# REPORT INLP ASSIGNMENT 2

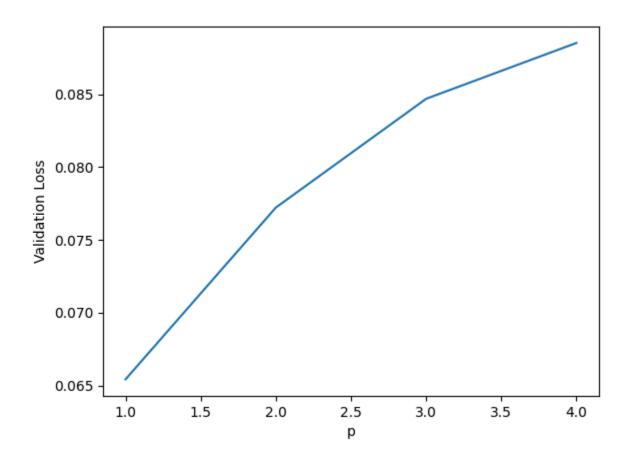
#### **Feed Forward Neural Network**

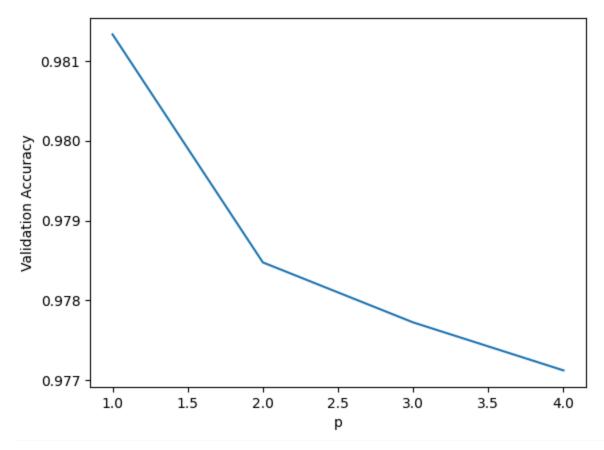
## **Best Hyperparameters:**

```
num_layers= 1
hidden_dim= 64
embedding_dim= 128
lr= 0.001
activation_fn= tanh
epochs: 5
```

P and s were kept constant while doing hyperparameter tuning. WandB report can be checked here: Report FFNN

## P and S Graphs:





Keeping the above hyperparameters constant and changing the values of p, the results obtained are shown in the above graphs.

## Analysis:

When the context window(2p+1) gets bigger with a higher value of p, the model looks at more words around the target word to make predictions. This makes the model more complicated. As a result, it becomes harder for the model to understand the important patterns and connections in the data. This can cause the model to perform less well, with lower accuracy and higher loss when tested on the validation set.

Using the above hyperparameters and p=s=1, the validation and test set metrics are as follows:

#### Validation Metrics:

| VALIDATION RES | ULTS |                     |
|----------------|------|---------------------|
| Average loss   | :    | 0.07231941695156913 |
| Accuracy       | :    | 0.9784768211920529  |
| Macro          |      |                     |
| Precision      | :    | 0.9675625585625272  |
| Recall         | :    | 0.9519782462569653  |
| F1 score       | :    | 0.9591947581916812  |
| Micro          |      |                     |
| Precision      | :    | 0.9784768211920529  |
| Recall         | :    | 0.9784768211920529  |
| F1 score       | :    | 0.9784768211920529  |

- 1400

- 1200

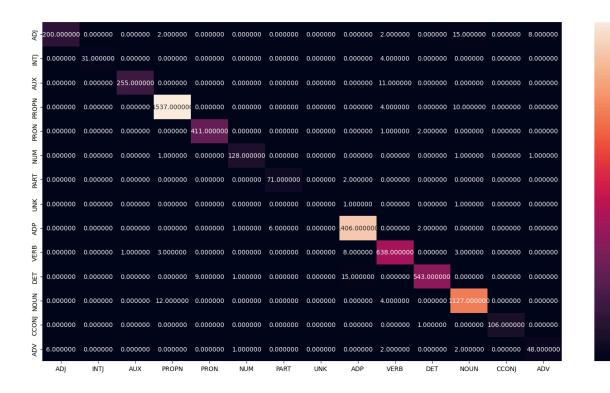
- 1000

800

- 600

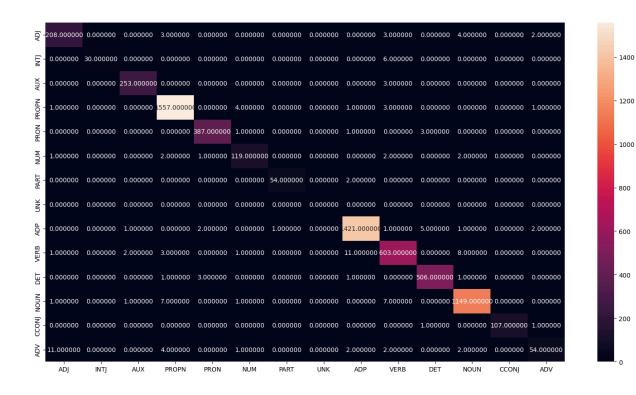
- 400

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#### **Test Metrics:**

| TEST RESULTS |   |                     |
|--------------|---|---------------------|
| Average loss | : | 0.06571719006564895 |
| Accuracy     | : | 0.9799392097264438  |
| Macro        |   |                     |
| Precision    | : | 0.970752467202373   |
| Recall       | : | 0.9434387824756599  |
| F1 score     | : | 0.9556374851546876  |
| Micro        |   |                     |
| Precision    | : | 0.9799392097264438  |
| Recall       | : | 0.9799392097264438  |
| F1 score     | : | 0.9799392097264438  |



#### **LSTM**

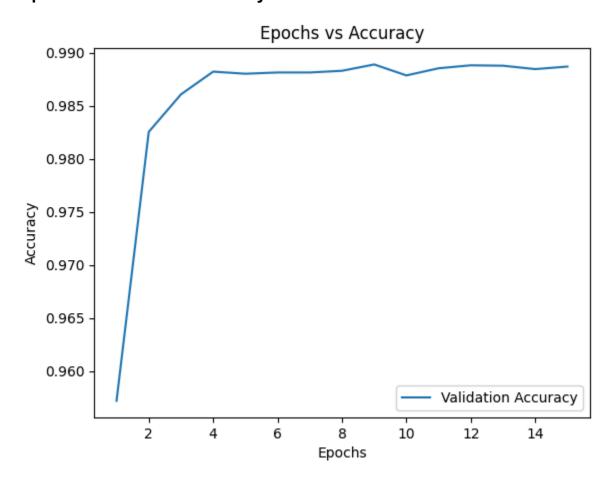
## **Best Hyperparameters:**

```
num_layers= 1
hidden_dim= 128
embedding_dim= 128
lr= 0.001
activation_fn= tanh
epochs= 15
bidirectional= True
```

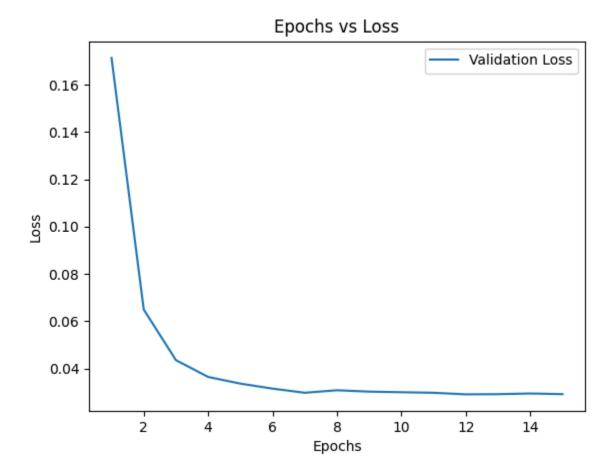
WandB report can be checked here: Report\_Istm

Training on the above hyperparameters

# **Epoch vs Validation Accuracy**

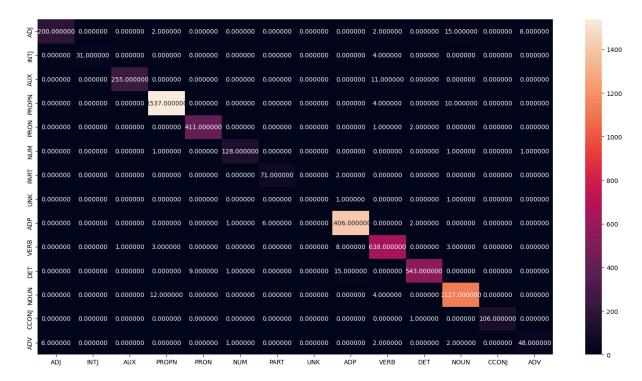


# **Epoch vs Validation Loss**



# **Validation Metrics:**

| VALIDATION RES | SULTS |                     |
|----------------|-------|---------------------|
| Average loss   | :     | 0.07224397400265804 |
| Accuracy       | :     | 0.9784768211920529  |
| Macro          |       |                     |
| Precision      | :     | 0.9675625585625272  |
| Recall         | :     | 0.9519782462569653  |
| F1 score       | :     | 0.9591947581916812  |
| Micro          |       |                     |
| Precision      | :     | 0.9784768211920529  |
| Recall         | :     | 0.9784768211920529  |
| F1 score       | :     | 0.9784768211920529  |



#### **Test Metrics:**

| : | 0.0657706045486317 |
|---|--------------------|
| : | 0.9799392097264438 |
|   |                    |
| : | 0.970752467202373  |
| : | 0.9434387824756599 |
| : | 0.9556374851546876 |
|   |                    |
| : | 0.9799392097264438 |
| : | 0.9799392097264438 |
| : | 0.9799392097264438 |
|   | :                  |

| AD)   | 208.000000 | 0.000000  | 0.000000   | 3.000000    | 0.000000   | 0.000000   | 0.000000  | 0.000000 | 0.000000    | 3.000000   | 0.000000   | 4.000000 | 0.000000   | 2.000000  |
|-------|------------|-----------|------------|-------------|------------|------------|-----------|----------|-------------|------------|------------|----------|------------|-----------|
| Į,    | 0.000000   | 30.000000 | 0.000000   | 0.000000    | 0.000000   | 0.000000   | 0.000000  | 0.000000 | 0.000000    | 6.000000   | 0.000000   | 0.000000 | 0.000000   | 0.000000  |
| AUX   | 0.000000   | 0.000000  | 253.000000 | 0.000000    | 0.000000   | 0.000000   | 0.000000  | 0.000000 | 0.000000    | 3.000000   | 0.000000   | 0.000000 | 0.000000   | 0.000000  |
| PROPN | 1.000000   | 0.000000  | 0.000000   | L557.000000 | 0.000000   | 4.000000   | 0.000000  | 0.000000 | 1.000000    | 3.000000   | 0.000000   | 0.000000 | 0.000000   | 1.000000  |
| PRON  | 0.000000   | 0.000000  | 0.000000   | 0.000000    | 387.000000 | 1.000000   | 0.000000  | 0.000000 | 1.000000    | 0.000000   | 3.000000   | 0.000000 | 0.000000   | 0.000000  |
| MOM . | 1.000000   | 0.000000  | 0.000000   | 2.000000    | 1.000000   | 119.000000 | 0.000000  | 0.000000 | 0.000000    | 2.000000   | 0.000000   | 2.000000 | 0.000000   | 0.000000  |
| PART  | 0.000000   | 0.000000  | 0.000000   | 0.000000    | 0.000000   | 0.000000   | 54.000000 | 0.000000 | 2.000000    | 0.000000   | 0.000000   | 0.000000 | 0.000000   | 0.000000  |
| NS.   | 0.000000   | 0.000000  | 0.000000   | 0.000000    | 0.000000   | 0.000000   | 0.000000  | 0.000000 | 0.000000    | 0.000000   | 0.000000   | 0.000000 | 0.000000   | 0.000000  |
| ADP   | 0.000000   | 0.000000  | 1.000000   | 0.000000    | 2.000000   | 0.000000   | 1.000000  | 0.000000 | .421.000000 | 1.000000   | 5.000000   | 1.000000 | 0.000000   | 2.000000  |
| VERB  | 1.000000   | 0.000000  | 2.000000   | 3.000000    | 0.000000   | 1.000000   | 0.000000  | 0.000000 | 11.000000   | 603.000000 | 0.000000   | 8.000000 | 0.000000   | 0.000000  |
| DET   | 0.000000   | 0.000000  | 0.000000   | 1.000000    | 3.000000   | 0.000000   | 0.000000  | 0.000000 | 1.000000    | 0.000000   | 506.000000 | 1.000000 | 0.000000   | 0.000000  |
| NOON  | 1.000000   | 0.000000  | 1.000000   | 7.000000    | 0.000000   | 1.000000   | 0.000000  | 0.000000 | 0.000000    | 7.000000   | 0.000000   |          | 0.000000   | 0.000000  |
| CCON  | 0.000000   | 0.000000  | 0.000000   | 0.000000    | 0.000000   | 0.000000   | 0.000000  | 0.000000 | 0.000000    | 0.000000   | 1.000000   | 0.000000 | 107.000000 | 1.000000  |
| ADV   | 11.000000  | 0.000000  | 0.000000   | 4.000000    | 0.000000   | 1.000000   | 0.000000  | 0.000000 | 2.000000    | 2.000000   | 0.000000   | 2.000000 | 0.000000   | 54.000000 |
|       | ADJ        | INTJ      | AÚX        | PROPN       | PRON       | NÚM        | PART      | UNK      | ADP         | VERB       | DET        | NOUN     | CCONJ      | ADV       |

- 1400

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