**TASK B**

On ATNT data, run 5-fold cross-validation (CV) using each of the

four classifiers: KNN, centroid, Linear Regression and SVM.

If you don't know how to partition the data for CV, you can use the data-handler to do that.

Report the classification accuracy on each classifier.

Remember, each of the 5-fold CV gives one accuracy. You need to present all 5 accuracy numbers for each classifier. Also, the average of these 5 accuracy numbers.

**KNN**

Predicted labels

[16, 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 7, 7, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 13, 13, 14, 14, 15, 15, 16, 16, 17, 17, 18, 18, 19, 19, 20, 20, 21, 21, 22, 22, 23, 23, 24, 24, 25, 25, 26, 26, 27, 27, 28, 28, 29, 29, 30, 30, 31, 31, 32, 32, 33, 33, 34, 34, 40, 35, 36, 36, 37, 37, 38, 38, 39, 39, 40, 40]

True/Ground truth labels

[ 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 10 10 11 11 12 12 13

13 14 14 15 15 16 16 17 17 18 18 19 19 20 20 21 21 22 22 23 23 24 24 25 25

26 26 27 27 28 28 29 29 30 30 31 31 32 32 33 33 34 34 35 35 36 36 37 37 38

38 39 39 40 40]

Accuracy: 97.5

Predicted labels

[1, 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 7, 7, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 13, 13, 14, 14, 15, 15, 16, 16, 3, 17, 18, 18, 19, 19, 20, 20, 21, 21, 22, 22, 23, 23, 24, 24, 25, 25, 26, 26, 27, 27, 28, 28, 29, 29, 30, 30, 31, 31, 32, 32, 33, 33, 34, 34, 35, 35, 36, 36, 37, 37, 38, 38, 39, 39, 40, 5]

True/Ground truth labels

[ 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 10 10 11 11 12 12 13

13 14 14 15 15 16 16 17 17 18 18 19 19 20 20 21 21 22 22 23 23 24 24 25 25

26 26 27 27 28 28 29 29 30 30 31 31 32 32 33 33 34 34 35 35 36 36 37 37 38

38 39 39 40 40]

Accuracy: 97.5

Predicted labels

[1, 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 7, 7, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 13, 13, 14, 14, 15, 15, 16, 16, 17, 17, 18, 18, 19, 19, 20, 20, 21, 21, 22, 22, 23, 23, 24, 24, 25, 25, 26, 26, 27, 27, 28, 28, 29, 29, 30, 30, 31, 31, 32, 32, 33, 33, 34, 34, 35, 35, 36, 36, 37, 37, 38, 38, 39, 39, 5, 40]

True/Ground truth labels

[ 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 10 10 11 11 12 12 13

13 14 14 15 15 16 16 17 17 18 18 19 19 20 20 21 21 22 22 23 23 24 24 25 25

26 26 27 27 28 28 29 29 30 30 31 31 32 32 33 33 34 34 35 35 36 36 37 37 38

38 39 39 40 40]

Accuracy: 98.75

Predicted labels

[1, 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 7, 7, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 13, 13, 14, 14, 15, 15, 16, 16, 17, 17, 18, 18, 19, 19, 20, 20, 21, 21, 22, 22, 23, 23, 24, 24, 25, 25, 26, 26, 27, 27, 28, 37, 29, 29, 30, 30, 31, 31, 32, 32, 33, 33, 34, 34, 35, 35, 36, 36, 37, 37, 38, 38, 39, 39, 40, 40]

True/Ground truth labels

[ 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 10 10 11 11 12 12 13

13 14 14 15 15 16 16 17 17 18 18 19 19 20 20 21 21 22 22 23 23 24 24 25 25

26 26 27 27 28 28 29 29 30 30 31 31 32 32 33 33 34 34 35 35 36 36 37 37 38

38 39 39 40 40]

Accuracy: 98.75

Predicted labels

[1, 1, 2, 2, 3, 3, 4, 4, 5, 40, 6, 6, 7, 7, 8, 8, 9, 9, 10, 38, 11, 11, 12, 12, 13, 13, 14, 14, 15, 15, 16, 16, 17, 17, 18, 18, 15, 19, 20, 20, 21, 21, 22, 22, 23, 23, 24, 24, 25, 25, 26, 26, 27, 27, 28, 28, 29, 29, 30, 30, 31, 31, 32, 32, 33, 33, 34, 34, 35, 35, 36, 36, 37, 37, 38, 38, 39, 39, 40, 40]

True/Ground truth labels

[ 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 10 10 11 11 12 12 13

13 14 14 15 15 16 16 17 17 18 18 19 19 20 20 21 21 22 22 23 23 24 24 25 25

26 26 27 27 28 28 29 29 30 30 31 31 32 32 33 33 34 34 35 35 36 36 37 37 38

38 39 39 40 40]

**Accuracy: 96.25**

**Average accuracy: 97.75**

**CENTROID**

Predicted labels

[1, 1, 2, 2, 3, 3, 4, 4, 5, 5]

True/Ground truth labels

[1 1 2 2 3 3 4 4 5 5]

Accuracy: 100.0

Predicted labels

[1, 1, 2, 2, 3, 3, 4, 4, 5, 5]

True/Ground truth labels

[1 1 2 2 3 3 4 4 5 5]

Accuracy: 100.0

Predicted labels

[1, 1, 2, 2, 3, 3, 4, 4, 5, 5]

True/Ground truth labels

[1 1 2 2 3 3 4 4 5 5]

Accuracy: 100.0

Predicted labels

[1, 1, 2, 2, 3, 3, 4, 4, 5, 5]

True/Ground truth labels

[1 1 2 2 3 3 4 4 5 5]

Accuracy: 100.0

Predicted labels

[1, 2, 3, 4, 5]

True/Ground truth labels

[1 2 3 4 5]

**Accuracy: 100.0**

**Average accuracy: 100.0**

**LINEAR REGRESSION**

Predicted labels

[1 1 2 2 3 3 4 4 5 5]

True/Ground truth labels

[1 1 2 2 3 3 4 4 5 5]

Error

[0 0 0 0 0 0 0 0 0 0]

10

Accuracy: 100.0

Predicted labels

[1 1 2 2 3 3 4 4 5 5]

True/Ground truth labels

[1 1 2 2 3 3 4 4 5 5]

Error

[0 0 0 0 0 0 0 0 0 0]

10

Accuracy: 100.0

Predicted labels

[1 1 2 2 3 3 4 4 5 5]

True/Ground truth labels

[1 1 2 2 3 3 4 4 5 5]

Error

[0 0 0 0 0 0 0 0 0 0]

10

Accuracy: 100.0

1 1 1 1 1 1 2 2 2 2 2 2 2 3 3 3 3 3 3 3 4 4 4 4 4 4 4 5 5 5 5 5 5 5]

Predicted labels

[1 1 2 2 3 3 4 4 5 5]

True/Ground truth labels

[1 1 2 2 3 3 4 4 5 5]

Error

[0 0 0 0 0 0 0 0 0 0]

10

Accuracy: 100.0

Predicted labels

[1 2 3 4 5]

True/Ground truth labels

[1 2 3 4 5]

Error

[0 0 0 0 0]

5

**Accuracy: 100.0**

**Average accuracy: 100.0**

**SVM**

[ 2 3 4 5 6 7 8 11 12 13 14 15 16 17 20 21 22 23 24 25 26 29 30 31 32

33 34 35 38 39 40 41 42 43 44] [ 0 1 9 10 18 19 27 28 36 37]

Predicted labels:

[1 1 2 2 3 3 4 4 5 5]

Actual labels:

[1 1 2 2 3 3 4 4 5 5]

Accuracy: 100.0

[ 0 1 4 5 6 7 8 9 10 13 14 15 16 17 18 19 22 23 24 25 26 27 28 31 32

33 34 35 36 37 40 41 42 43 44] [ 2 3 11 12 20 21 29 30 38 39]

Predicted labels:

[1 1 2 2 3 3 4 4 5 5]

Actual labels:

[1 1 2 2 3 3 4 4 5 5]

Accuracy: 100.0

[ 0 1 2 3 6 7 8 9 10 11 12 15 16 17 18 19 20 21 24 25 26 27 28 29 30

33 34 35 36 37 38 39 42 43 44] [ 4 5 13 14 22 23 31 32 40 41]

Predicted labels:

[1 1 2 2 3 3 4 4 5 5]

Actual labels:

[1 1 2 2 3 3 4 4 5 5]

Accuracy: 100.0

[ 0 1 2 3 4 5 8 9 10 11 12 13 14 17 18 19 20 21 22 23 26 27 28 29 30

31 32 35 36 37 38 39 40 41 44] [ 6 7 15 16 24 25 33 34 42 43]

Predicted labels:

[1 1 2 2 3 3 4 4 5 5]

Actual labels:

[1 1 2 2 3 3 4 4 5 5]

Accuracy: 100.0

[ 0 1 2 3 4 5 6 7 9 10 11 12 13 14 15 16 18 19 20 21 22 23 24 25 27

28 29 30 31 32 33 34 36 37 38 39 40 41 42 43] [ 8 17 26 35 44]

Predicted labels:

[1 2 3 4 5]

Actual labels:

[1 2 3 4 5]

**Accuracy: 100.0**

**Average accuracy: 100.0**

From the above output from the data handler we could see that following accuracy and aveage accuracy values for different classifiers.

**KNN :**

**Accuracy: 96.25**

**Average accuracy: 97.75**

**CENTROID:**

**Accuracy: 100.0**

**Average accuracy: 100.0**

**LINEAR REGRESSION:**

**Accuracy: 100.0**

**Average accuracy: 100.0**

**SVM:**

**Accuracy: 100.0**

**Average accuracy: 100.0**

Centroid, Linear, SVM classifier have the same accuracy with a 100, while KNN is slightly less with accuracy of 96.25 and average accuracy of 97.75 respectively.