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Course : CS564 Machine Learning
Assignment: End Semester
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Output of all 3 models of test data

1. Vanilla RNN

```
Accuracy of RNN = 0.42408376963350786
              precision    recall  f1-score   support

           0       0.73      0.39      0.51        98
           1       0.38      0.46      0.42        80
           2       0.30      0.42      0.35        89
           3       0.39      0.47      0.43        34
           4       0.51      0.42      0.46        81

    accuracy                           0.42       382
   macro avg       0.46      0.43      0.43       382
weighted avg       0.48      0.42      0.43       382
```

2. FFNN (Assignment 4)

```
Accuracy of FFNN = 0.9424083769633508
              precision    recall  f1-score   support

           0       0.97      0.91      0.94        93
           1       0.92      0.96      0.94        76
           2       0.91      0.95      0.93        82
           3       0.98      0.95      0.96        42
           4       0.95      0.94      0.95        89

    accuracy                           0.94       382
   macro avg       0.95      0.94      0.94       382
weighted avg       0.94      0.94      0.94       382
```

3. FFNN Fine Tuned

Accuracy of FFNN Fine Tuned = 0.9607329842931938

	precision	recall	f1-score	support
0	0.97	0.92	0.95	93
1	0.95	0.97	0.96	76
2	0.94	0.96	0.95	82
3	1.00	0.98	0.99	42
4	0.97	0.98	0.97	89
accuracy			0.96	382
macro avg	0.96	0.96	0.96	382
weighted avg	0.96	0.96	0.96	382

Ensemble

1. Equal Weight Ensembler

Accuracy of Ensembler = 0.9450261780104712

	precision	recall	f1-score	support
0	0.97	0.91	0.94	93
1	0.88	0.97	0.93	76
2	0.93	0.96	0.95	82
3	1.00	0.93	0.96	42
4	0.98	0.94	0.96	89
accuracy			0.95	382
macro avg	0.95	0.94	0.95	382
weighted avg	0.95	0.95	0.95	382

2. Weighted Ensembler

Accuracy of Weighted Ensembler = 0.9554973821989529

	precision	recall	f1-score	support
0	0.98	0.91	0.94	93
1	0.93	0.97	0.95	76
2	0.93	0.96	0.95	82
3	1.00	0.95	0.98	42
4	0.97	0.98	0.97	89
accuracy			0.96	382
macro avg	0.96	0.96	0.96	382
weighted avg	0.96	0.96	0.96	382

(iv) Overall Accuracy

```
1 accuracy_models
```

```
{'Ensemble': 0.9450261780104712,
 'FFNN': 0.9424083769633508,
 'FFNN_Pre': 0.9607329842931938,
 'RNN': 0.5209424083769634,
 'Weighted_Ensembler': 0.9554973821989529}
```

+ Code + Text

(v) Misclassified Examples:

Misclassified by alteast one of simple model but ensembler predicts correctly

```
[26] 1 df_temp = df_test[(df_test['labels'] == df_test['prediction_ensemble']) & ((df_test['labels'] != df_test['prediction_rnn'])
     2                 | (df_test['labels'] != df_test['prediction_ffnn_pre']) | (df_test['labels'] != df_test['prediction_ffnn']))]
     3 len(df_temp)
```

```
167
```

Misclassified by all the simple model but ensembler predicts correctly = 0

Instances misclassified by at least one of the model but ensemble predicts correctly = 167
Instances misclassified by all three individual models, but were correctly classified by the ensemble = 0

Reason: Ensembler uses the results of three individual models, so it cannot be correct when all three models are incorrect.