Faculty of Computers and Artificial Intelligence

AI Department

2023/2024

Machine Learning Project

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I. NUMERICAL DATASET

1. Project Introduction

a. Dataset Name

CO2 Emissions in Canada

b. Number of classes and their labels

N/A

c. Dataset Samples Numbers

Total number of samples: (6720x7)

d. Training, Validation and Testing

Number of samples used in training: (80% of the dataset)
Number of samples used in testing: (20% of the dataset)

2. Implementation Details

a. Extracted Features

'Year', 'Engine Size(L)', 'Cylinders', 'Fuel Consumption Comb (L/100 km)', 'CO2 Emissions(g/km)'

b. Cross-validation

Cross-validation used: NO

c. Linear Regression

℘ Hyper-parameters

Hyper-parameters:
Initial learning rate: N/A
Optimizer: N/A
Regularization: ridge
Batch size: N/A
Number of epochs: N/A

d. K-Nearest Neighbors (KNN)

℘ Hyper-parameters

Number of neighbors: (3)
Leve size 10
'algorithm': 'auto', 'leaf_size': 10, 'n_neighbors': 3, 'p': 1, 'weights': 'distance'

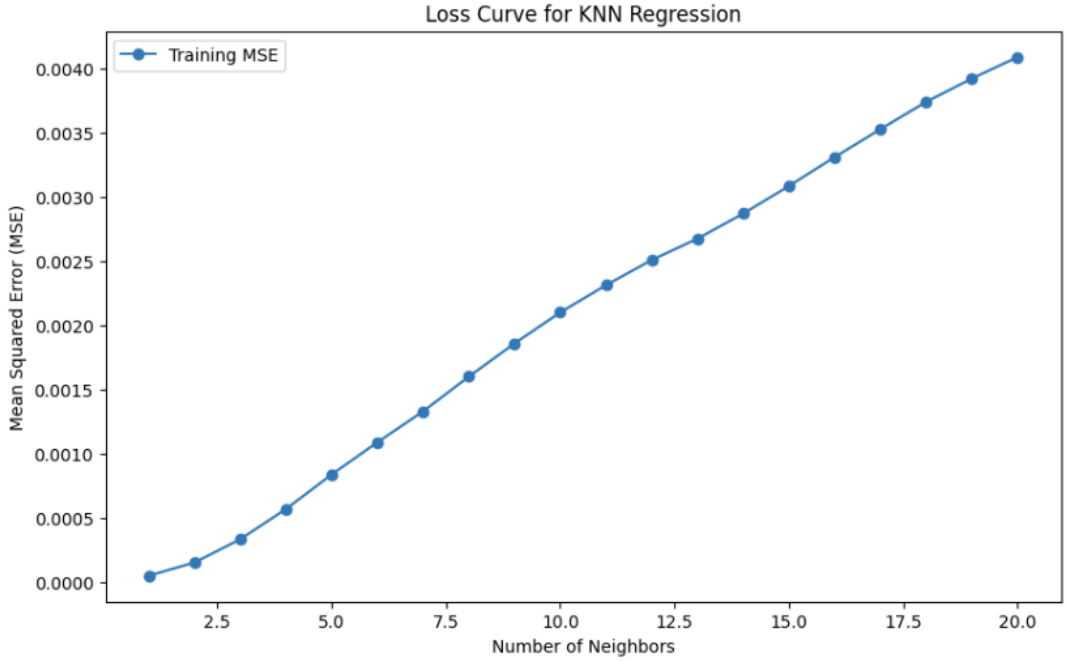
3. Models Results

a. Linear Regression Results:

- **Loss curve: N/A**
- **Accuracy: 99.3%**
- **Confusion matrix: N/A**
- **ROC curve: N/A**
- **Mean Squared error: 0.00022827852243677196**

b. KNN Results:

- **Loss curve:**



- **Accuracy: 97.59188589981756**
- **Confusion matrix: N/A**

- **ROC curve: N/A**
- **Mean Squared error: 0.00075274698553121 05**

II. IMAGE DATASET

1. Project Introduction

a. Dataset Name

Tomato Image Dataset

b. Number of classes and their labels

Number of classes: 2 (Reject, Unripe)

c. Dataset Images Numbers and size

- Total number of images in the dataset: 1600 (800 Reject, 800 Unripe)
- Size of each image: 128x128 pixels

d. Training, Validation and Testing

- Number of images used in training: 1120
- Number of images used in testing: 480

2. Implementation Details

a. Extracted Features

- HOG features were extracted, including their names and dimensions.

b. Cross-validation

Cross-validation is used with 5 folds for model evaluation.

c. Logistic Regression

℘ Hyper-parameters

- Initial learning rate: Not explicitly specified in the provided code.
- Optimizer: Liblinear (default for LogisticRegression)
- Regularization: L2 regularization (default for LogisticRegression)
- Batch size: Not applicable
- Number of epochs: Not applicable

d. K-Means

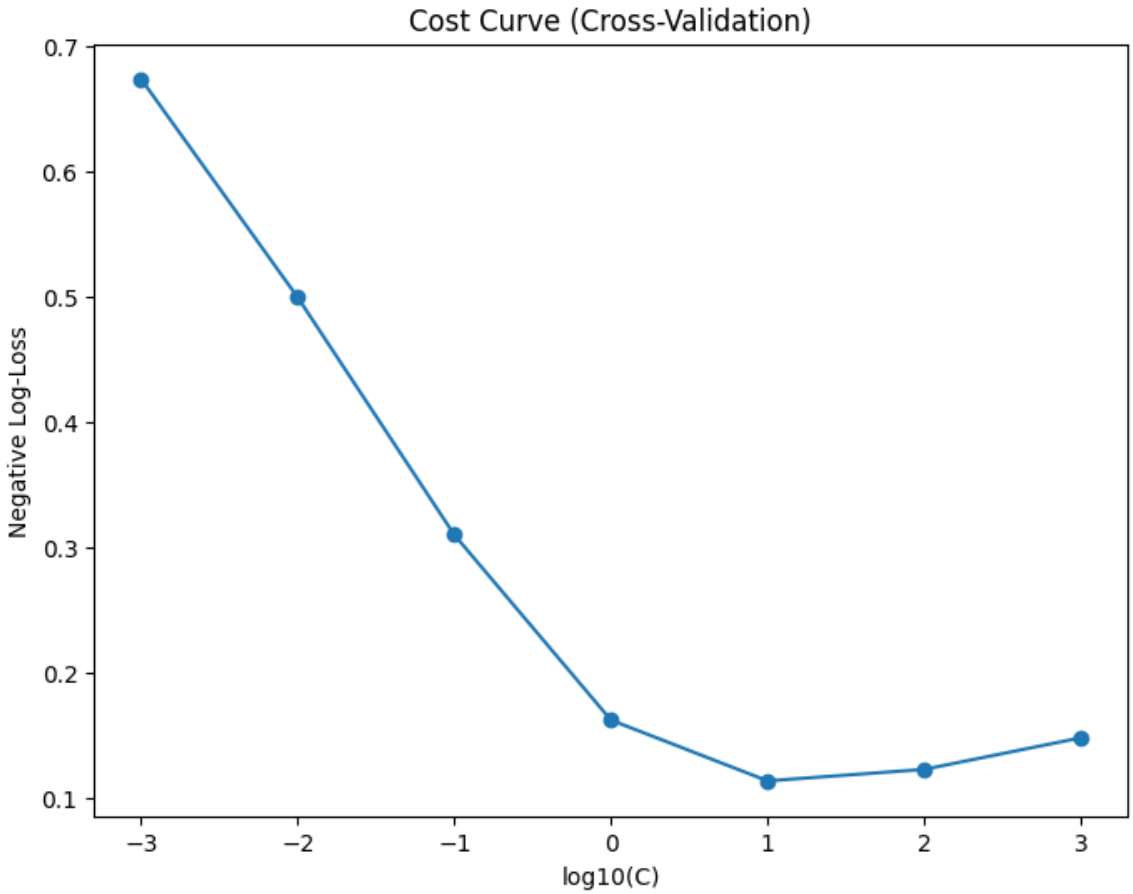
℘ Hyper-parameters

- Number of clusters (n_clusters): 2
- Initialization runs (n_init): 10
- Random state: 42

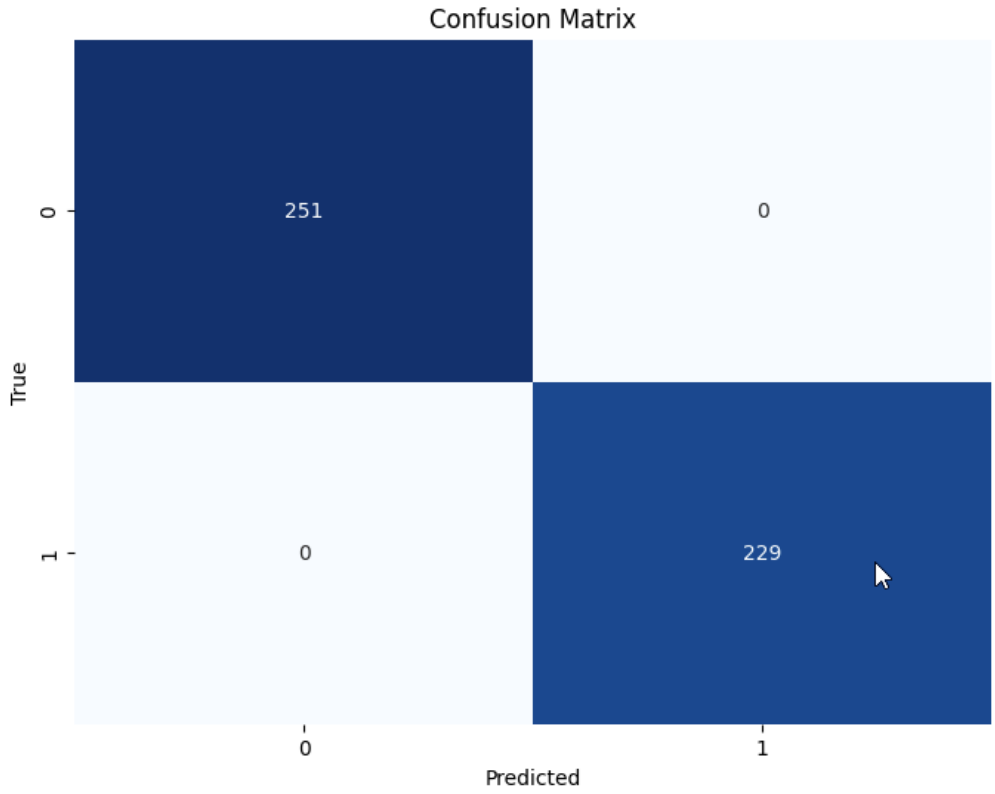
3. Models Results

a. Logistic Regression Results

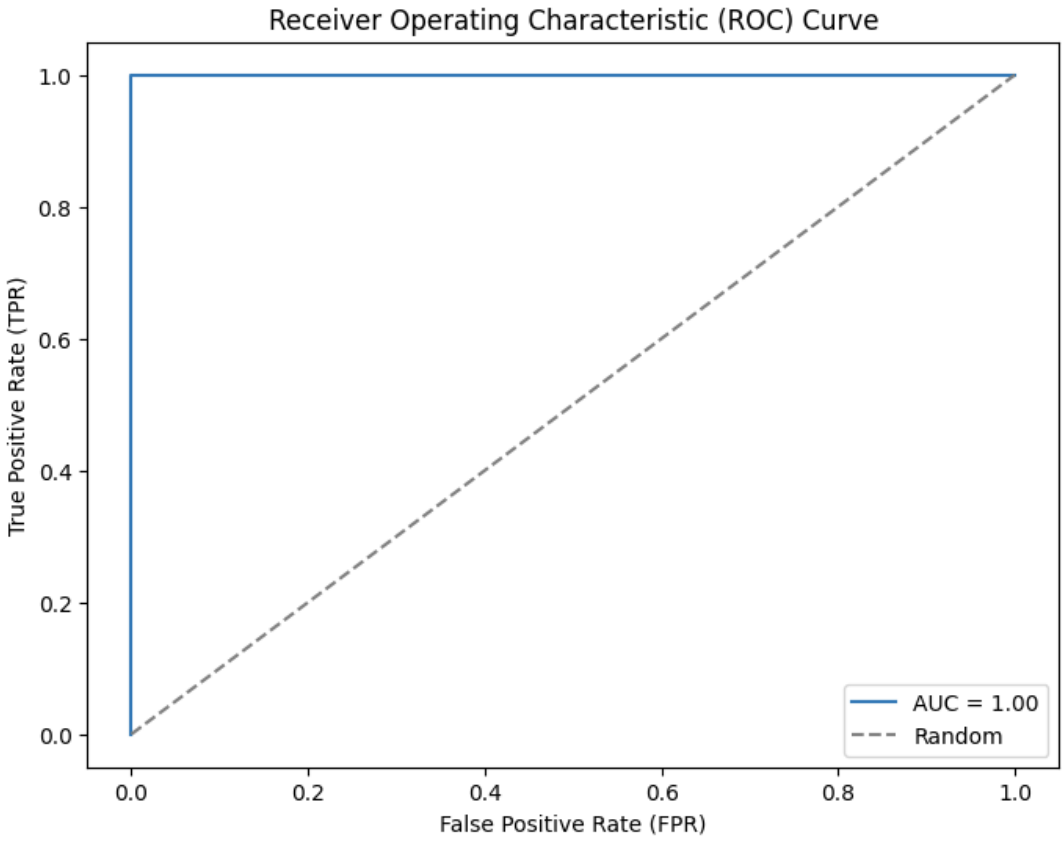
- **Loss curve:**



- **Accuracy: 97.92%**
- **Confusion matrix:**

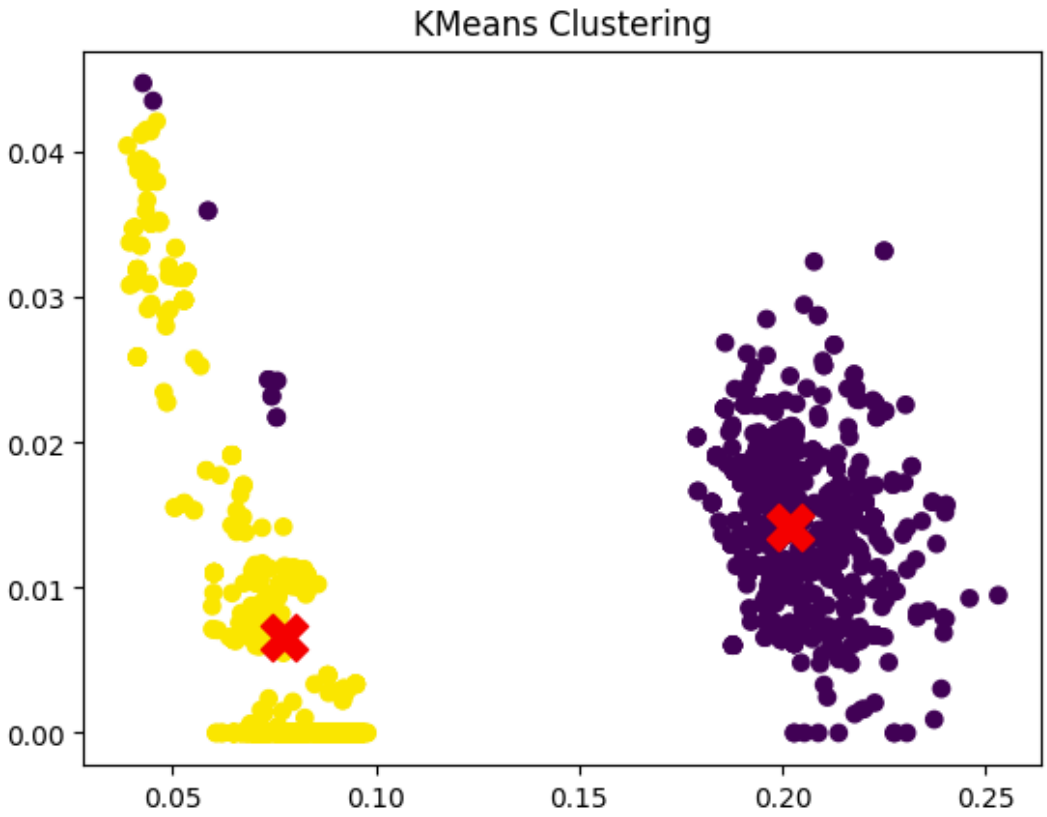

Confusion Matrix
251
0
0
229
True
0
1
0
1
Predicted

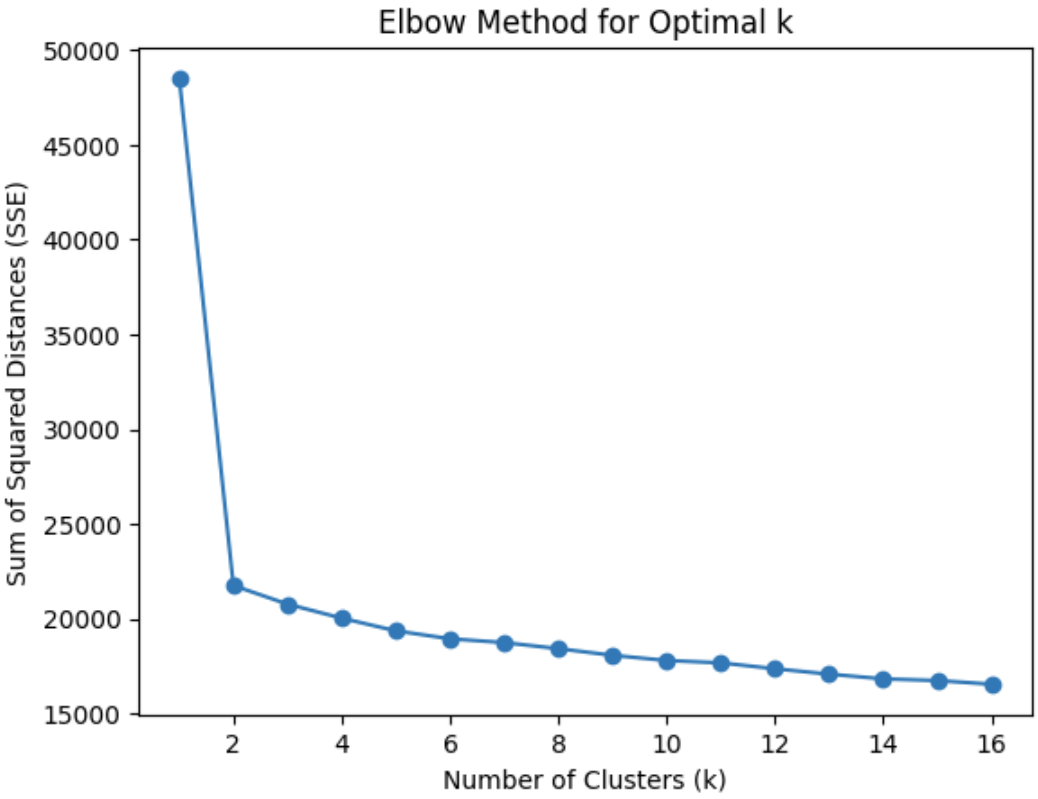
- **ROC curve:**



b.K-Means Results

- **Loss curve: N/A**
- **Confusion matrix: N/A**
- **ROC curve: N/A**
- **Silhouette Score: 0.470104236699423 97**


KMeans Clustering
0.04
0.03
0.02
0.01
0.00
0.05
0.10
0.15
0.20
0.25


Elbow Method for Optimal k
Sum of Squared Distances (SSE)
Number of Clusters (k)
50000
45000
40000
35000
30000
25000
20000
15000
2
4
6
8
10
12
14
16