**1. Introduction**

This report examines a C program written for data analysis and model training. The program reads a dataset to perform data analysis, then trains a decision tree model and tests this model.

**2. Data Analysis Function**

The **Explore Data** module at the beginning of the program performs simple data analysis by reading the dataset and printing each example to the screen. Each example includes x and y coordinates along with a class label.

**3. Model Training Function**

The **Train Model** module of the program trains a decision tree model using the dataset. For model training, it classifies regions derived from x and y coordinates in the dataset. This function calculates which class is more prevalent in each region by splitting the dataset. Then, it determines the best split point and classes. This process is performed over all combinations of the dataset.

**4. Model Testing Function**

The **Test Model** module of the program tests the trained decision tree model. The model is tested with a different portion of the dataset. Each tested example is classified based on the determined best split point. The results are reported as the model's success rate and error amount.

here are a few output examples:
for explore data:

```
[ahmet@Ahmet-MacBook-Pro HOMEWORK2 % ./main
Class 0: X in [1 48], Y in [3 45]
Class 1: X in [5 49], Y in [8 49]
1. Explore Data
2. Train Model
3. Test Model
4. Exit
Please enter a module from the list: 1
10 20 1
25 45 0
5 30 1
35 10 0
20 25 1
40 15 0
15 35 0
30 5 0
45 40 1
12 18 1
28 42 1
8 32 0
38 8 0
18 22 1
48 12 0
13 33 0
33 3 0
43 46 1
14 27 1
29 47 1
3 37 0
42 6 1
17 23 0
47 16 0
22 28 1
32 48 1
2 39 0
41 4 1
16 24 0
46 17 0
21 29 1
31 49 1
1 40 0
39 7 1
19 21 0
49 14 1
11 19 0
27 43 1
7 31 0
37 9 1
23 26 0
43 0 1
18 22 0
48 13 1
13 33 0
28 42 1
8 32 0
38 8 1
18 22 0
48 12 1
1. Explore Data
2. Train Model
3. Test Model
4. Exit
Please enter a module from the list:
```

For Train model:

```
Please enter a module from the list: 2
bestSepxX -> 15
bestSepY -> 27
bestR1 -> 0
bestR2 -> 1
bestR3 -> 1
bestR4 -> 0
xMax -> 49
xMin -> 1
yMax -> 49
yMin -> 3
bestError -> 14
1. Explore Data
2. Train Model
3. Test Model
4. Exit
Please enter a module from the list:
```

For Test Model:

```
Please enter a module from the list: 3
error -> 2, count -> 12
success rate -> 83.00
1. Explore Data
2. Train Model
3. Test Model
4. Exit
Please enter a module from the list:
```