**DT+TFIDF+PCA**

Classification Report:

precision recall f1-score support

0 0.96 0.97 0.97 23122

1 0.72 0.63 0.67 2330

accuracy 0.94 25452

macro avg 0.84 0.80 0.82 25452

weighted avg 0.94 0.94 0.94 25452

Confusion Matrix:

[[22543 579]

[ 859 1471]]

Accuracy: 0.94

ROC-AUC Score: 0.81

Average Precision-Recall Score: 0.50

Classification Report:

precision recall f1-score support

0 0.96 0.98 0.97 25710

1 0.72 0.64 0.68 2571

accuracy 0.95 28281

macro avg 0.84 0.81 0.82 28281

weighted avg 0.94 0.95 0.94 28281

Confusion Matrix:

[[25081 629]

[ 926 1645]]

Accuracy: 0.95

ROC-AUC Score: 0.81

Average Precision-Recall Score: 0.51

**DT+tfidf+fld**

Classification Report:

precision recall f1-score support

0 0.97 0.98 0.97 23122

1 0.73 0.66 0.69 2330

accuracy 0.95 25452

macro avg 0.85 0.82 0.83 25452

weighted avg 0.94 0.95 0.95 25452

Confusion Matrix:

[[22548 574]

[ 791 1539]]

Accuracy: 0.95

ROC-AUC Score: 0.82

Average Precision-Recall Score: 0.52

Classification Report:

precision recall f1-score support

0 0.97 0.98 0.97 25710

1 0.75 0.66 0.70 2571

accuracy 0.95 28281

macro avg 0.86 0.82 0.84 28281

weighted avg 0.95 0.95 0.95 28281

Confusion Matrix:

[[25136 574]

[ 868 1703]]

Accuracy: 0.95

ROC-AUC Score: 0.83

Average Precision-Recall Score: 0.5

**DT+tfidf**

Classification Report:

precision recall f1-score support

0 0.97 0.98 0.98 23122

1 0.81 0.75 0.78 2330

accuracy 0.96 25452

macro avg 0.89 0.86 0.88 25452

weighted avg 0.96 0.96 0.96 25452

Confusion Matrix:

[[22718 404]

[ 594 1736]]

Accuracy: 0.96

Balanced Accuracy: 0.86

ROC-AUC Score: 0.87

Average Precision-Recall Score: 0.64

Classification Report:

precision recall f1-score support

0 0.98 0.99 0.98 25710

1 0.62 0.55 0.58 241

accuracy 0.96 28281

macro avg 0.91 0.87 0.89 28281

weighted avg 0.96 0.96 0.96 28281

Confusion Matrix:

[[25330 380]

[ 626 1945]]

Accuracy: 0.96

Balanced Accuracy: 0.76

ROC-AUC Score: 0.88

Average Precision-Recall Score: 0.67

**DT+bow+pca**

Classification Report:

precision recall f1-score support

0 0.95 0.97 0.96 23122

1 0.66 0.55 0.60 2330

accuracy 0.93 25452

macro avg 0.81 0.76 0.78 25452

weighted avg 0.93 0.93 0.93 25452

Confusion Matrix:

[[22463 659]

[ 1059 1271]]

Accuracy: 0.93

ROC-AUC Score: 0.76

Average Precision-Recall Score: 0.41

Classification Report:

precision recall f1-score support

0 0.96 0.97 0.97 25710

1 0.69 0.57 0.62 2571

accuracy 0.94 28281

macro avg 0.82 0.77 0.79 28281

weighted avg 0.93 0.94 0.93 28281

Confusion Matrix:

[[25044 666]

[ 1108 1463]]

Accuracy: 0.94

ROC-AUC Score: 0.78

Average Precision-Recall Score: 0.44

DT+bow+fld

Classification Report:

precision recall f1-score support

0 0.95 0.97 0.96 23122

1 0.62 0.53 0.57 2330

accuracy 0.93 25452

macro avg 0.79 0.75 0.77 25452

weighted avg 0.92 0.93 0.92 25452

Confusion Matrix:

[[22359 763]

[ 1094 1236]]

Accuracy: 0.93

ROC-AUC Score: 0.75

Average Precision-Recall Score: 0.38

Classification Report:

precision recall f1-score support

0 0.96 0.97 0.96 25710

1 0.65 0.56 0.60 2571

accuracy 0.93 28281

macro avg 0.80 0.76 0.78 28281

weighted avg 0.93 0.93 0.93 28281

Confusion Matrix:

[[24941 769]

[ 1142 1429]]

Accuracy: 0.93

ROC-AUC Score: 0.77

Average Precision-Recall Score: 0.41

**DT+bow**

Classification Report:

precision recall f1-score support

0 0.97 0.98 0.98 23122

1 0.80 0.75 0.77 2330

accuracy 0.96 25452

macro avg 0.89 0.86 0.88 25452

weighted avg 0.96 0.96 0.96 25452

Confusion Matrix:

[[22695 427]

[ 587 1743]]

Accuracy: 0.96

Balanced Accuracy: 0.86

ROC-AUC Score: 0.87

Average Precision-Recall Score: 0.64

Classification Report:

precision recall f1-score support

0 0.98 0.98 0.98 25710

1 0.88 0.80 0.84 241

accuracy 0.96 28281

macro avg 0.90 0.87 0.88 28281

weighted avg 0.96 0.96 0.96 28281

Confusion Matrix:

[[25280 430]

[ 629 1942]]

Accuracy: 0.96

Balanced Accuracy: 0.89

ROC-AUC Score: 0.88

Average Precision-Recall Score: 0.66

**DT+word2vec+pca**

Classification Report:

precision recall f1-score support

0 0.95 0.97 0.96 23122

1 0.63 0.55 0.58 2330

accuracy 0.93 25452

macro avg 0.79 0.76 0.77 25452

weighted avg 0.92 0.93 0.93 25452

Confusion Matrix:

[[22367 755]

[ 1059 1271]]

Accuracy: 0.93

Balanced Accuracy: 0.76

ROC-AUC Score: 0.76

Average Precision-Recall Score: 0.38

Classification Report:

precision recall f1-score support

0 0.96 0.97 0.96 25710

1 0.67 0.57 0.61 2571

accuracy 0.94 28281

macro avg 0.81 0.77 0.79 28281

weighted avg 0.93 0.94 0.93 28281

Confusion Matrix:

[[24983 727]

[ 1109 1462]]

Accuracy: 0.94

Balanced Accuracy: 0.77

ROC-AUC Score: 0.77

Average Precision-Recall Score: 0.42

**DT+word2vec+fld**

Classification Report:

precision recall f1-score support

0 0.95 0.96 0.95 23122

1 0.56 0.46 0.51 2330

accuracy 0.92 25452

macro avg 0.75 0.71 0.73 25452

weighted avg 0.91 0.92 0.91 25452

Confusion Matrix:

[[22273 849]

[ 1256 1074]]

Accuracy: 0.92

ROC-AUC Score: 0.71

Average Precision-Recall Score: 0.31

Classification Report:

precision recall f1-score support

0 0.95 0.97 0.96 25710

1 0.58 0.47 0.52 2571

accuracy 0.92 28281

macro avg 0.77 0.72 0.74 28281

weighted avg 0.91 0.92 0.92 28281

Confusion Matrix:

[[24847 863]

[ 1365 1206]]

Accuracy: 0.92

ROC-AUC Score: 0.72

Average Precision-Recall Score: 0.32

**DT+word2vec**

Classification Report:

precision recall f1-score support

0 0.96 0.97 0.96 23122

1 0.63 0.56 0.59 2330

accuracy 0.93 25452

macro avg 0.79 0.76 0.78 25452

weighted avg 0.93 0.93 0.93 25452

Confusion Matrix:

[[22367 755]

[ 1030 1300]]

Accuracy: 0.93

ROC-AUC Score: 0.76

Average Precision-Recall Score: 0.39

Classification Report:

precision recall f1-score support

0 0.96 0.97 0.96 25710

1 0.67 0.59 0.62 2571

accuracy 0.94 28281

macro avg 0.81 0.78 0.79 28281

weighted avg 0.93 0.94 0.93 28281

Confusion Matrix:

[[24959 751]

[ 1063 1508]]

Accuracy: 0.94

ROC-AUC Score: 0.78

Average Precision-Recall Score: 0.43

**CNN+bow+pca**

Classification Report:

precision recall f1-score support

0 0.94 0.99 0.96 23122

1 0.79 0.38 0.51 2330

accuracy 0.93 25452

macro avg 0.86 0.68 0.74 25452

weighted avg 0.93 0.93 0.92 25452

Confusion Matrix:

[[22885 237]

[ 1449 881]]

Accuracy: 0.93

ROC-AUC Score: 0.90

Average Precision-Recall Score: 0.62

Classification Report:

precision recall f1-score support

0 0.95 0.99 0.97 2588

1 0.78 0.40 0.53 241

accuracy 0.94 2829

macro avg 0.86 0.70 0.75 2829

weighted avg 0.93 0.94 0.93 2829

Confusion Matrix:

[[2560 28]

[ 144 97]]

Accuracy: 0.94

ROC-AUC Score: 0.91

Average Precision-Recall Score: 0.63

**CNN+bow+fld**

Classification Report:

precision recall f1-score support

0 0.94 0.98 0.96 23122

1 0.66 0.42 0.51 2330

accuracy 0.93 25452

macro avg 0.80 0.70 0.74 25452

weighted avg 0.92 0.93 0.92 25452

Confusion Matrix:

[[22630 492]

[ 1359 971]]

Accuracy: 0.93

ROC-AUC Score: 0.91

Average Precision-Recall Score: 0.55

Classification Report:

precision recall f1-score support

0 0.95 0.98 0.96 2588

1 0.62 0.41 0.49 241

accuracy 0.93 2829

macro avg 0.78 0.69 0.73 2829

weighted avg 0.92 0.93 0.92 2829

Confusion Matrix:

[[2528 60]

[ 142 99]]

Accuracy: 0.93

ROC-AUC Score: 0.90

Average Precision-Recall Score: 0.50

**CNN+bow**

Classification Report:

precision recall f1-score support

0 1.00 1.00 1.00 23122

1 0.98 0.96 0.97 2330

accuracy 0.99 25452

macro avg 0.99 0.98 0.98 25452

weighted avg 0.99 0.99 0.99 25452

Confusion Matrix:

[[23072 50]

[ 98 2232]]

Accuracy: 0.99

Balanced Accuracy: 0.98

ROC-AUC Score: 1.00

Average Precision-Recall Score: 0.99

Classification Report:

precision recall f1-score support

0 0.99 0.99 0.99 2588

1 0.92 0.86 0.89 241

accuracy 0.98 2829

macro avg 0.95 0.93 0.94 2829

weighted avg 0.98 0.98 0.98 2829

Confusion Matrix:

[[2569 19]

[ 33 208]]

Accuracy: 0.98

Balanced Accuracy: 0.93

ROC-AUC Score: 0.99

Average Precision-Recall Score: 0.95

**CNN+tfidf+pca**

Classification Report:

precision recall f1-score support

0 0.94 0.98 0.96 23122

1 0.70 0.43 0.53 2330

accuracy 0.93 25452

macro avg 0.82 0.71 0.75 25452

weighted avg 0.92 0.93 0.92 25452

Confusion Matrix:

[[22682 440]

[ 1327 1003]]

Accuracy: 0.93

Balanced Accuracy: 0.71

ROC-AUC Score: 0.89

Average Precision-Recall Score: 0.58

Classification Report:

precision recall f1-score support

0 0.95 0.98 0.96 2588

1 0.67 0.44 0.54 241

accuracy 0.93 2829

macro avg 0.81 0.71 0.75 2829

weighted avg 0.93 0.93 0.93 2829

Confusion Matrix:

[[2536 52]

[ 134 107]]

Accuracy: 0.93

Balanced Accuracy: 0.71

ROC-AUC Score: 0.89

Average Precision-Recall Score: 0.57

**CNN+tfidf+fld**

Classification Report:

precision recall f1-score support

0 0.94 0.98 0.96 23122

1 0.67 0.40 0.50 2330

accuracy 0.93 25452

macro avg 0.81 0.69 0.73 25452

weighted avg 0.92 0.93 0.92 25452

Confusion Matrix:

[[22672 450]

[ 1402 928]]

Accuracy: 0.93

Balanced Accuracy: 0.69

ROC-AUC Score: 0.91

Average Precision-Recall Score: 0.55

Classification Report:

precision recall f1-score support

0 0.94 0.98 0.96 2588

1 0.61 0.39 0.47 241

accuracy 0.93 2829

macro avg 0.78 0.68 0.72 2829

weighted avg 0.92 0.93 0.92 2829

Confusion Matrix:

[[2529 59]

[ 148 93]]

Accuracy: 0.93

Balanced Accuracy: 0.68

ROC-AUC Score: 0.90

Average Precision-Recall Score: 0.50

**CNN+tfidf**

Classification Report:

precision recall f1-score support

0 0.99 0.99 0.99 23122

1 0.93 0.89 0.91 2330

accuracy 0.98 25452

macro avg 0.96 0.94 0.95 25452

weighted avg 0.98 0.98 0.98 25452

Confusion Matrix:

[[22961 161]

[ 257 2073]]

Accuracy: 0.98

Balanced Accuracy: 0.94

ROC-AUC Score: 0.99

Average Precision-Recall Score: 0.96

Classification Report:

precision recall f1-score support

0 0.99 0.99 0.99 2588

1 0.88 0.86 0.87 241

accuracy 0.98 2829

macro avg 0.93 0.92 0.93 2829

weighted avg 0.98 0.98 0.98 2829

Confusion Matrix:

[[2559 29]

[ 34 207]]

Accuracy: 0.98

Balanced Accuracy: 0.92

ROC-AUC Score: 0.99

Average Precision-Recall Score: 0.92

**CNN+word2vec+pca**

Classification Report:

precision recall f1-score support

0 0.92 0.99 0.96 23122

1 0.67 0.19 0.30 2330

accuracy 0.92 25452

macro avg 0.80 0.59 0.63 25452

weighted avg 0.90 0.92 0.90 25452

Confusion Matrix:

[[22899 223]

[ 1882 448]]

Accuracy: 0.92

Balanced Accuracy: 0.59

ROC-AUC Score: 0.83

Average Precision-Recall Score: 0.45

Classification Report:

precision recall f1-score support

0 0.93 0.99 0.96 2588

1 0.66 0.20 0.31 241

accuracy 0.92 2829

macro avg 0.80 0.60 0.64 2829

weighted avg 0.91 0.92 0.90 2829

Confusion Matrix:

[[2563 25]

[ 192 49]]

Accuracy: 0.92

Balanced Accuracy: 0.60

ROC-AUC Score: 0.83

Average Precision-Recall Score: 0.46

**CNN+word2vec+fld**

Classification Report:

precision recall f1-score support

0 0.93 0.98 0.96 23122

1 0.62 0.31 0.42 2330

accuracy 0.92 25452

macro avg 0.78 0.65 0.69 25452

weighted avg 0.91 0.92 0.91 25452

Confusion Matrix:

[[22681 441]

[ 1600 730]]

Accuracy: 0.92

Balanced Accuracy: 0.65

ROC-AUC Score: 0.84

Average Precision-Recall Score: 0.46

Classification Report:

precision recall f1-score support

0 0.94 0.98 0.96 2588

1 0.62 0.35 0.45 241

accuracy 0.93 2829

macro avg 0.78 0.66 0.70 2829

weighted avg 0.91 0.93 0.92 2829

Confusion Matrix:

[[2537 51]

[ 157 84]]

Accuracy: 0.93

Balanced Accuracy: 0.66

ROC-AUC Score: 0.84

Average Precision-Recall Score: 0.46

**CNN+word2vec**

Classification Report:

precision recall f1-score support

0 0.96 1.00 0.98 23122

1 0.94 0.60 0.73 2330

accuracy 0.96 25452

macro avg 0.95 0.80 0.86 25452

weighted avg 0.96 0.96 0.96 25452

Confusion Matrix:

[[23032 90]

[ 926 1404]]

Accuracy: 0.96

Balanced Accuracy: 0.80

ROC-AUC Score: 0.96

Average Precision-Recall Score: 0.85

Classification Report:

precision recall f1-score support

0 0.96 0.99 0.98 2588

1 0.88 0.53 0.66 241

accuracy 0.95 2829

macro avg 0.92 0.76 0.82 2829

weighted avg 0.95 0.95 0.95 2829

Confusion Matrix:

[[2571 17]

[ 113 128]]

Accuracy: 0.95

Balanced Accuracy: 0.76

ROC-AUC Score: 0.94

Average Precision-Recall Score: 0.76

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Accuracy | Balanced Accuracy | ROC-AUC Score | Average Precision-Recall Score | precision | recall | f1-score |
| DT+TFIDF | 0.96 | 0.87 | 0.88 | 0.67 | 0.84 | 0.76 | 0.79 |
| DT+BOW | 0.96 | 0.87 | 0.88 | 0.66 | 0.82 | 0.76 | 0.79 |
| DT+Word2vec+pca | 0.94 | 0.77 | 0.77 | 0.42 | 0.67 | 0.57 | 0.61 |
| CNN+Bow | 0.98 | 0.93 | 0.99 | 0.95 | 0.92 | 0.86 | 0.89 |
| CNN+TFIDF | 0.98 | 0.92 | 0.99 | 0.92 | 0.88 | 0.86 | 0.87 |
| CNN+Word2Vec | 0.95 | 0.76 | 0.94 | 0.76 | 0.88 | 0.53 | 0.66 |