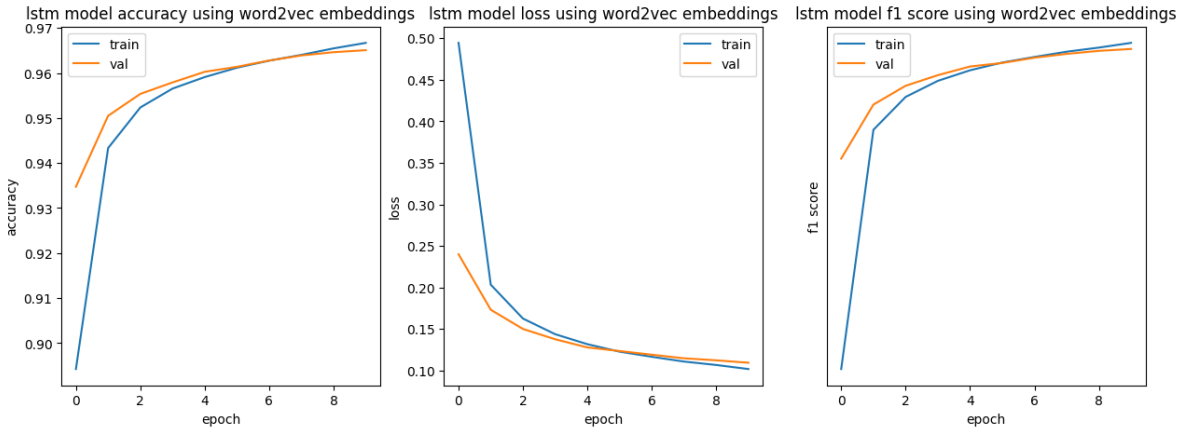


3. glove

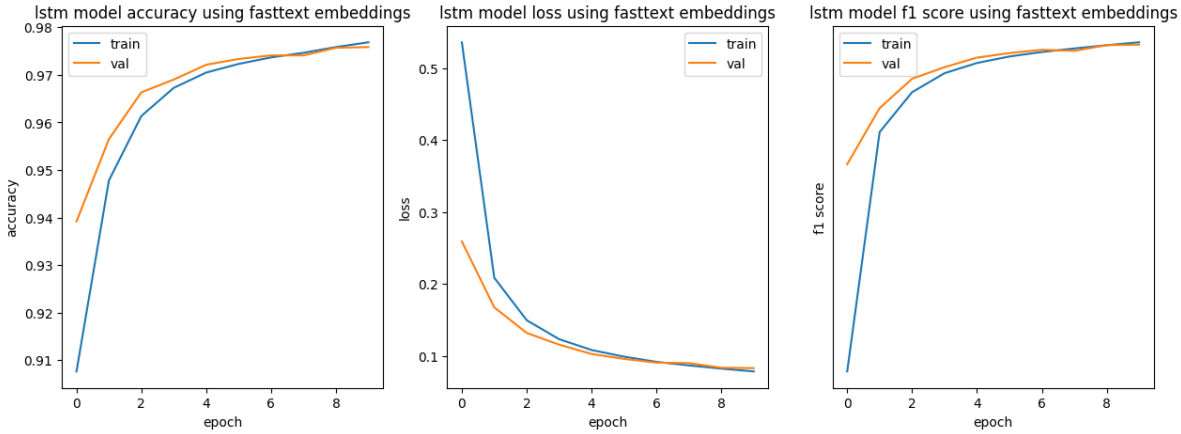


LSTM (Model 2):

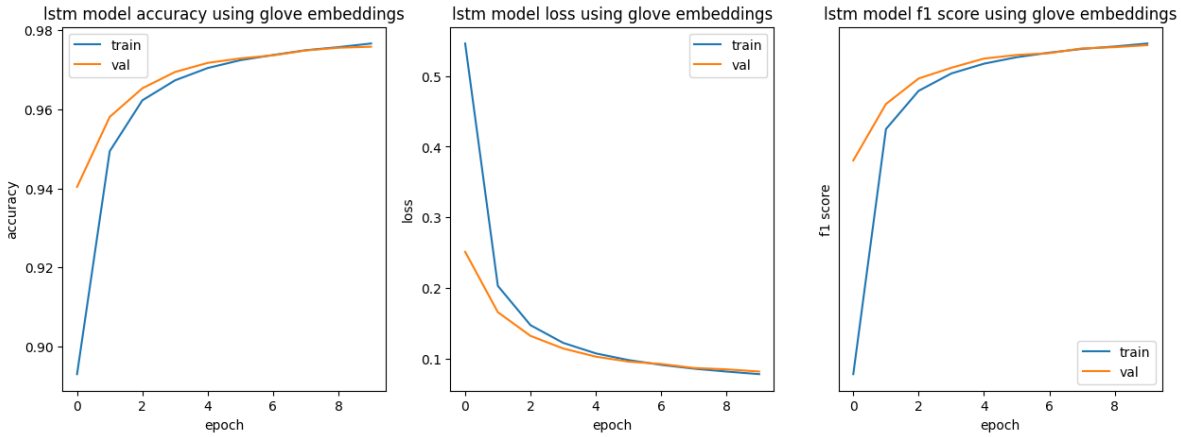
1. word2vec



2. fasttext

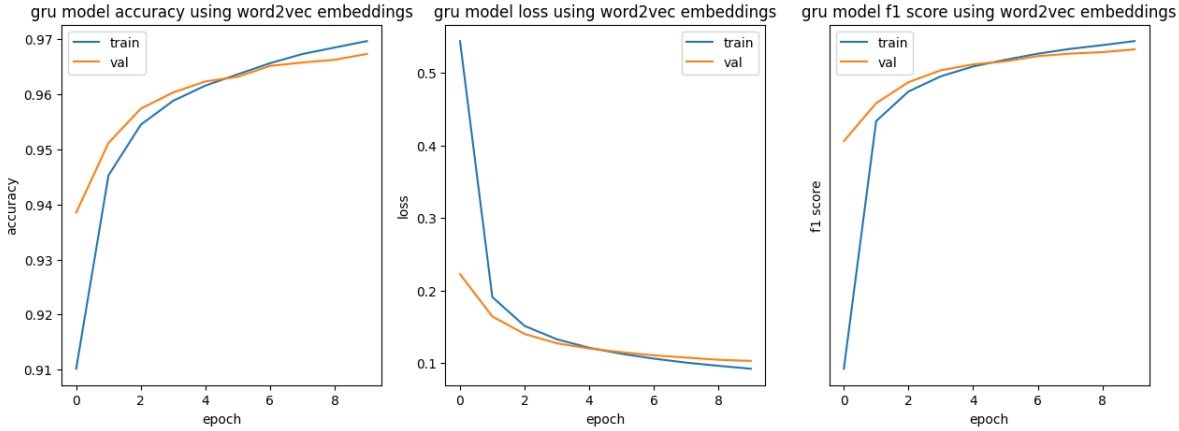


3. glove

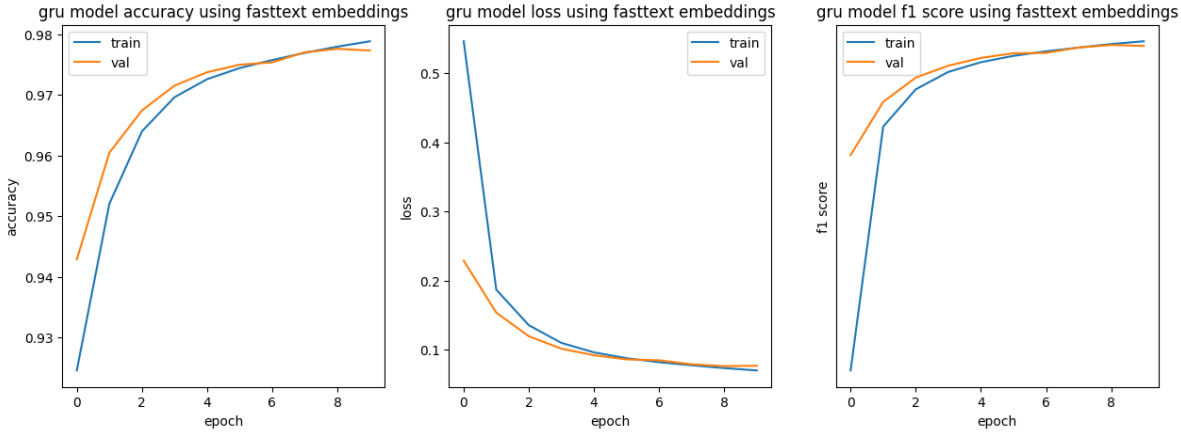


GRU (Model 3):

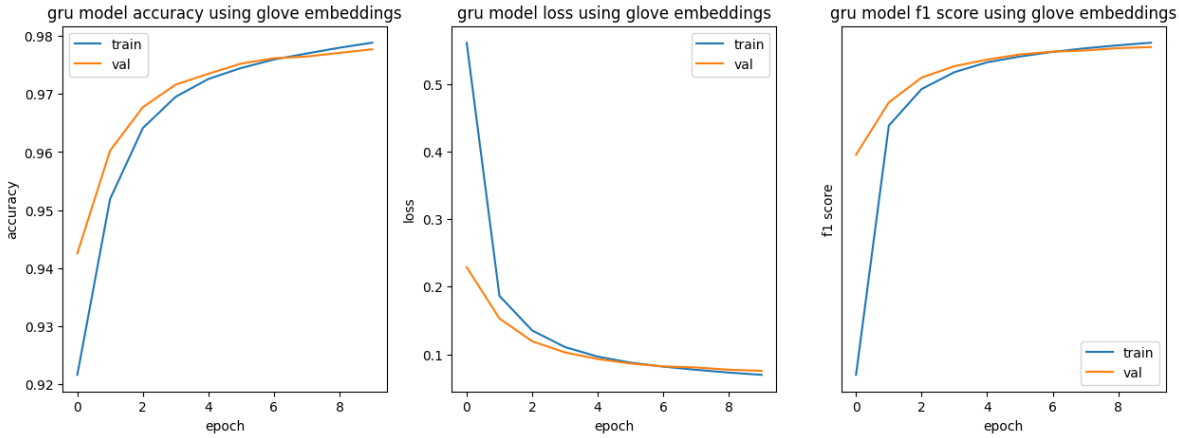
1. word2vec:



2. fasttext



3. glove

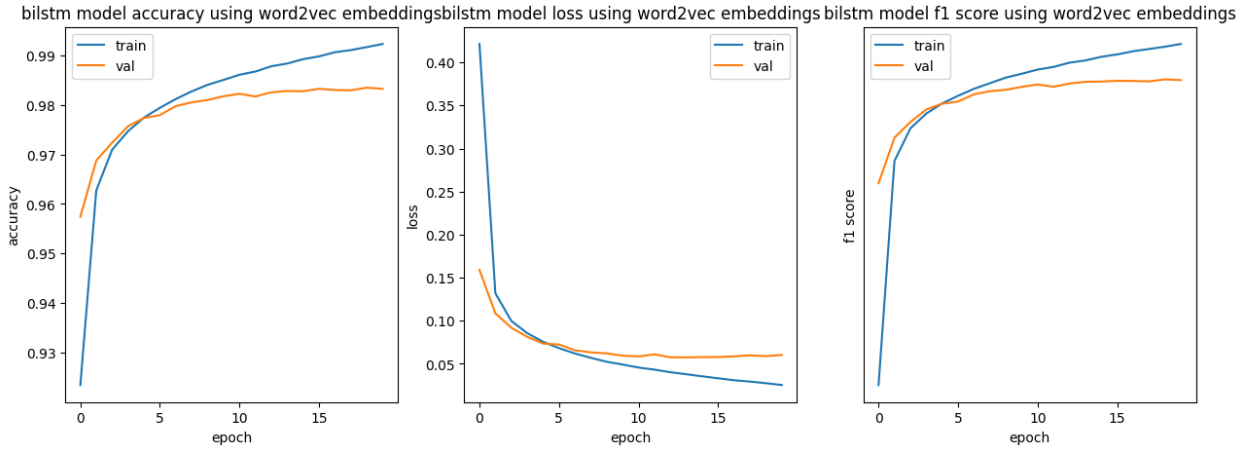


Bi-LSTM (Model 4):

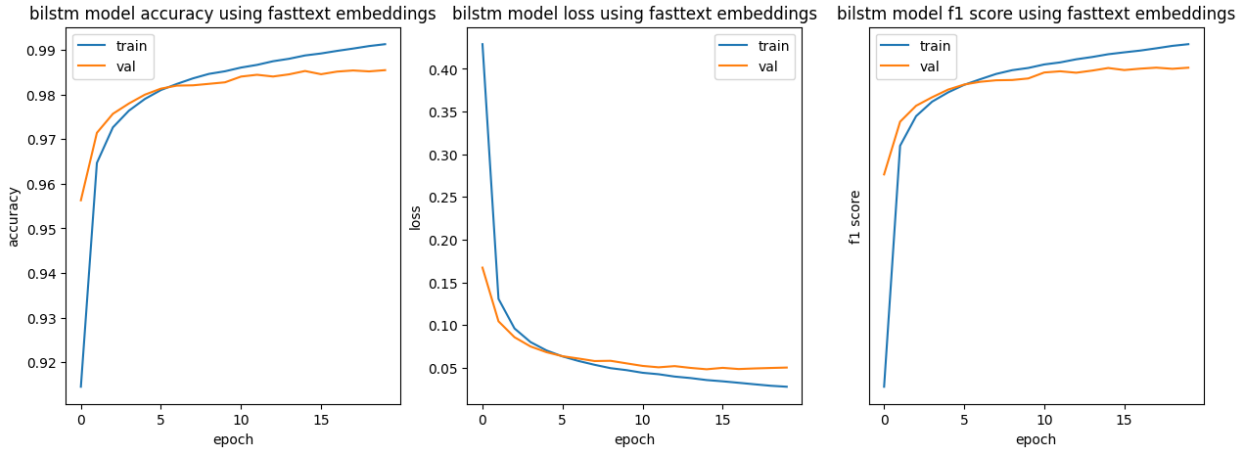
Bi-LSTM is checked to not be over-trained giving potential over-fitting.

Thus, we have trained it till sweet-spot (20 epochs) giving us a robust model

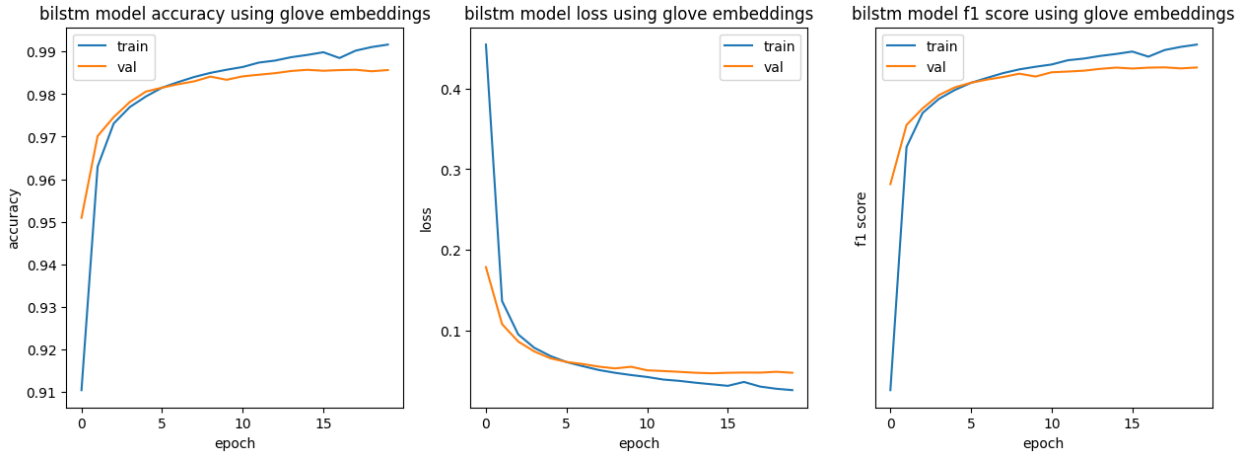
1. word2vec



2. fasttext



3. glove



We can observe the divergence between the loss curves in the case of Bi-LSTM which indicates potential overfitting.

Task-2

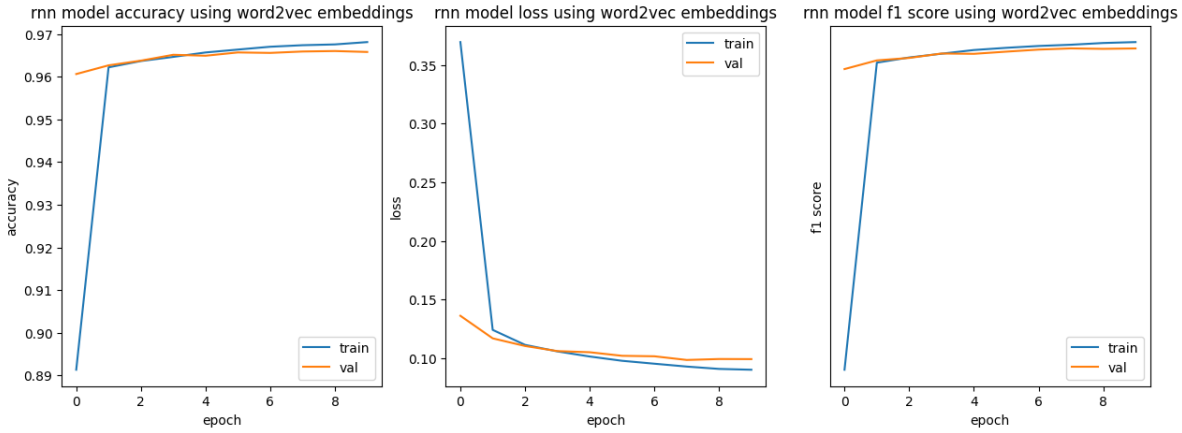
LSTM, RNN, and GRU is being trained excellently, i.e. good fit or robust model , as the the accuracies of both training and validation are increasing together thus implying no hazard of overfit.

As we know, Overfitting **occurs when the model cannot generalize and fits too closely to the training dataset instead**.

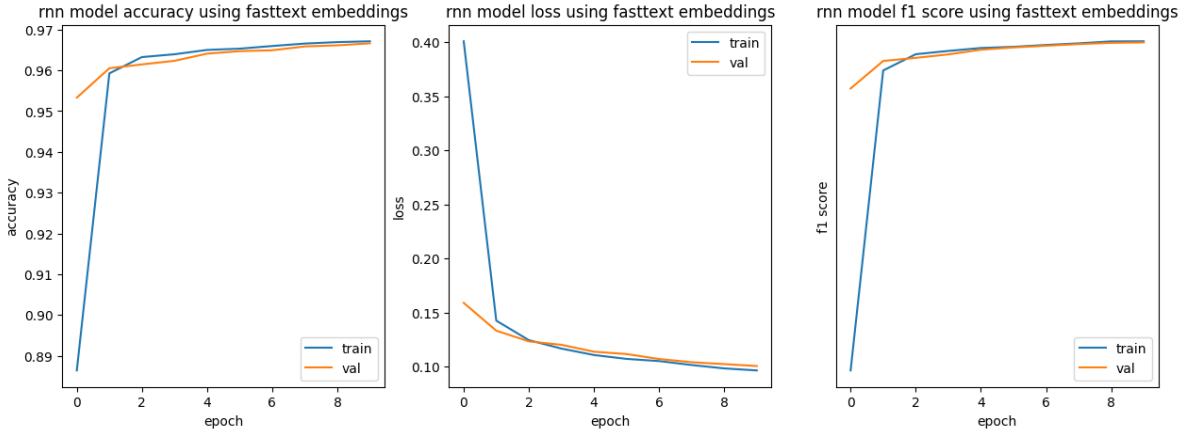
Whereas, underfitting is the model being too simple to explain the variance captured.

RNN (Model 1):

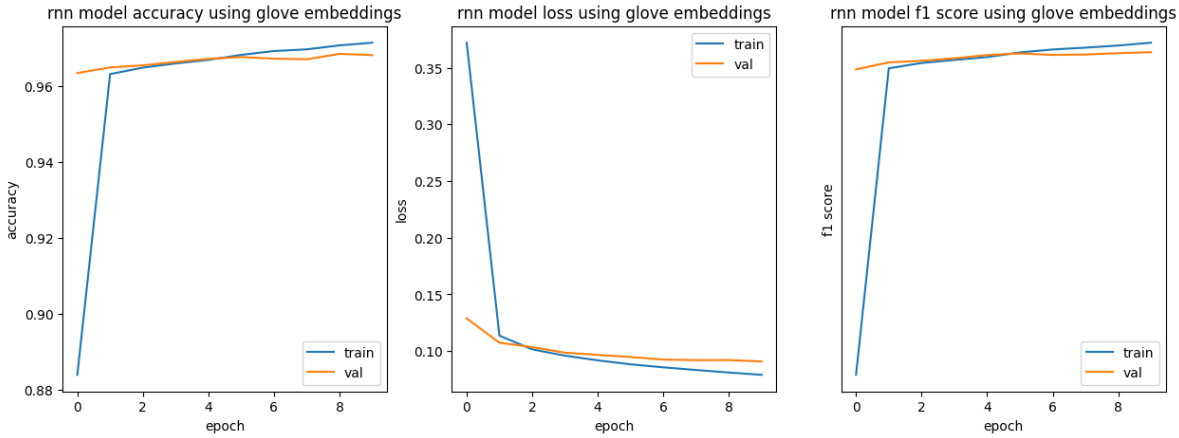
1. word2vec



2. fasttext



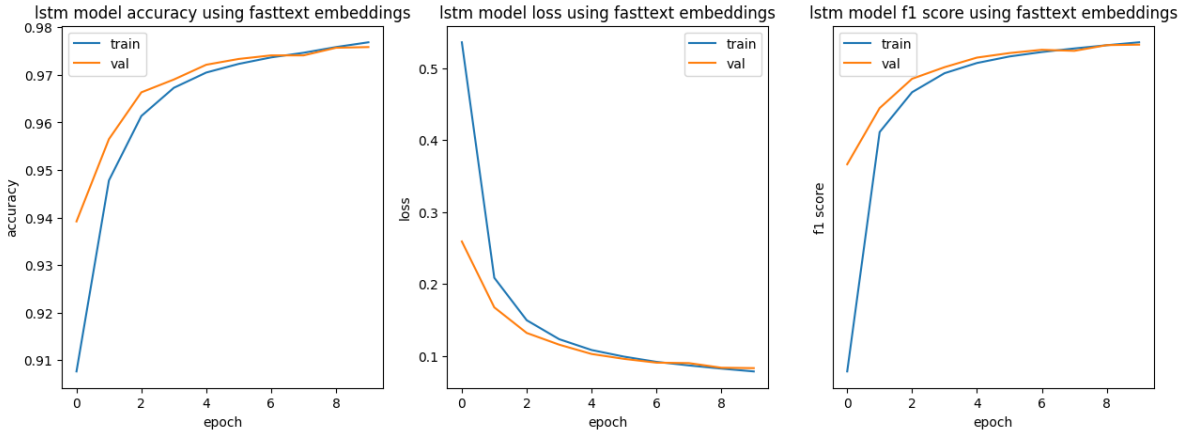
3. glove



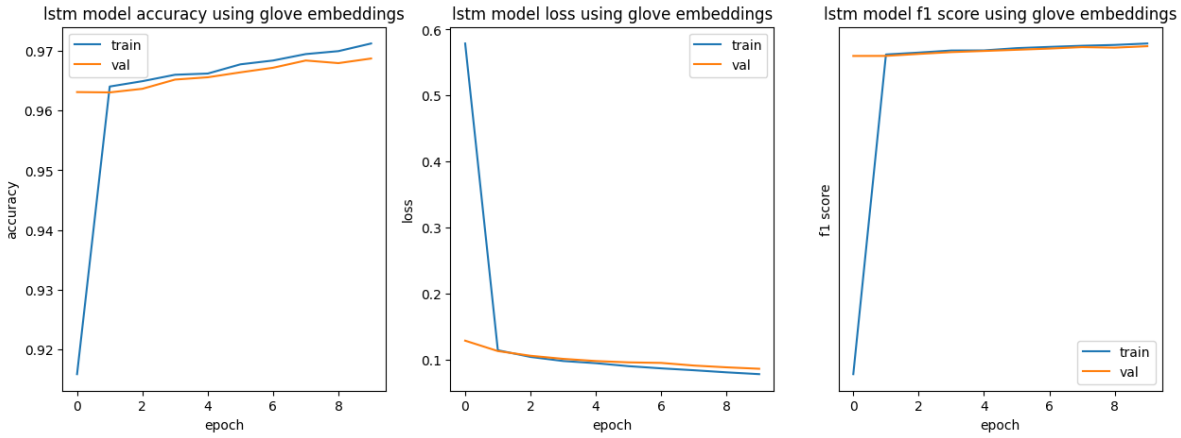
LSTM (Model 2):

1. word2vec

2. fasttext

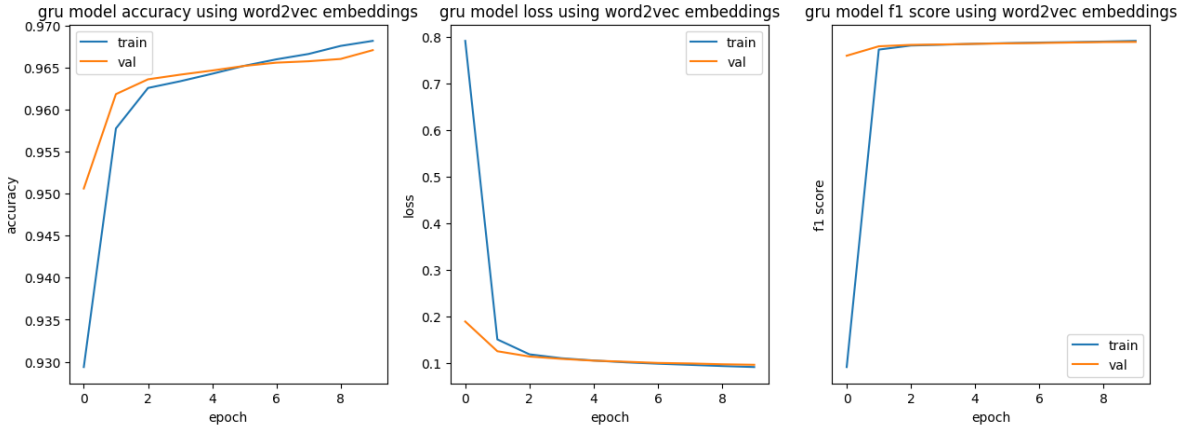


3. glove

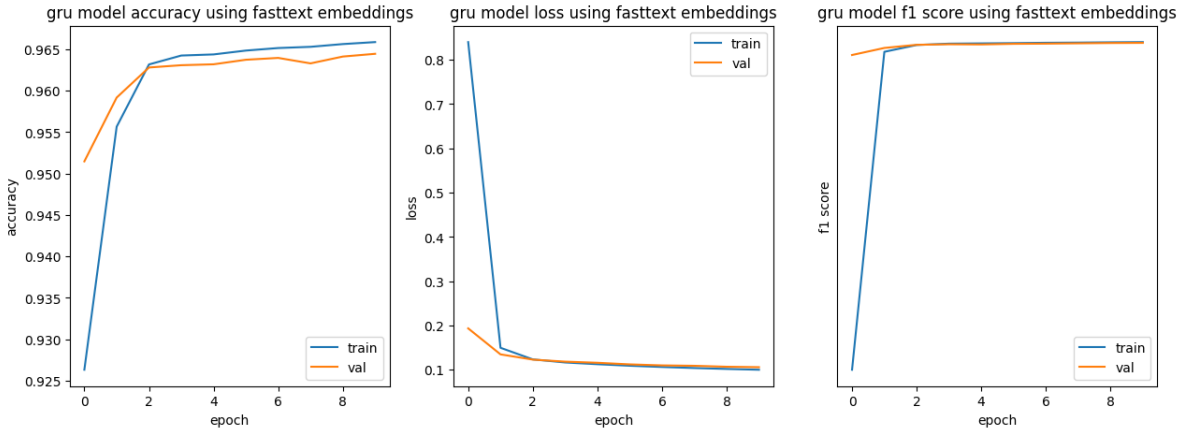


GRU (Model 3):

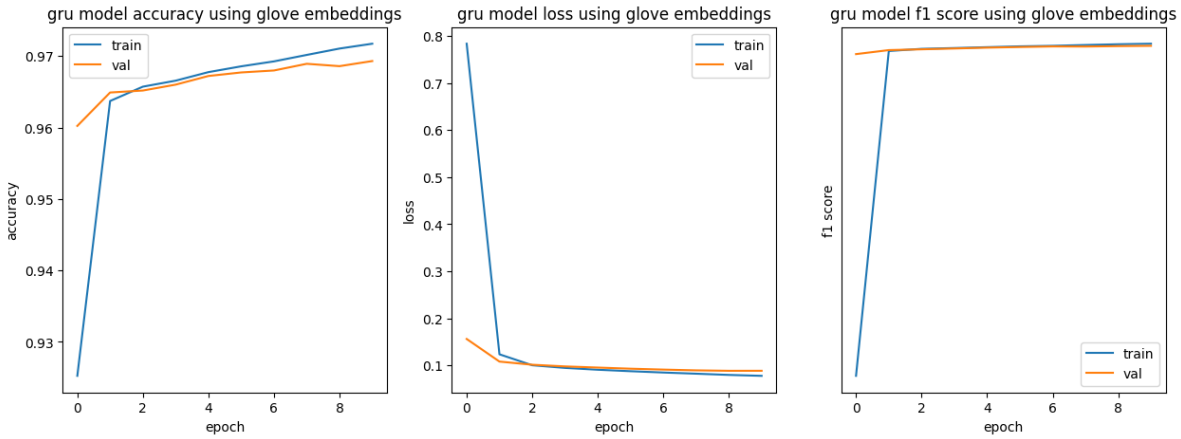
1. word2vec



2. fasttext



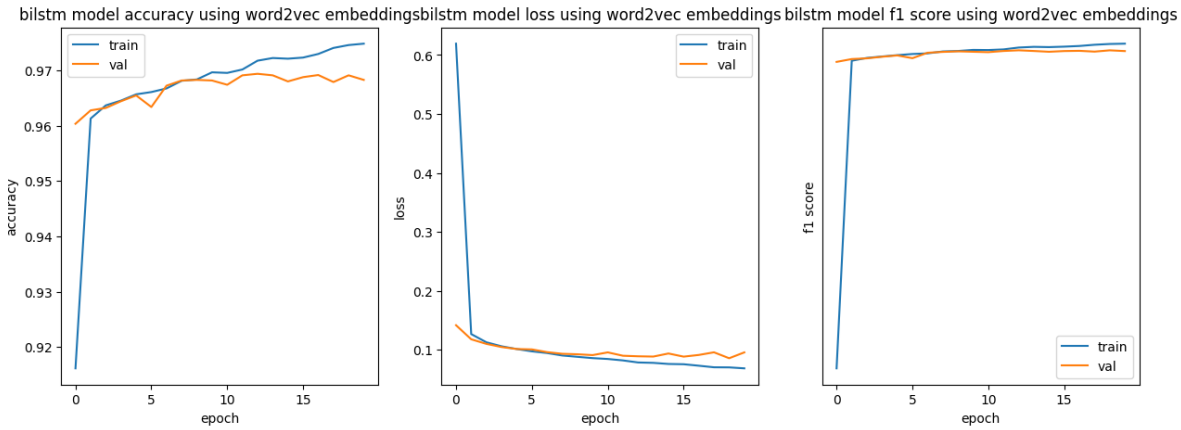
3. glove



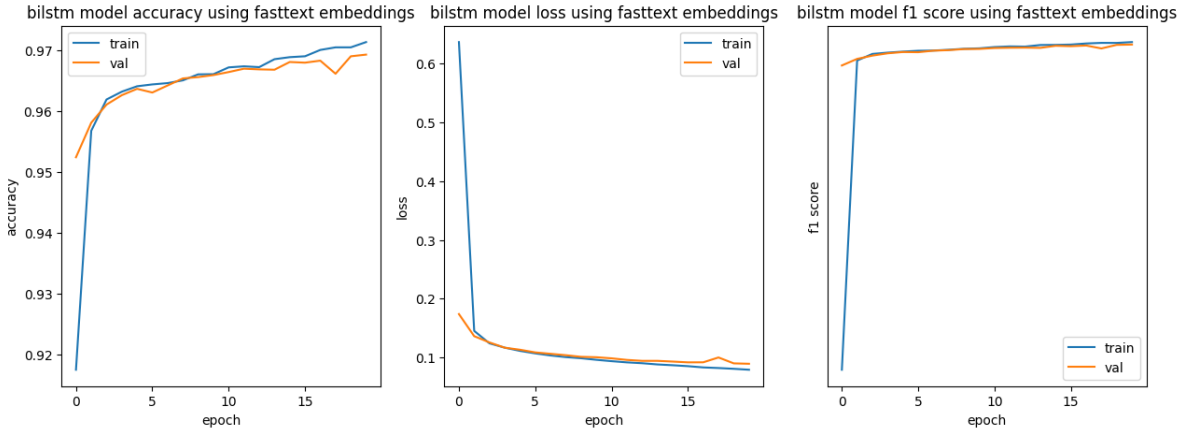
Bi-LSTM (Model 4):

Bi-LSTM is being trained well here, but the model will start to overfit if trained for further training (mainly in, glove embedding)

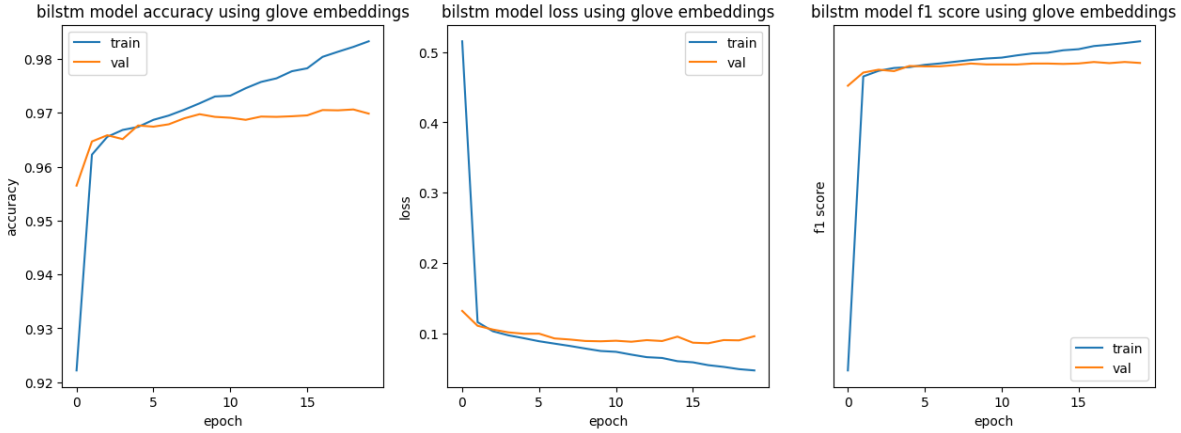
1. word2vec



2. fasttext



3. glove



Task-1

Model	Embedding	Accuracy	Macro_F1
RNN (Model 1)	Word2Vec	0.9602	0.6128
RNN (Model 1)	FastText	0.9725	0.5668
RNN (Model 1)	GloVe	0.9732	0.5729
LSTM (Model 2)	Word2Vec	0.9615	0.6210
LSTM (Model 2)	FastText	0.9735	0.5473
LSTM (Model 2)	GloVe	0.9746	0.5475
GRU (Model 3)	word2vec	0.9631	0.6735
GRU (Model 3)	FastText	0.9757	0.6029
GRU (Model 3)	GloVe	0.9755	0.5881
BI-LSTM (Model 4)	Word2Vec	0.9803	0.7388
BI-LSTM (Model 4)	FastText	0.9843	0.7174
BI-LSTM (Model 4)	GloVe	0.9852	0.7130

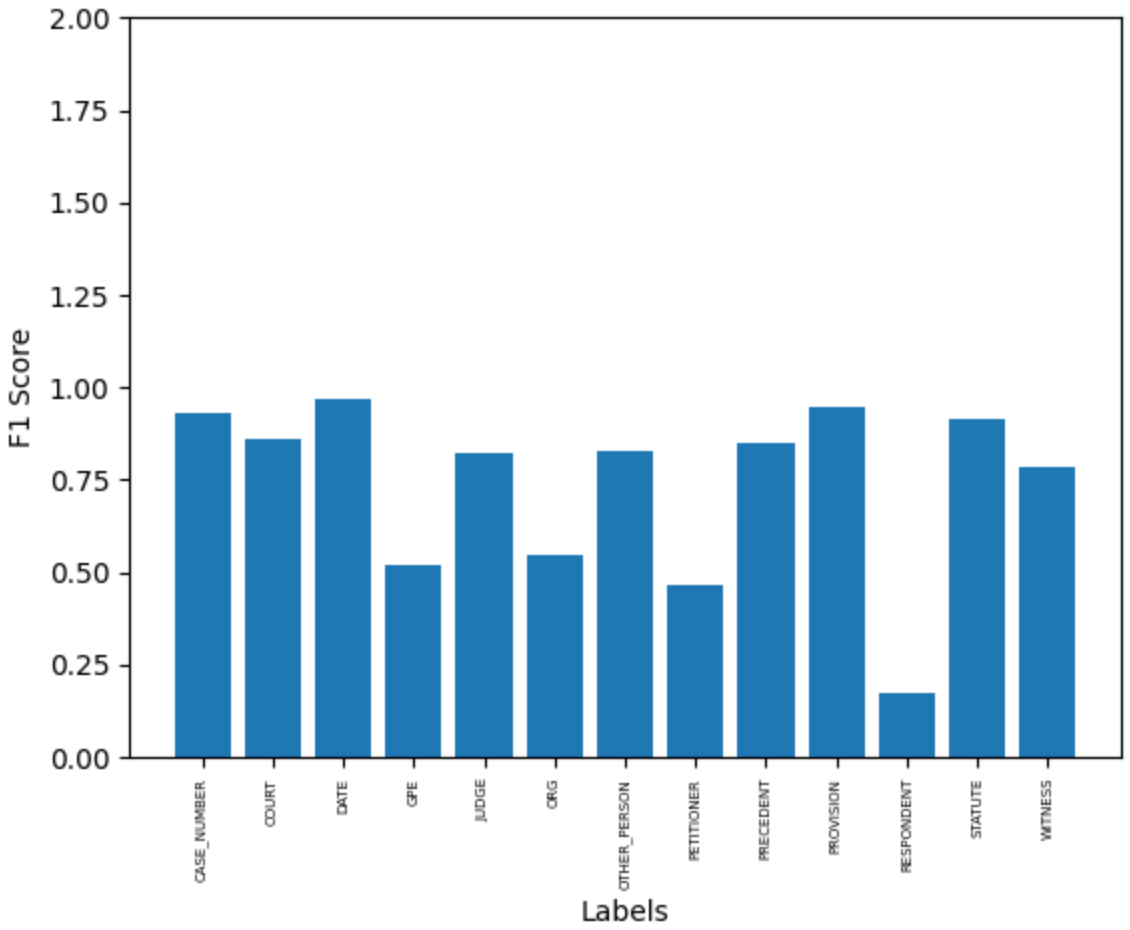
Task-2

Model	Embedding	Accuracy	Macro_F1
RNN (Model 1)	Word2Vec	0.9644	0.6531
RNN (Model 1)	FastText	0.9639	0.6298
RNN (Model 1)	GloVe	0.9660	0.5053
LSTM (Model 2)	Word2Vec	0.9622	0.6247
LSTM (Model 2)	FastText	0.9636	0.6294
LSTM (Model 2)	GloVe	0.9654	0.6582
GRU (Model 3)	Word2Vec	0.9634	0.6370
GRU (Model 3)	FastText	0.9645	0.6332
GRU (Model 3)	GloVe	0.9658	0.6898
BI-LSTM (Model 4)	Word2Vec	0.9668	0.7094

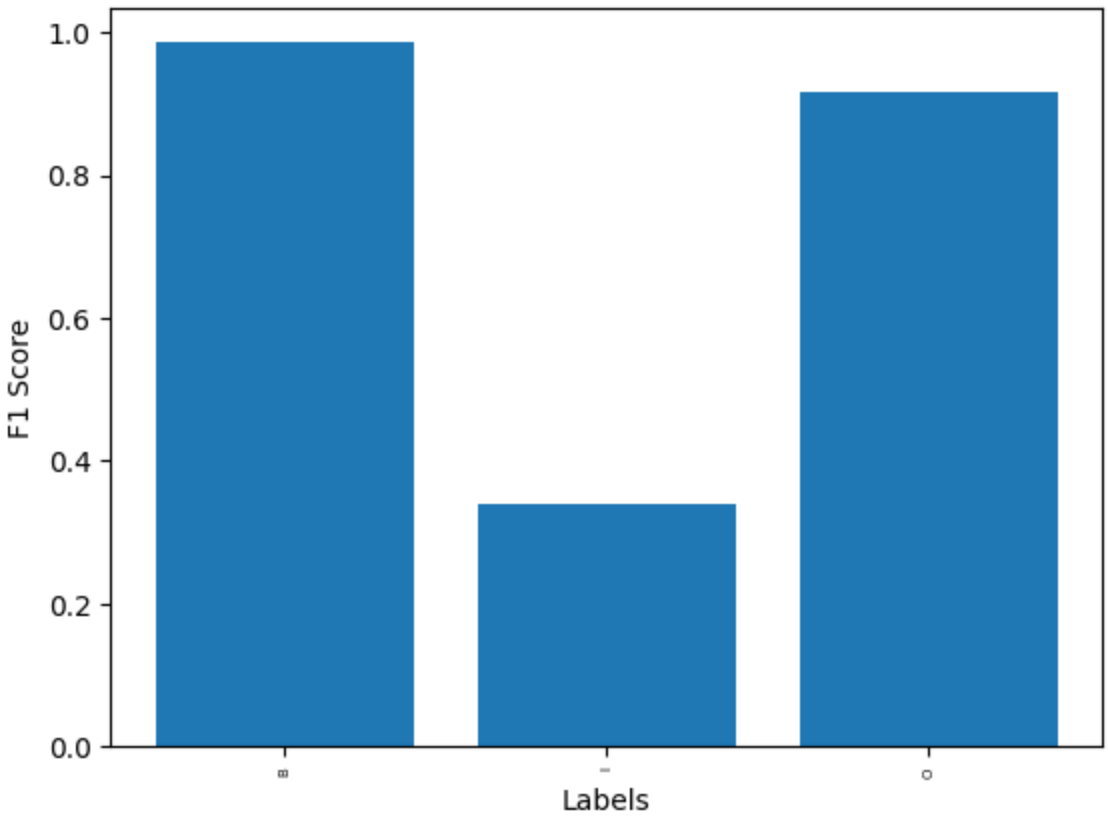
Model	Embedding	Accuracy	Macro_F1
BI-LSTM (Model 4)	FastText	0.9676	0.6871
BI-LSTM (Model 4)	GloVe	0.9692	0.7467

Plot of the label-wise F1 scores (13 labels) on test data of Dataset_1 using the best model.

Best Model == <Bi-LSTM><glove>



Dataset_2



Contribution

PART 1 - Manav Mittal

PART 2 - Utkarsh Venaik, Lakshay Kumar, Akash Kushwaha

PART 3 - Utkarsh Venaik, Manav Mittal

Report - Lakshay Kumar, Akash Kushwaha

NOTE: Everyone was involved in every task the above mentioned contribution is just for the sake of submission whole assignment is solved together in the group.