Programming Assignment 03 – Learning

CII-2M3 Introduction to Artificial Intelligence

Group 4

Member:

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Problem Statement

We want to predict the ‘y’ value in the test data, but we don't have any kind of knowledge to predict what the value will be. Then, we need to analyze and make a model based on train data, so we can predict the ‘y’ value in the test data accurately.

Program Design

- Read training/test data

  This program is processing the file input, which is “traintest.xlsx”.
- Model training
- Save the trained model

  To find the optimal k value.
- Model testing

  To predict the truth of validation data, then it will be tested with the confusion matrix.
- Model evaluation

  To predict the data test.
- Save output to a file

The Decoding

- read_excel(path, sheet_target) → to read the file “traintest.xlsx”
- reScale(data, method) → to check the data, are they within the same range or not by using the methods of scaling.
- cross_data(train_data, total) → fold the data based on the cross validation based on each index.
- euclidean(X_train, X_test, i, j) → find the distance with the Euclidean method.
- manhattanDist(X_train, X_test, i, j) → find the distance with the manhattan method.
- minkowski(X_train, X_test, i, j, p = 3) → find the distance with the Minkowski method.
- supremum(X_train, X_test, i, j) → find the distance with the Supremum method.

- closest_neighbor(train_data, validate_data,k, method, debug) → to find the closest neighbor.
- kNN(train_data, validate_data, k, method, debug, run_as) → process the kNN algorithm.
- confussion_matrix(trained) → confusion matrix to evaluate the model (k value).
- training_model(data, method, debug, run_as, reScale_method, fold_total) → making a model from kNN
- test_prediction(data, test_data, k_value, method, debug, run_as, reScale_method, model_index,via) → predicting the ‘test’ database (to predict y value)
- model_report(knn_method, optimal_k, reScale_method, fold_total, end_time, start_time, model_grade) → To show the model report.

Output of the Program

The description of the data.

	id	x1	x2	x3	y
count	296.000000	296.000000	296.000000	296.000000	296.000000
mean	148.500000	52.462838	62.881757	4.111486	0.736486
std	85.592056	10.896367	3.233753	7.291816	0.441285
min	1.000000	30.000000	58.000000	0.000000	0.000000
25%	74.750000	44.000000	60.000000	0.000000	0.000000
50%	148.500000	52.000000	63.000000	1.000000	1.000000
75%	222.250000	61.000000	65.250000	5.000000	1.000000
max	296.000000	83.000000	69.000000	52.000000	1.000000

The detail of ‘y’ value.

```
1    218
0     78
Name: y, dtype: int64
```

Standardization scaling

	id	x1	x2	x3	y
0	1	0.691713	0.345804	-0.563849	1
1	2	0.141071	-0.891149	0.944691	0
2	3	1.150582	-0.272673	2.453232	0
3	4	-1.694403	-0.891149	-0.563849	1
4	5	-1.327308	1.891995	2.316092	0
...	...	...	...	...	...
291	292	0.599940	0.345804	-0.426709	1
292	293	1.150582	1.273518	-0.563849	1
293	294	0.049297	0.655042	1.081831	0
294	295	0.416392	0.345804	-0.426709	0
295	296	0.141071	-1.200388	0.396131	1

296 rows × 5 columns

Data describing after we do standardization scaling

Model configuration

```
<Model configuration>
Algorithm : KNN
Distance Method : eu
K Value : 3
Scaling Method : std
Cross-Validation : 8 folds
Training Time : 32.488822460174565
Model Quality :
<-> Accuracy : 91.66666666641203
<-> Precision : 93.54838709647242
<-> Specificity : 66.66666666555555
<-> Recall : 96.66666666634444
<-> F1 : 95.08196721275303
<-> Miss_Rate : 0.03333333333322223
<-> Accuracy_Balance : 81.66666666595
<-> Mathew_Correlation : 0.6825001477017434
<-> Confussion Matrix
    29  2
    1   4
```

Model training


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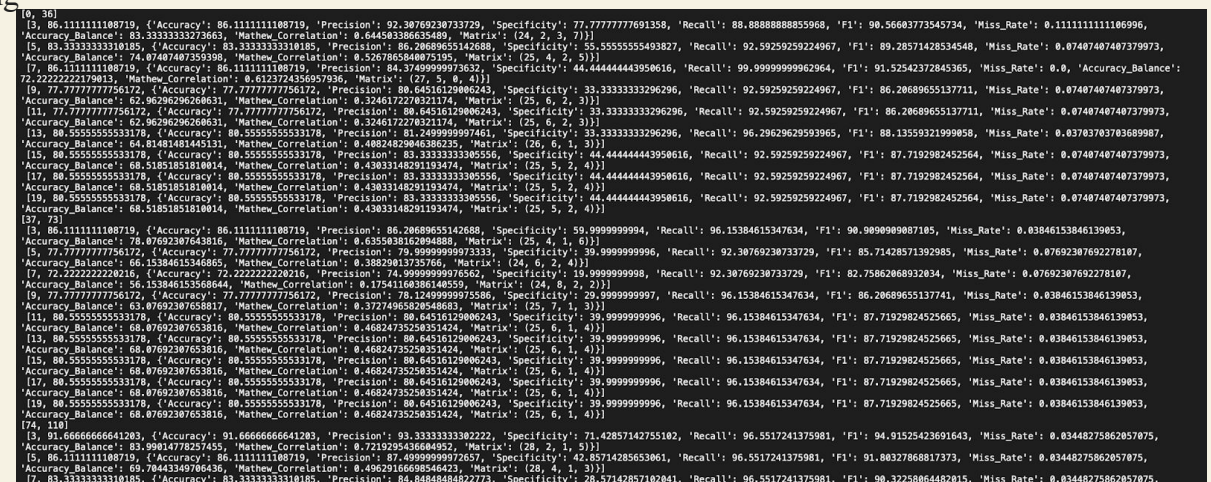
```

Model training



Prediction

	id	x1	x2	x3	y
0	297	-1.166456	-0.795495	0.393919	1
1	298	1.843752	1.060660	-1.181758	1
2	299	0.714924	-0.530330	1.181758	0
3	300	-0.413904	0.265165	1.181758	0
4	301	-0.915605	-0.530330	-1.181758	1
5	302	0.213223	-1.060660	-0.393919	1
6	303	0.464074	1.060660	1.181758	0
7	304	-1.291881	1.856155	-0.393919	1
8	305	-0.288478	-0.795495	0.393919	1
9	306	0.840350	-0.530330	-1.181758	1

Result

Thank you!