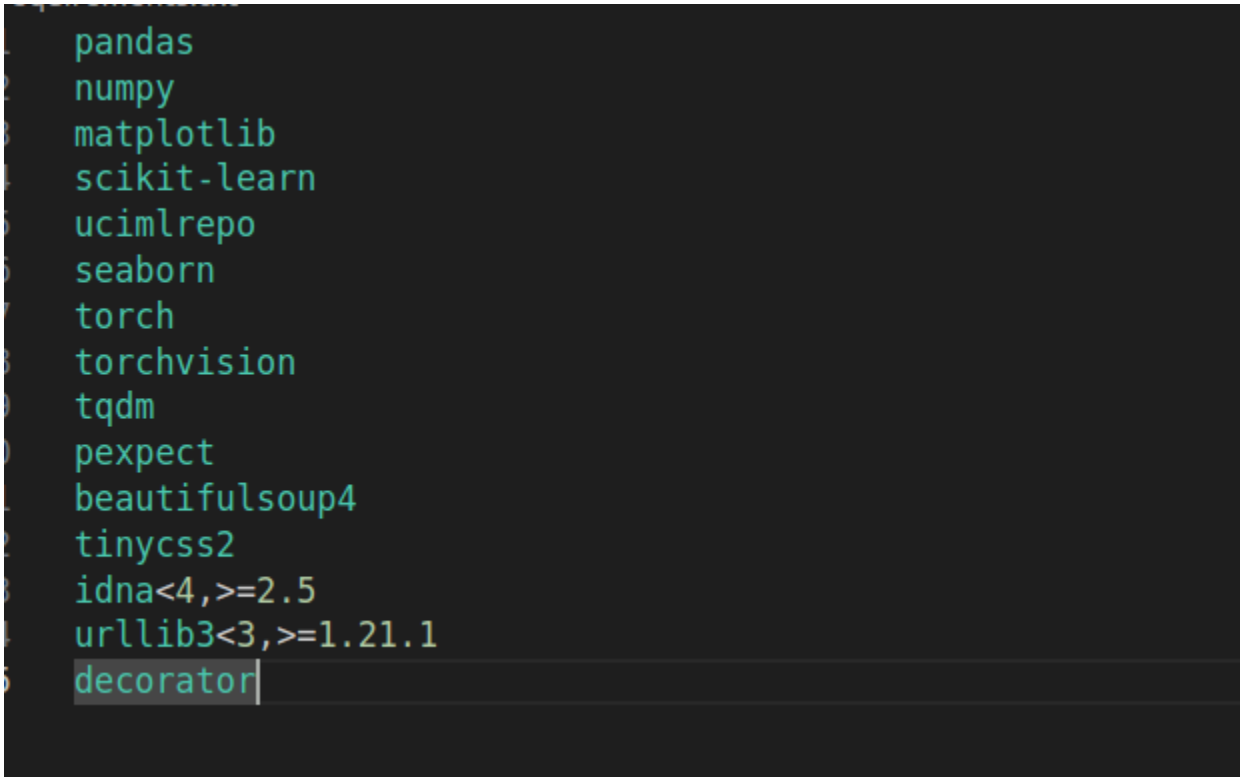
HOW TO RUN:

CREATE CONDA ENV AND INSTALL THESE:



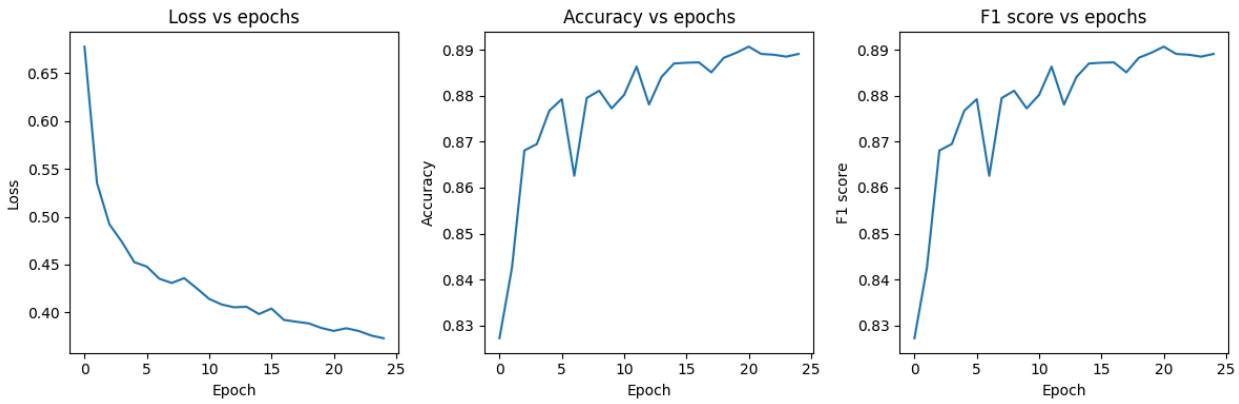
MODEL 1:

2 HIDDEN LAYERS : [128,64]
DROP RATE: 0.4

==========**Learning Rate: 0.003**==========
Best Validation=========:
Macro F1: 0.8906666666666667
Accuracy: 0.8906666666666667

```
Confusion Matrix:
  987     1    14    33     4     0   126     1     8     0
    2  1159     2    19     2     1     4     0     0     0
   15     1   937     8   108     0   116     0     3     0
   20     8    12  1109    44     0    22     0     7     0
    3     0    76    29  1039     0    79     0     3     0
    3     0     0     1     0  1140     0    41     3    11
  151     1    74    18    87     0   813     0     8     0
    0     0     0     0     0    19     0  1110     2    41
    0     1     9     5     5     2    14     5  1217     1
    0     0     0     1     0    10     0    28     0  1177
```

graphs==========:

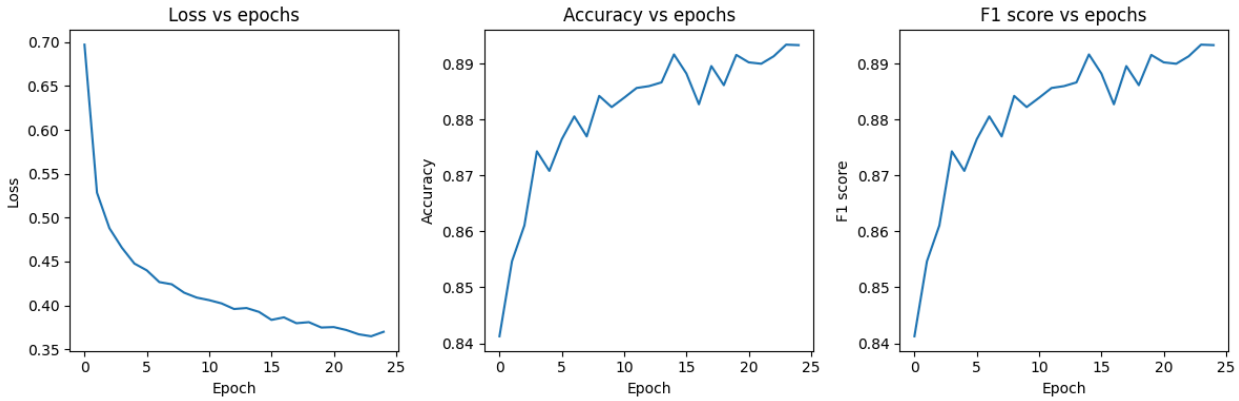


Testing on test data==========:
Macro F1: 0.8811
Accuracy: 0.8811

==========**Learning Rate: 0.002**==========
Best Validation=========:
Macro F1: 0.8934166666666667
Accuracy: 0.8934166666666666

```
Confusion Matrix:
 1062     0    15    21     5     0    60     1    10     0
    3  1154     5    19     6     1     1     0     0     0
   23     1   959     9   128     0    62     0     6     0
   31     8    10  1103    45     2    17     0     6     0
    7     0    77    22  1054     0    63     0     6     0
    1     0     1     0     0  1153     0    29     3    12
  199     0    95    20   106     0   718     0    13     1
    0     0     0     0     0    22     0  1114     2    34
    2     0     5     4     4     2     6     3  1233     0
    0     0     0     0     0    11     0    34     0  1171
```

graphs==========:

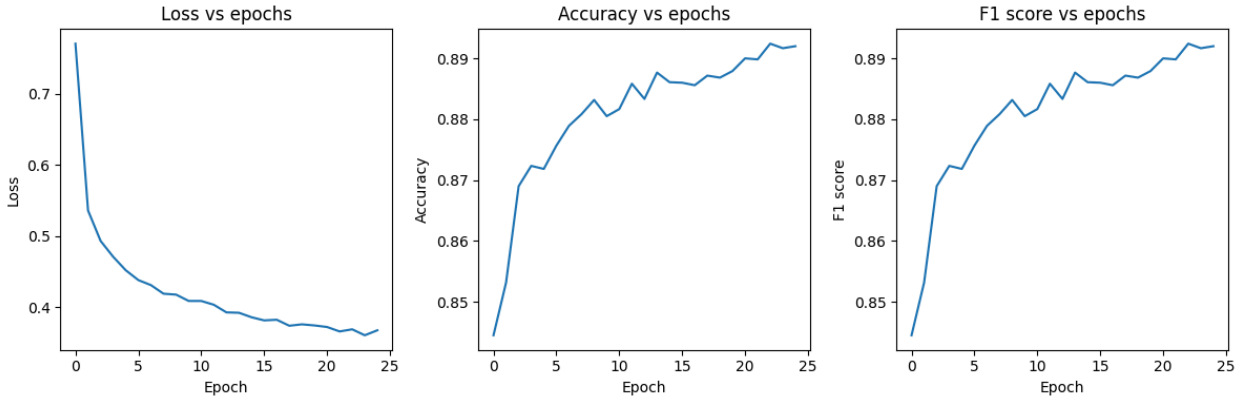


Testing on test data==========:
Macro F1: 0.8805
Accuracy: 0.8805

==========**Learning Rate: 0.001**==========
Best Validation=========:
Macro F1: 0.8924166666666666
Accuracy: 0.8924166666666666

```
Confusion Matrix:
 1004     0     8    43     5     0   106     0     8     0
    2  1156     3    19     6     1     2     0     0     0
   20     1   949    14   123     0    74     0     7     0
   11    12     6  1137    31     2    17     0     6     0
    3     0    75    41  1053     0    53     0     4     0
    1     1     0     1     0  1155     0    34     3     4
  157     1    99    27    95     0   760     1    12     0
    0     0     0     0     0    26     0  1103     2    41
    4     1     7     5     6     2    10     3  1220     1
    0     0     0     0     0    10     0    34     0  1172
```

graphs==========:

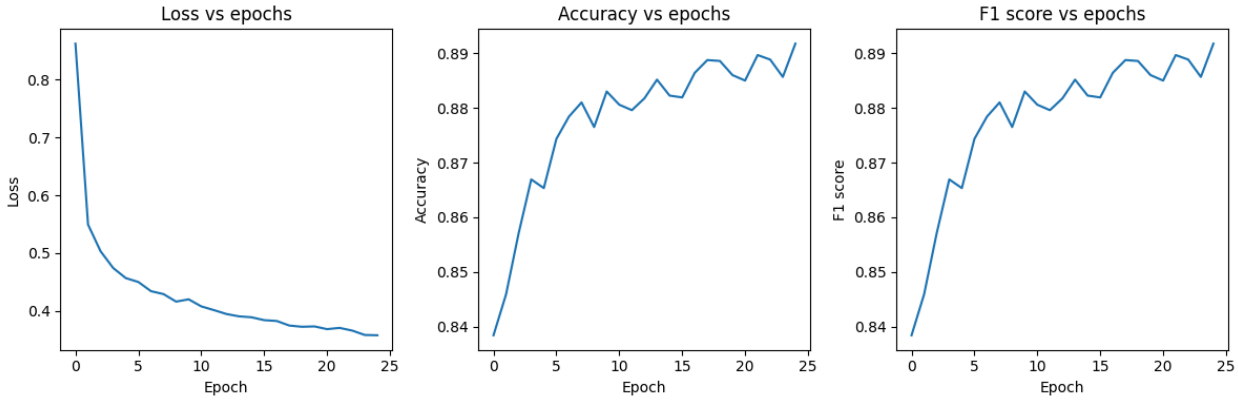


Testing on test data==========:
Macro F1: 0.8841
Accuracy: 0.8841

==========**Learning Rate: 0.0005**==========
Best Validation=========:
Macro F1: 0.89175
Accuracy: 0.89175

```
Confusion Matrix:
 1033     0    10    36     2     0    83     0    10     0
    3  1152     5    23     4     1     1     0     0     0
   16     1   967    11   108     0    76     0     9     0
   18     4    13  1125    35     1    21     0     5     0
    3     0    86    34  1040     0    56     0    10     0
    1     0     1     0     0  1140     0    39     4    14
  185     1   101    25    88     0   733     0    19     0
    0     0     0     0     0    27     0  1111     1    33
    0     0     6     9     3     2     6     3  1230     0
    0     0     0     0     0    10     0    36     0  1170
```

graphs==========:



Testing on test data==========:
Macro F1: 0.882
Accuracy: 0.882

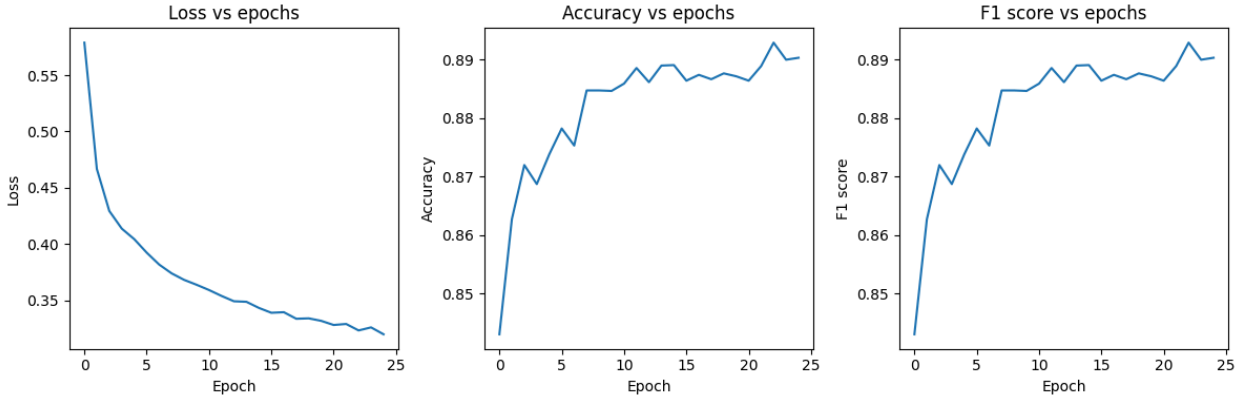
MODEL 2:

1 HIDDEN LAYER : [128]
DROP RATE: 0.4

==========**Learning Rate: 0.003**==========
Best Validation=========:
Macro F1: 0.8929166666666667

```
Confusion Matrix:
 1049     0    16    28     3     1    87     0     9     0
    3  1163     1    23     1     0     1     0     0     0
   14     1   955     9   132     0    90     1     4     0
   30     5     6  1094    22     1    12     1     6     0
    3     0    66    49  1034     0    69     0     4     0
    0     0     0     0     0  1120     0    32     3    10
  156     7    92    24    86     0   834     0    17     0
    0     0     0     0     0     9     0  1190     2    40
   18     0     5    10     8     3    12     5  1140     3
    0     0     0     0     0     9     0    36     0  1136
```

graphs==========:

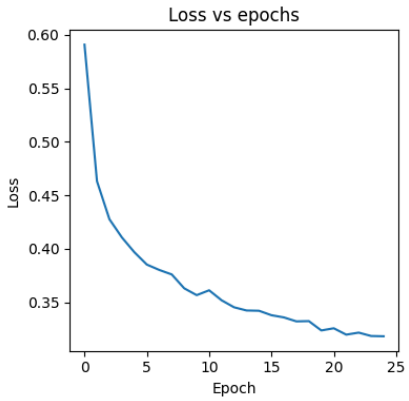


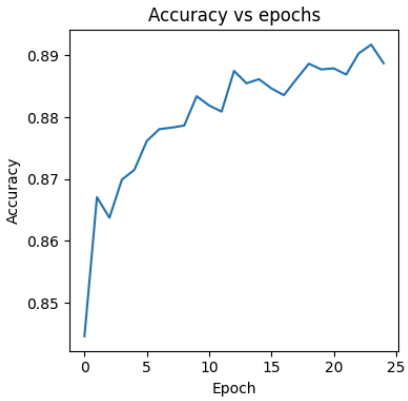
Testing on test data==========:
Macro F1: 0.8865

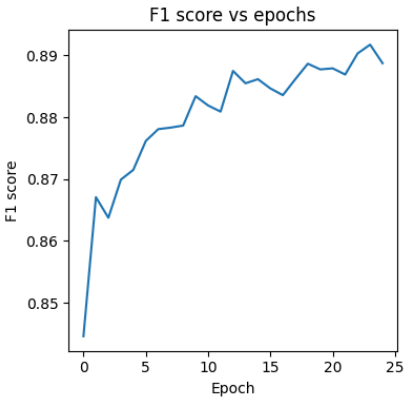
==========**Learning Rate: 0.002**==========
Best Validation=========:
Macro F1: 0.89175

Confusion Matrix:

```
Confusion Matrix:
[[ 998    3   22   33    7    1  117    0   11    1]
 [   1 1167    1   18    3    0    2    0    0    0]
 [  14    1  962    7  138    0   77    0    7    0]
 [  18   13    6 1079   37    3   16    1    4    0]
 [   1    1   77   35 1040    0   68    0    3    0]
 [   0    0    0    0    0 1137    0   14    2   12]
 [ 122    9   90   24  113    0  846    1   11    0]
 [   0    0    0    0    0   19    0 1194    2   26]
 [   5    1    3    7   14    5   13    6 1147    3]
 [   0    0    0    0    0    9    0   41    0 1131]]
```







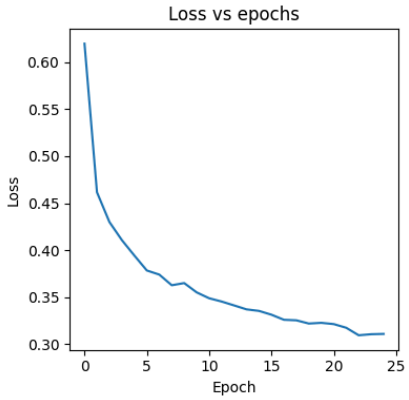
Testing on test data==========:
Macro F1: 0.8863

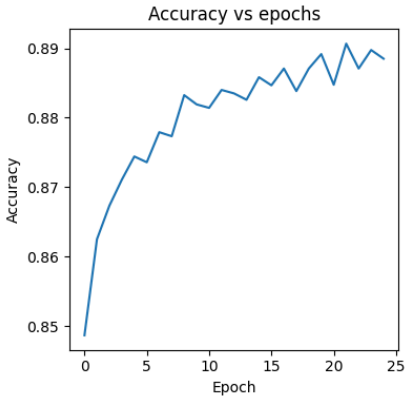
==========Learning Rate: 0.001==========

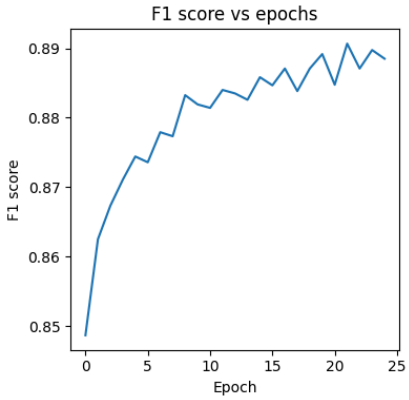
Best Validation=========:

Macro F1: 0.8906666666666667

```
Confusion Matrix:
 1024     0    20    30     5     2   101     0    11     0
    4  1160     1    23     3     0     1     0     0     0
   13     2  1008     6   110     0    61     1     5     0
   35     4     8  1068    42     1    12     0     7     0
    4     0    89    31  1033     0    63     1     4     0
    1     0     0     1     0  1132     0    18     2    11
  160     8   118    22    97     1   797     2    11     0
    0     0     0     0     0    24     0  1187     0    30
   13     0     7     6    11     2    12     5  1146     2
    0     0     0     0     0    13     0    34     1  1133
```





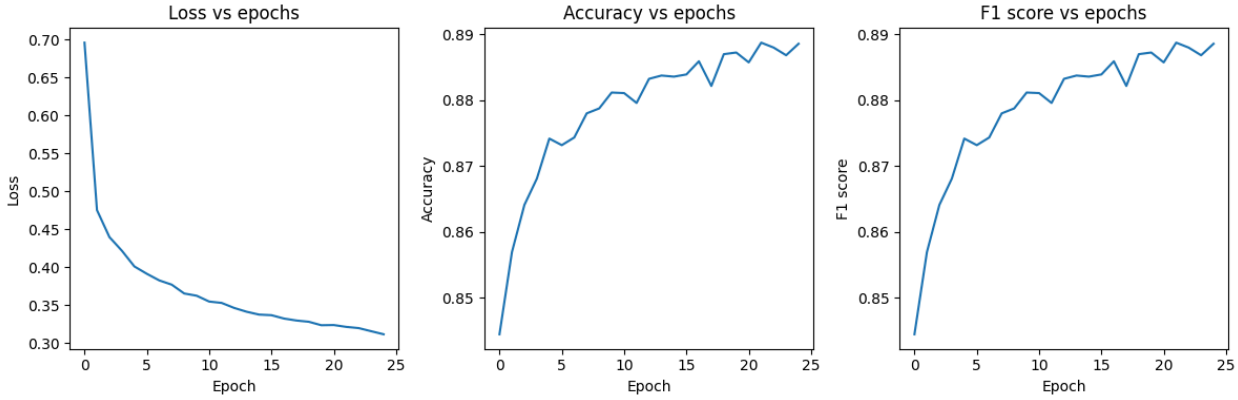


Testing on test data==========:

Macro F1: 0.8861

==========**Learning Rate: 0.0005**==========
Best Validation=========:
Macro F1: 0.88875

```
Confusion Matrix:
 1034     0    22    34     2     0    91     0     9     1
    2  1156     0    28     4     0     2     0     0     0
   19     1  1011     7    89     0    74     1     4     0
   27     1     8  1090    22     1    23     0     5     0
    3     1   107    48   985     0    77     0     4     0
    1     0     0     0     0  1118     0    31     3    12
  167     4   122    32    75     0   801     1    14     0
    0     0     0     0     0    12     0  1193     2    34
   10     0     8    10     6     2    14     6  1145     3
    0     0     0     0     0    11     0    36     2  1132
```



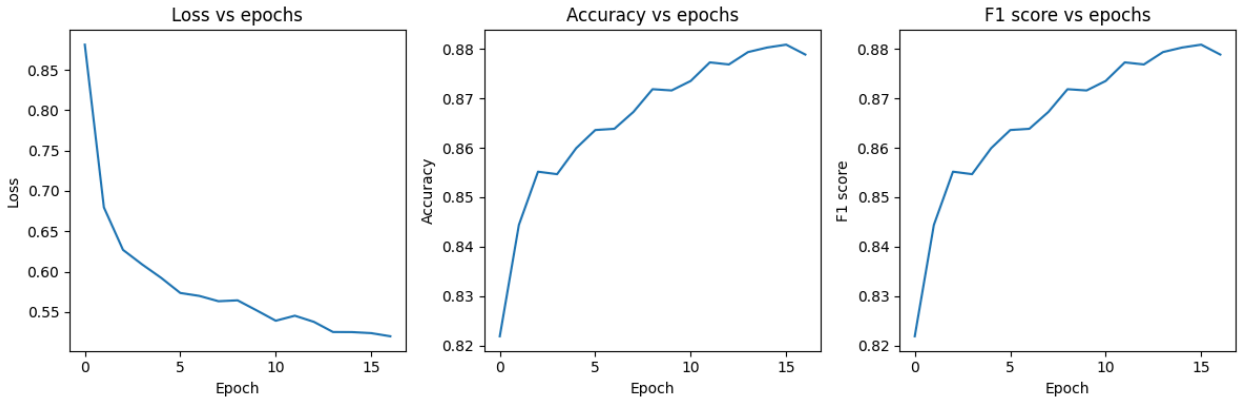
Testing on test data==========:
Macro F1: 0.8844

MODEL 3:

3 HIDDEN LAYERS : [128,64,32]
DROP RATE: 0.4

==========**Learning Rate: 0.003**==========
Best Validation=========:
Macro F1: 0.8808333333333332

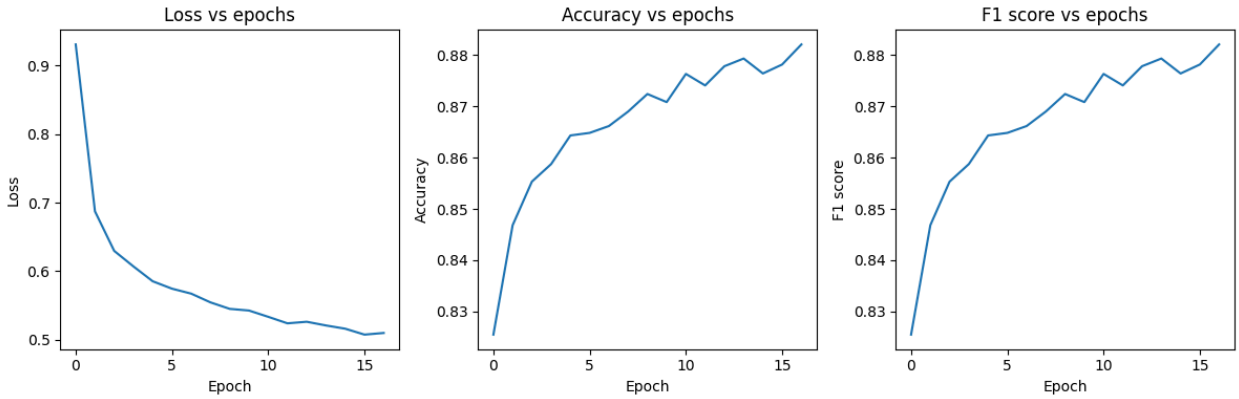
```
Confusion Matrix:
 1031     0    14    22     2     1    97     0    11     0
    4  1183     2    18     4     0     3     0     1     0
   14     1  1009     6   112     1    86     0     7     0
   53     5    11  1122    52     0    35     0     3     0
    1     3    83    22   994     2    73     0     4     0
    1     0     0     0     0  1138     0    33     4    21
  211     3   119    14    97     0   804     0    10     0
    0     0     0     0     0    33     0  1094     0    48
    5     0     2     1     5     5    24     5  1100     2
    0     1     0     0     0     5     1    27     0  1095
```



Testing on test data==========:
Macro F1: 0.8758

==========**Learning Rate: 0.002**==========
Best Validation=========:
Macro F1: 0.8820833333333333

```
Confusion Matrix:
 1027     1    12    34     3     3    87     0    11     0
    3  1184     4    19     1     0     4     0     0     0
   14     1   994    12   127     2    78     0     8     0
   40    11     8  1146    45     1    29     0     1     0
    1     2    60    34  1033     1    47     0     4     0
    1     0     1     0     0  1136     0    42     3    14
  208     2   123    25   115     0   773     0    12     0
    0     0     0     0     0    24     0  1101     1    49
    2     2     5     3     7     4    14     7  1104     1
    0     0     0     0     1    10     1    30     0  1087
```



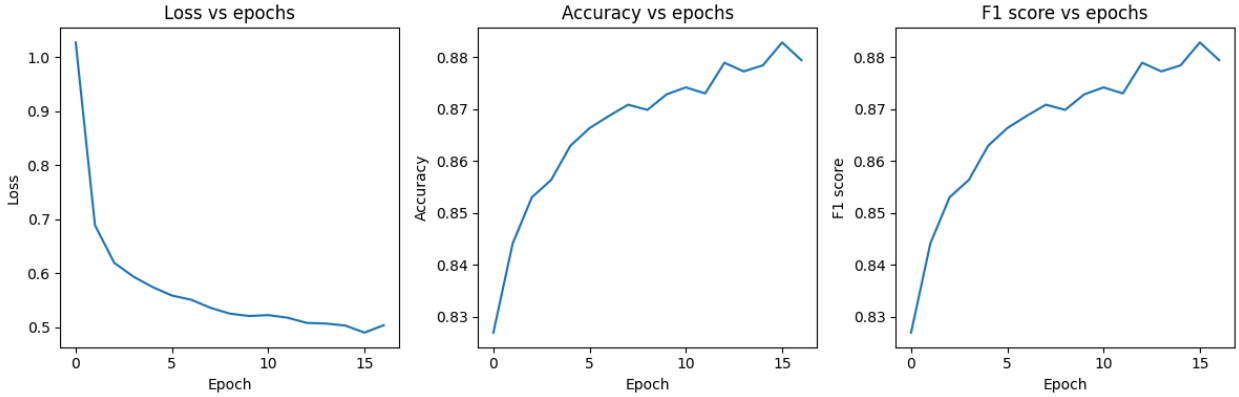
Testing on test data==========:
Macro F1: 0.8725

==========**Learning Rate: 0.001**==========

Best Validation=========:

Macro F1: 0.8828333333333334

```
Confusion Matrix:
 1013     1    18    41     6     3    87     0     9     0
    3  1182     2    19     5     0     3     0     1     0
   14     1  1023    10   114     1    66     1     6     0
   37     6    10  1147    53     1    26     0     1     0
    1     4    83    23  1020     1    45     0     5     0
    1     0     0     0     0  1142     0    36     5    13
  193     2   147    29    99     0   781     0     7     0
    0     0     0     0     0    32     0  1102     2    39
    6     0     4     3     6     5    19     7  1098     1
    0     1     0     0     0     9     1    32     0  1086
```



Testing on test data==========:

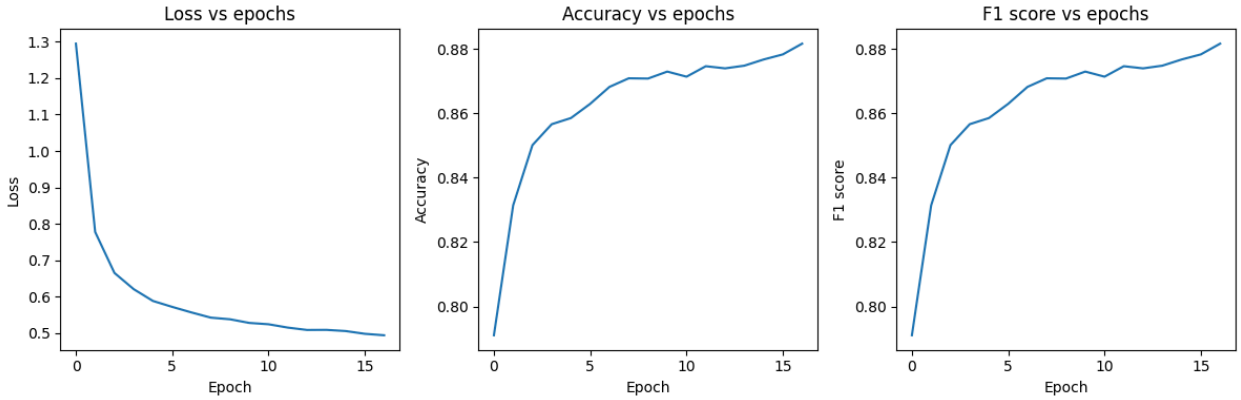
Macro F1: 0.8741

==========**Learning Rate: 0.0005**==========

Best Validation=========:

Macro F1: 0.8815833333333334

```
Confusion Matrix:
[[999   0  11  39   3   1 116   0   9   0]
 [  2 1183   2  20   5   0   3   0   0   0]
 [ 16   1 984  10 125   0  91   1   8   0]
 [ 41   9   6 1151  50   0  24   0   0   0]
 [  1   3  59  36 1004   0  73   0   6   0]
 [  1   0   1   0   0 1149   0  32   2  12]
 [177   5 115  29  94   1 830   0   7   0]
 [  0   0   0   0   0  36   0 1097   4  38]
 [  3   1   3   2   7   4  22   5 1101   1]
 [  0   1   0   1   0   9   0  37   0 1081]]
```



Testing on test data==========:

Macro F1: 0.8734