```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

```
data = pd.read_csv("/content/sample_data/mission7.csv")
```

```
data.head()
```

	Soil Type	Sunlight (hours/day)	Water Supply (liters/week)	Temperature (Â°C)	pH Level	Plant Species	Thrives
0	Clay	11	10	30	6.1	Lily	Yes
1	Sandy	11	28	26	7.0	Fern	No
2	Clay	6	9	25	5.7	Cactus	Yes
3	Clay	4	24	17	5.5	Fern	Yes
4	Sandy	11	6	20	7.1	Rose	No

```
data.duplicated().sum()
```

```
900
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 7 columns):
 #   Column                      Non-Null Count  Dtype  
---  ------                      --------------  -----  
 0   Soil Type                   1000 non-null   object 
 1   Sunlight (hours/day)        1000 non-null   int64  
 2   Water Supply (liters/week)  1000 non-null   int64  
 3   Temperature (Â°C)           1000 non-null   int64  
 4   pH Level                    1000 non-null   float64
 5   Plant Species               1000 non-null   object 
 6   Thrives                     1000 non-null   object 
dtypes: float64(1), int64(3), object(3)
memory usage: 54.8+ KB
```

```
from sklearn.preprocessing import LabelEncoder, StandardScaler
```

```
data.columns
```

```
Index(['Soil Type', 'Sunlight (hours/day)', 'Water Supply (liters/week)',
       'Temperature (Â°C)', 'pH Level', 'Plant Species', 'Thrives'],
      dtype='object')
```

```
data['Thrives'] = data['Thrives'].map({"Yes":1, "No": 0})
```

```
encode_cols = ['Soil Type', 'Plant Species']
```

```
le = {}
for col in encode_cols:
  le[col] = LabelEncoder()
  data[col] = le[col].fit_transform(data[col])
```

```
le
```

```
{'Soil Type': LabelEncoder(), 'Plant Species': LabelEncoder()}
```

```
data.head()
```

	Soil Type	Sunlight (hours/day)	Water Supply (liters/week)	Temperature (Â°C)	pH Level	Plant Species	Thrives
0	0	11	10	30	6.1	2	1
1	2	11	28	26	7.0	1	0
2	0	6	9	25	5.7	0	1
3	0	4	24	17	5.5	1	1
4	2	11	6	20	7.1	4	0

```
from sklearn.preprocessing import StandardScaler
scale_cols = ['Sunlight (hours/day)', 'Water Supply (liters/week)',
       'Temperature (Â°C)', 'pH Level',]
scaler = StandardScaler()
data[scale_cols] = scaler.fit_transform(data[scale_cols])
```

```
data.head()
```

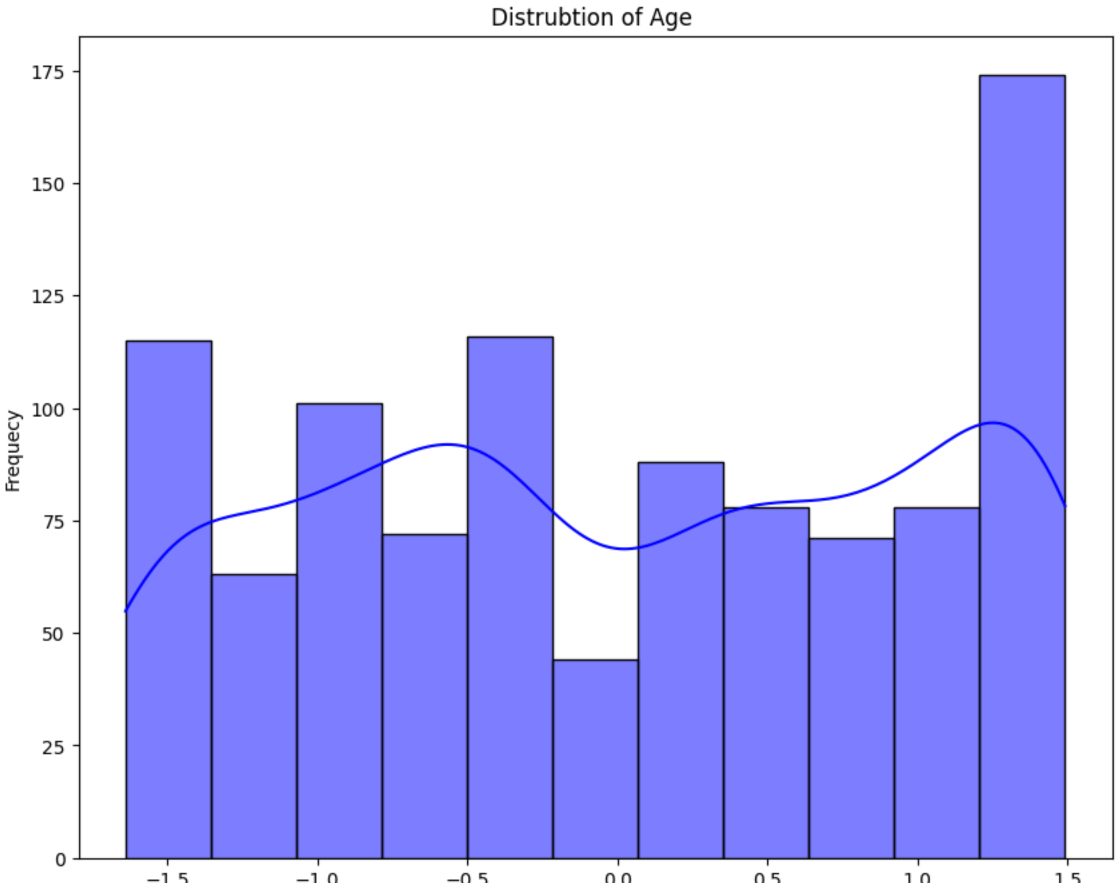
	Soil Type	Sunlight (hours/day)	Water Supply (liters/week)	Temperature (Â°C)	pH Level	Plant Species	Thrives
0	0	1.146992	-0.826136	1.463304	-0.683192	2	1
1	2	1.146992	1.403317	0.654178	0.480238	1	0
2	0	-0.710184	-0.949995	0.451897	-1.200272	0	1
3	0	-1.453055	0.907883	-1.166355	-1.458812	1	1
4	2	1.146992	-1.321570	-0.559511	0.609508	4	0

```
data.describe()
```

	Soil Type	Sunlight (hours/day)	Water Supply (liters/week)	Temperature (Â°C)	pH Level	Plant Species	Thrives
count	1000.00000	1.000000e+03	1.000000e+03	1.000000e+03	1.000000e+03	1000.000000	1000.00000
mean	1.03200	3.730349e-17	-2.202682e-16	3.517187e-16	1.563194e-16	2.000000	0.50000
std	0.79976	1.000500e+00	1.000500e+00	1.000500e+00	1.000500e+00	1.384889	0.50025
min	0.00000	-1.453055e+00	-1.445429e+00	-1.570918e+00	-1.458812e+00	0.000000	0.00000
25%	0.00000	-7.101844e-01	-9.499947e-01	-7.617920e-01	-8.124620e-01	1.000000	0.00000
50%	1.00000	3.268631e-02	1.647318e-01	4.733387e-02	-3.684195e-02	2.000000	0.50000
75%	2.00000	7.755570e-01	9.078828e-01	8.564598e-01	8.680481e-01	3.000000	1.00000
max	2.00000	1.518428e+00	1.651034e+00	1.463304e+00	1.772938e+00	4.000000	1.00000

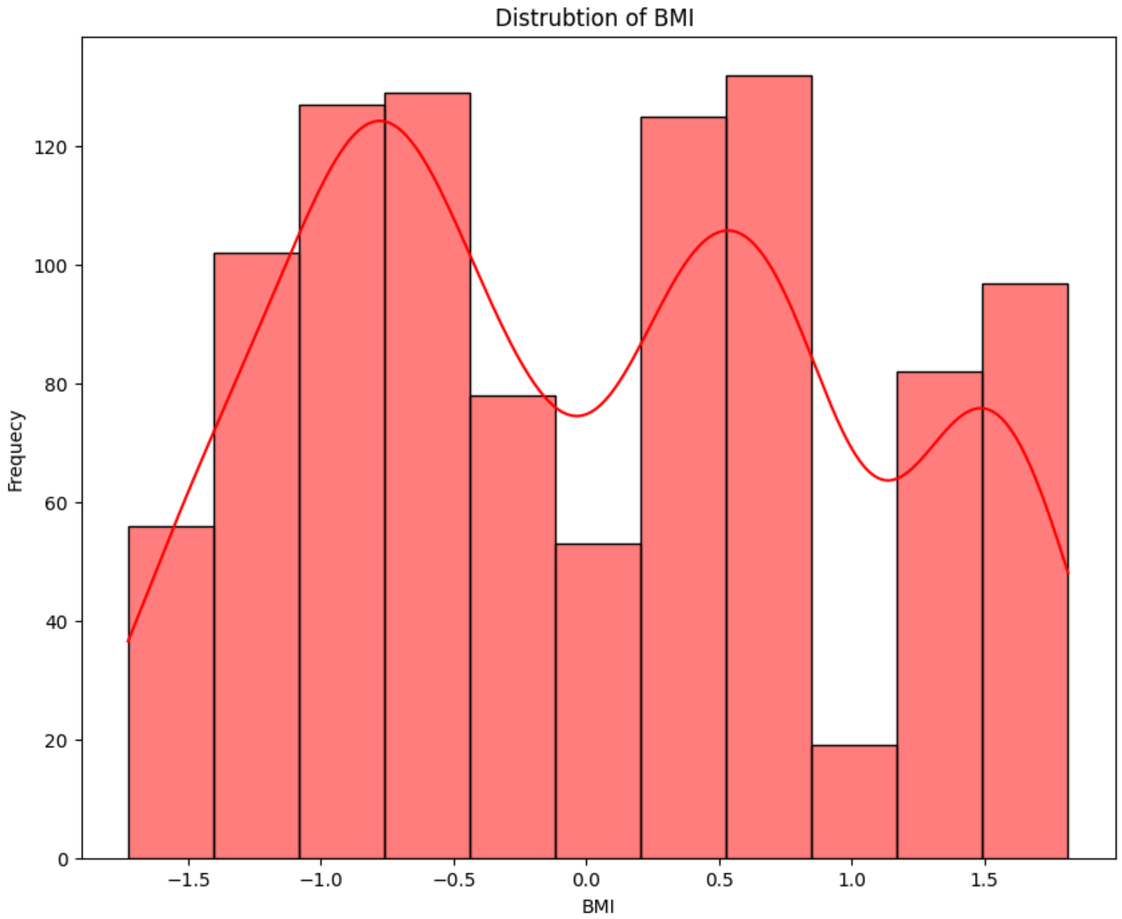
```
plt.figure(figsize=(10,8))
sns.histplot(data['Age'], color="Blue", kde=True)
plt.title("Distrubtion of Age ")
plt.xlabel("Age")
plt.ylabel("Frequecy")
```

```
Text(0, 0.5, 'Frequecy')
```



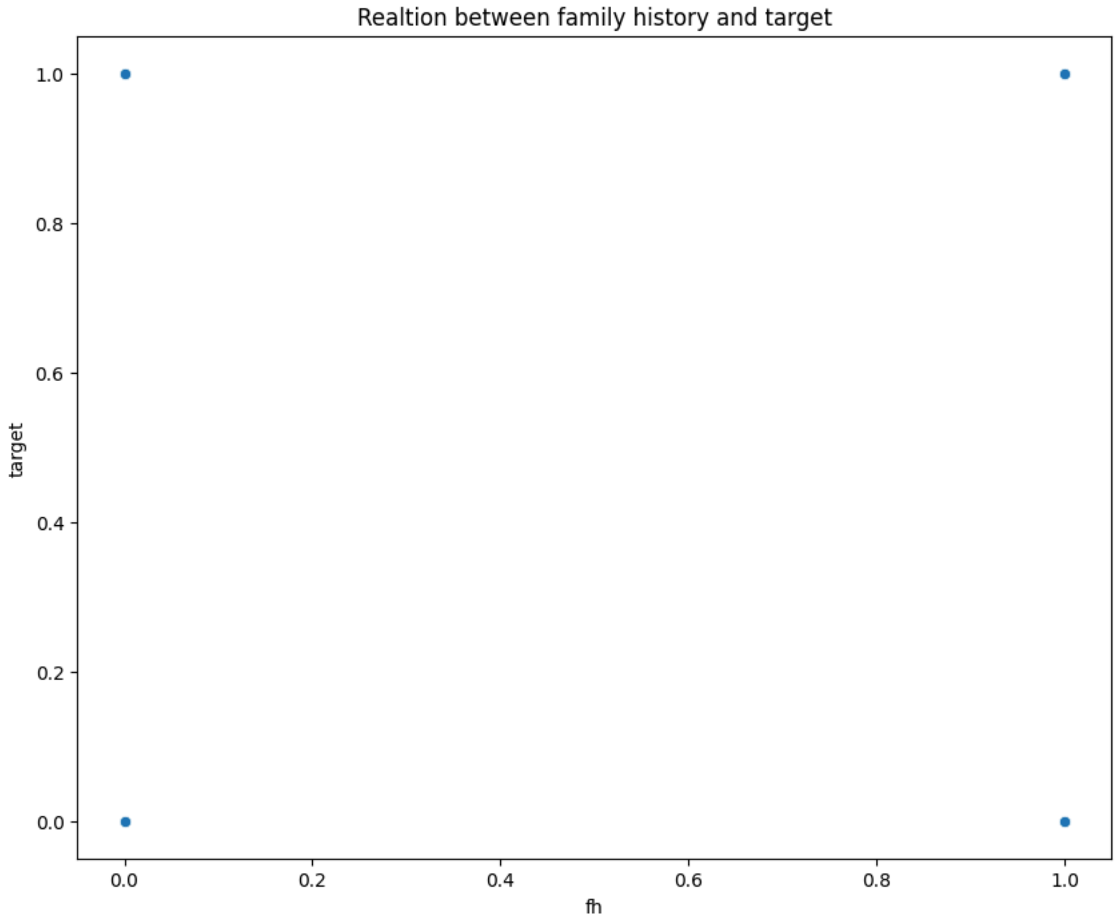
```
plt.figure(figsize=(10,8))
sns.histplot(data['BMI'], color="Red", kde=True)
plt.title("Distrubtion of BMI ")
plt.xlabel("BMI")
plt.ylabel("Frequecy")
```

```
Text(0, 0.5, 'Frequecy')
```



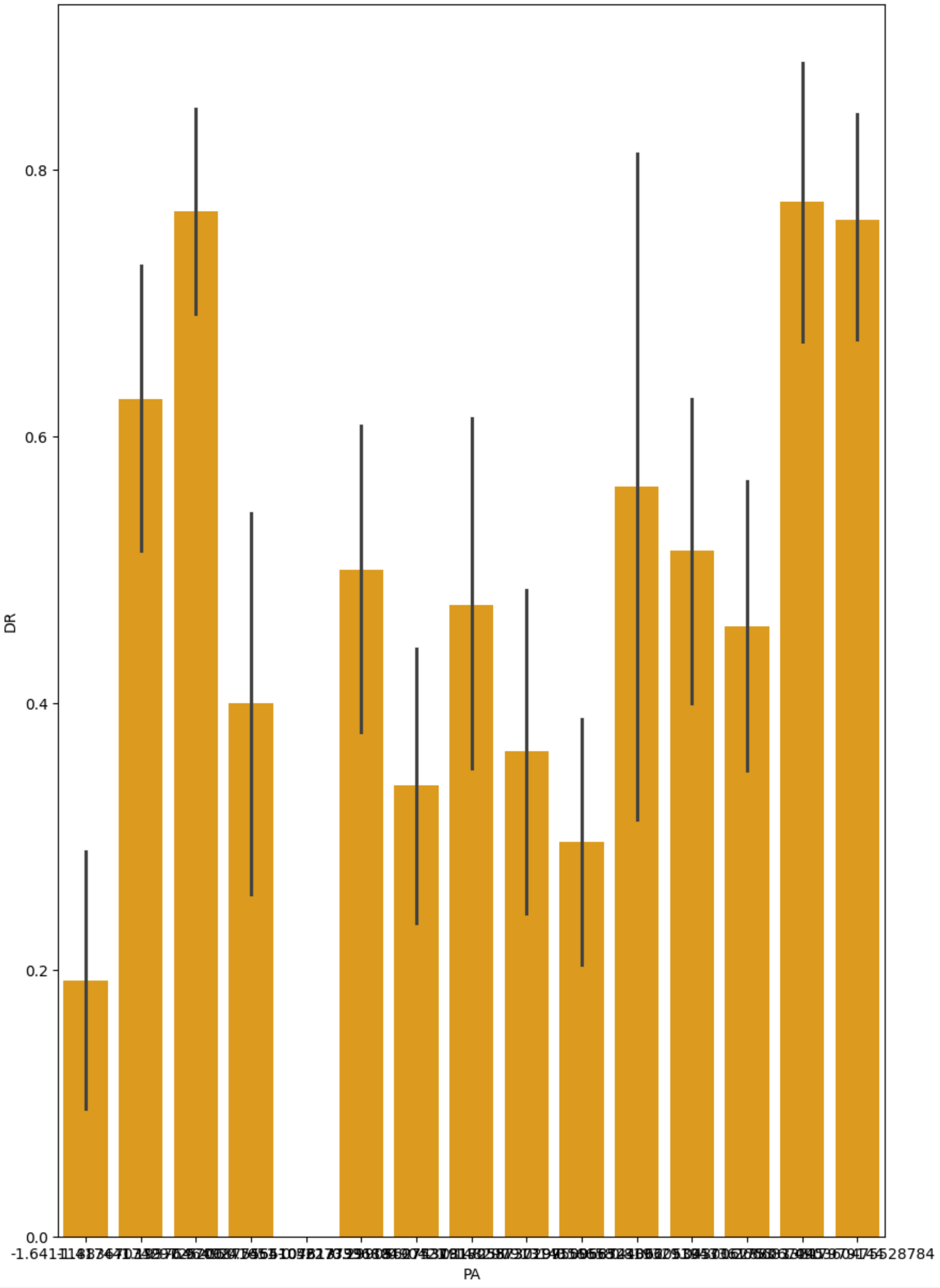
```
plt.figure(figsize=(10, 8))
sns.scatterplot(x=data['Family History'], y=data['Diabetes Risk'])
plt.title("Realtion between family history and target")
plt.xlabel('fh')
plt.ylabel('target')
```

```
Text(0, 0.5, 'target')
```



```
plt.figure(figsize=(10, 15))
sns.barplot(x=data['Physical Activity (hours/week)'], y = data['Diabetes Risk'], color="orange")
plt.xlabel('PA')
plt.ylabel('DR')
```

```
Text(0, 0.5, 'DR')
```



```
x = data.drop('Thrives', axis=1)
y = data['Thrives']
```

```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.2, random_state=42)
```

```
from sklearn.tree import DecisionTreeClassifier
from sklearn.linear_model import LogisticRegression
```

```
lo  = LogisticRegression()
lo.fit(x_train, y_train)
dt = DecisionTreeClassifier()
dt.fit(x_train, y_train)
```

```
▾ DecisionTreeClassifier ⓘ ?
DecisionTreeClassifier()
```

```
y_pred_lo = lo.predict(x_test)
y_pred_dt = dt.predict(x_test)
```

```
from sklearn.metrics import accuracy_score, confusion_matrix, classification_report
# for Lo
print("accuracy = ", accuracy_score(y_test, y_pred_lo))
print("Confusion matrix:", confusion_matrix(y_test, y_pred_lo))
print("classfication report:", classification_report(y_test, y_pred_lo))
```

```
accuracy =  0.695
Confusion matrix: [[64 33]
 [28 75]]
classfication report:               precision    recall  f1-score   support

           0       0.70      0.66      0.68        97
           1       0.69      0.73      0.71       103

    accuracy                           0.69       200
   macro avg       0.70      0.69      0.69       200
weighted avg       0.70      0.69      0.69       200
```

```
# for dt
print("accuracy = ", accuracy_score(y_test, y_pred_dt))
print("Confusion matrix:", confusion_matrix(y_test, y_pred_dt))
print("classfication report:", classification_report(y_test, y_pred_dt))
```

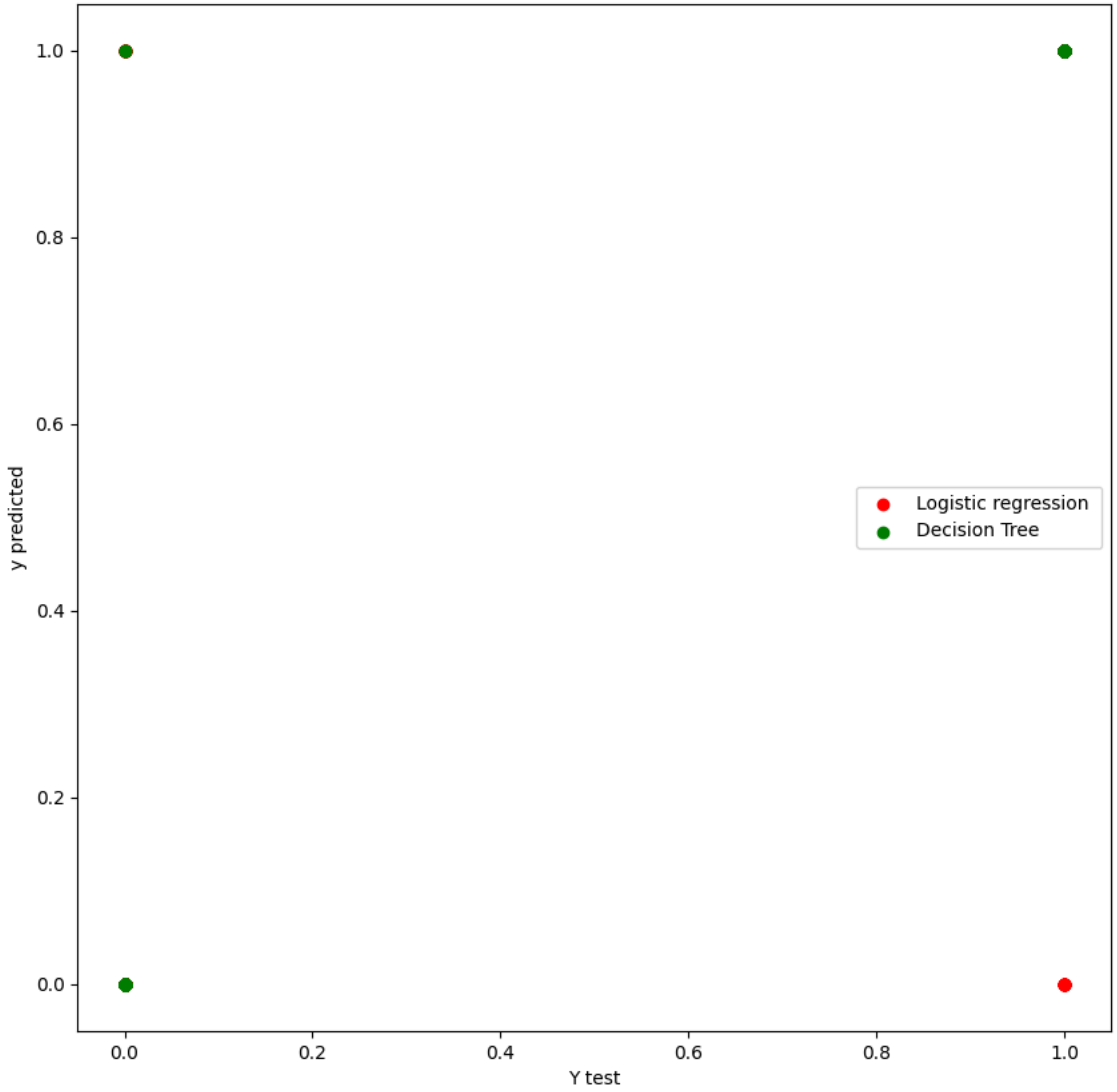
```
accuracy =  0.985
Confusion matrix: [[ 94   3]
 [  0 103]]
classfication report:               precision    recall  f1-score   support

           0       1.00      0.97      0.98        97
           1       0.97      1.00      0.99       103

    accuracy                           0.98       200
   macro avg       0.99      0.98      0.98       200
weighted avg       0.99      0.98      0.98       200
```

```
plt.figure(figsize=(10, 10))
plt.scatter(x = y_test, y = y_pred_lo, color="red", label="Logistic regression ")
plt.scatter(x = y_test, y = y_pred_dt, color="green", label="Decision Tree")
plt.xlabel("Y test")
plt.ylabel("y predicted")
plt.legend()
```

```
<matplotlib.legend.Legend at 0x79fb42b2fb10>
```



```
# using grid search cv for lo
from sklearn.model_selection import GridSearchCV, RandomizedSearchCV
grid_param = {'max_iter': [30, 40, 50]}
grid_search_model = GridSearchCV(lo,grid_param, cv=5)
grid_search_model.fit(x_train, y_train)
print(grid_search_model.best_params_)
grid_search_model.best_score_
```

```
{'max_iter': 30}
0.61875
```

```
random_param = {'max_depth': [5,10, 20, 30, 40, 50]}
random_search_model = RandomizedSearchCV(dt,random_param, cv=5)
random_search_model.fit(x_train, y_train)
print(random_search_model.best_params_)
random_search_model.best_score_
```

```
{'max_depth': 20}
/usr/local/lib/python3.11/dist-packages/sklearn/model_selection/_search.py:317: UserWarning: The total space of parameters 6 is smaller
  warnings.warn(
1.0
```

```
!pip install gradio
```

```
Collecting gradio
  Downloading gradio-5.12.0-py3-none-any.whl.metadata (16 kB)
Collecting aiofiles<24.0,>=22.0 (from gradio)
  Downloading aiofiles-23.2.1-py3-none-any.whl.metadata (9.7 kB)
```

```
Requirement already satisfied: anyio<5.0,>=3.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (3.7.1)
Collecting fastapi<1.0,>=0.115.2 (from gradio)
  Downloading fastapi-0.115.6-py3-none-any.whl.metadata (27 kB)
Collecting ffmpy (from gradio)
  Downloading ffmpy-0.5.0-py3-none-any.whl.metadata (3.0 kB)
Collecting gradio-client==1.5.4 (from gradio)
  Downloading gradio_client-1.5.4-py3-none-any.whl.metadata (7.1 kB)
Requirement already satisfied: httpx>=0.24.1 in /usr/local/lib/python3.11/dist-packages (from gradio) (0.28.1)
Requirement already satisfied: huggingface-hub>=0.25.1 in /usr/local/lib/python3.11/dist-packages (from gradio) (0.27.1)
Requirement already satisfied: jinja2<4.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (3.1.5)
Collecting markupsafe~=2.0 (from gradio)
  Downloading MarkupSafe-2.1.5-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (3.0 kB)
Requirement already satisfied: numpy<3.0,>=1.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (1.26.4)
Requirement already satisfied: orjson~=3.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (3.10.14)
Requirement already satisfied: packaging in /usr/local/lib/python3.11/dist-packages (from gradio) (24.2)
Requirement already satisfied: pandas<3.0,>=1.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (2.2.2)
Requirement already satisfied: pillow<12.0,>=8.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (11.1.0)
```