Dataset: Full Set 1 (Training and Test set combined)

Experiment is done using kNN classifier (k = 3) along with 4-fold cross validation.

**With all 9 features:**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R10

Instances: 2372

Attributes: 10

Word count limit ratio

Long sentences

Voice

Tense

Spell errors

Grammatical Errors

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Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0.01 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1888 79.5953 %

Incorrectly Classified Instances 484 20.4047 %

Kappa statistic 0.5618

Mean absolute error 0.1272

Root mean squared error 0.2858

Relative absolute error 51.7917 %

Root relative squared error 81.6049 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.886 0.374 0.822 0.886 0.853 0.536 0.811 0.849 B

0.644 0.082 0.731 0.644 0.685 0.587 0.854 0.658 A

0.539 0.017 0.716 0.539 0.615 0.596 0.859 0.538 C

0.538 0.000 1.000 0.538 0.700 0.733 0.923 0.781 D

Weighted Avg. 0.796 0.270 0.792 0.796 0.791 0.555 0.827 0.776

=== Confusion Matrix ===

a b c d <-- classified as

1390 145 33 0 | a = B

218 395 0 0 | b = A

82 0 96 0 | c = C

1 0 5 7 | d = D

**Removed Feature: Long Sentences**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R10-weka.filters.unsupervised.attribute.Remove-R2

Instances: 2372

Attributes: 9

Word count limit ratio

Voice

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Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1886 79.511 %

Incorrectly Classified Instances 486 20.489 %

Kappa statistic 0.5655

Mean absolute error 0.1248

Root mean squared error 0.2863

Relative absolute error 50.8339 %

Root relative squared error 81.7645 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.874 0.354 0.828 0.874 0.850 0.536 0.812 0.851 B

0.672 0.093 0.715 0.672 0.693 0.591 0.849 0.645 A

0.528 0.016 0.723 0.528 0.610 0.592 0.880 0.601 C

0.692 0.000 0.900 0.692 0.783 0.788 0.961 0.835 D

Weighted Avg. 0.795 0.260 0.791 0.795 0.791 0.556 0.828 0.779

=== Confusion Matrix ===

a b c d <-- classified as

1371 164 33 0 | a = B

201 412 0 0 | b = A

83 0 94 1 | c = C

1 0 3 9 | d = D

**Removed Feature: Grammatical Errors**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R6,10

Instances: 2372

Attributes: 9

Word count limit ratio

Long sentences

Voice

Tense

Spell errors

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Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1882 79.3423 %

Incorrectly Classified Instances 490 20.6577 %

Kappa statistic 0.5626

Mean absolute error 0.1239

Root mean squared error 0.2814

Relative absolute error 50.4336 %

Root relative squared error 80.3645 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.874 0.356 0.827 0.874 0.850 0.535 0.825 0.862 B

0.654 0.092 0.712 0.654 0.682 0.578 0.863 0.668 A

0.579 0.019 0.715 0.579 0.640 0.618 0.884 0.562 C

0.538 0.000 0.875 0.538 0.667 0.685 0.922 0.655 D

Weighted Avg. 0.793 0.260 0.789 0.793 0.790 0.553 0.840 0.788

=== Confusion Matrix ===

a b c d <-- classified as

1371 162 35 0 | a = B

212 401 0 0 | b = A

74 0 103 1 | c = C

0 0 6 7 | d = D

**Removed Feature: Tense**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R4,10

Instances: 2372

Attributes: 9

Word count limit ratio

Long sentences

Voice

Spell errors

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Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1862 78.4992 %

Incorrectly Classified Instances 510 21.5008 %

Kappa statistic 0.5463

Mean absolute error 0.128

Root mean squared error 0.2882

Relative absolute error 52.1133 %

Root relative squared error 82.2923 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.864 0.362 0.823 0.864 0.843 0.516 0.815 0.856 B

0.657 0.099 0.697 0.657 0.677 0.569 0.856 0.638 A

0.545 0.020 0.693 0.545 0.610 0.587 0.875 0.558 C

0.538 0.000 0.875 0.538 0.667 0.685 0.923 0.717 D

Weighted Avg. 0.785 0.266 0.781 0.785 0.782 0.536 0.831 0.776

=== Confusion Matrix ===

a b c d <-- classified as

1355 175 38 0 | a = B

210 403 0 0 | b = A

80 0 97 1 | c = C

1 0 5 7 | d = D

**Removed Feature: Spell Errors**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R5,10

Instances: 2372

Attributes: 9

Word count limit ratio

Long sentences

Voice

Tense

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Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1881 79.3002 %

Incorrectly Classified Instances 491 20.6998 %

Kappa statistic 0.5565

Mean absolute error 0.1284

Root mean squared error 0.2855

Relative absolute error 52.2777 %

Root relative squared error 81.5352 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.883 0.374 0.821 0.883 0.851 0.531 0.811 0.849 B

0.639 0.086 0.722 0.639 0.678 0.577 0.852 0.662 A

0.539 0.017 0.722 0.539 0.617 0.598 0.869 0.539 C

0.615 0.001 0.800 0.615 0.696 0.700 0.922 0.667 D

Weighted Avg. 0.793 0.271 0.788 0.793 0.788 0.549 0.827 0.776

=== Confusion Matrix ===

a b c d <-- classified as

1385 150 33 0 | a = B

221 392 0 0 | b = A

79 1 96 2 | c = C

1 0 4 8 | d = D

**Removed Feature: SS Essay**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R7,10

Instances: 2372

Attributes: 9

Word count limit ratio

Long sentences

Voice

Tense

Spell errors

Grammatical Errors

SS Topic Essay

Vocabulary

Grade

Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1898 80.0169 %

Incorrectly Classified Instances 474 19.9831 %

Kappa statistic 0.5696

Mean absolute error 0.1267

Root mean squared error 0.2852

Relative absolute error 51.5773 %

Root relative squared error 81.4263 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.892 0.372 0.824 0.892 0.856 0.545 0.810 0.847 B

0.643 0.082 0.731 0.643 0.684 0.585 0.849 0.657 A

0.556 0.014 0.767 0.556 0.645 0.630 0.863 0.562 C

0.538 0.000 1.000 0.538 0.700 0.733 0.923 0.765 D

Weighted Avg. 0.800 0.268 0.797 0.800 0.795 0.563 0.825 0.776

=== Confusion Matrix ===

a b c d <-- classified as

1398 145 25 0 | a = B

219 394 0 0 | b = A

79 0 99 0 | c = C

1 0 5 7 | d = D

**Removed Feature: Voice**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R3,10

Instances: 2372

Attributes: 9

Word count limit ratio

Long sentences

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Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1877 79.1315 %

Incorrectly Classified Instances 495 20.8685 %

Kappa statistic 0.5564

Mean absolute error 0.1272

Root mean squared error 0.2878

Relative absolute error 51.7917 %

Root relative squared error 82.187 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.874 0.362 0.825 0.874 0.849 0.530 0.809 0.847 B

0.662 0.094 0.711 0.662 0.686 0.582 0.849 0.656 A

0.534 0.017 0.714 0.534 0.611 0.591 0.860 0.534 C

0.385 0.000 0.833 0.385 0.526 0.565 0.999 0.817 D

Weighted Avg. 0.791 0.265 0.787 0.791 0.787 0.548 0.824 0.774

=== Confusion Matrix ===

a b c d <-- classified as

1371 165 32 0 | a = B

207 406 0 0 | b = A

82 0 95 1 | c = C

2 0 6 5 | d = D

**Removed Feature: SS Topic Essay**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R3,10

Instances: 2372

Attributes: 9

Word count limit ratio

Long sentences

Tense

Spell errors

Grammatical Errors

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Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1877 79.1315 %

Incorrectly Classified Instances 495 20.8685 %

Kappa statistic 0.5564

Mean absolute error 0.1272

Root mean squared error 0.2878

Relative absolute error 51.7917 %

Root relative squared error 82.187 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.874 0.362 0.825 0.874 0.849 0.530 0.809 0.847 B

0.662 0.094 0.711 0.662 0.686 0.582 0.849 0.656 A

0.534 0.017 0.714 0.534 0.611 0.591 0.860 0.534 C

0.385 0.000 0.833 0.385 0.526 0.565 0.999 0.817 D

Weighted Avg. 0.791 0.265 0.787 0.791 0.787 0.548 0.824 0.774

=== Confusion Matrix ===

a b c d <-- classified as

1371 165 32 0 | a = B

207 406 0 0 | b = A

82 0 95 1 | c = C

2 0 6 5 | d = D

**Removed Feature: Word Count Limit Ratio**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R1,10

Instances: 2372

Attributes: 9

Long sentences

Voice

Tense

Spell errors

Grammatical Errors

SS Essay

SS Topic Essay

Vocabulary

Grade

Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1833 77.2766 %

Incorrectly Classified Instances 539 22.7234 %

Kappa statistic 0.5053

Mean absolute error 0.1355

Root mean squared error 0.2963

Relative absolute error 55.194 %

Root relative squared error 84.6136 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.876 0.423 0.802 0.876 0.837 0.479 0.788 0.832 B

0.631 0.092 0.706 0.631 0.667 0.561 0.844 0.649 A

0.376 0.017 0.638 0.376 0.473 0.460 0.834 0.431 C

0.385 0.000 1.000 0.385 0.556 0.619 0.884 0.706 D

Weighted Avg. 0.773 0.305 0.766 0.773 0.764 0.500 0.806 0.754

=== Confusion Matrix ===

a b c d <-- classified as

1374 161 33 0 | a = B

226 387 0 0 | b = A

111 0 67 0 | c = C

3 0 5 5 | d = D

**Removed Feature: Vocabulary**

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 3 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""

Relation: full\_set1-weka.filters.unsupervised.attribute.Remove-R9-10

Instances: 2372

Attributes: 9

Word count limit ratio

Long sentences

Voice

Tense

Spell errors

Grammatical Errors

SS Essay

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Grade

Test mode: 4-fold cross-validation

=== Classifier model (full training set) ===

IB1 instance-based classifier

using 3 nearest neighbour(s) for classification

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 1756 74.0304 %

Incorrectly Classified Instances 616 25.9696 %

Kappa statistic 0.444

Mean absolute error 0.1558

Root mean squared error 0.3137

Relative absolute error 63.428 %

Root relative squared error 89.5796 %

Total Number of Instances 2372

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.842 0.451 0.784 0.842 0.812 0.407 0.752 0.812 B

0.550 0.119 0.616 0.550 0.581 0.447 0.800 0.531 A

0.517 0.020 0.681 0.517 0.588 0.565 0.862 0.508 C

0.538 0.000 1.000 0.538 0.700 0.733 0.884 0.705 D

Weighted Avg. 0.740 0.331 0.734 0.740 0.735 0.431 0.773 0.716

=== Confusion Matrix ===

a b c d <-- classified as

1320 210 38 0 | a = B

276 337 0 0 | b = A

86 0 92 0 | c = C

1 0 5 7 | d = D