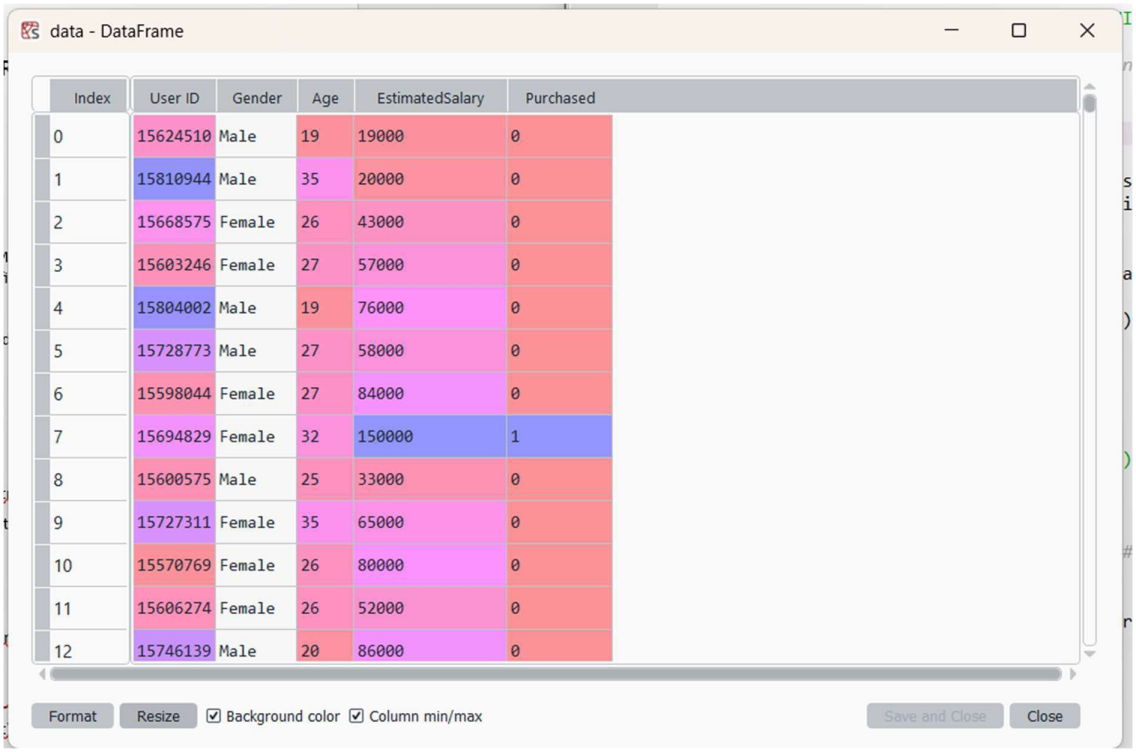
RandomForest-Classifier

#lets import libraries

import pandas as pd

#lets read the dataset

data=pd.read_csv(r"C:\Users\TharunMahendra\NIT\6.Algorithms\2.Classification\ClassificationData.csv")

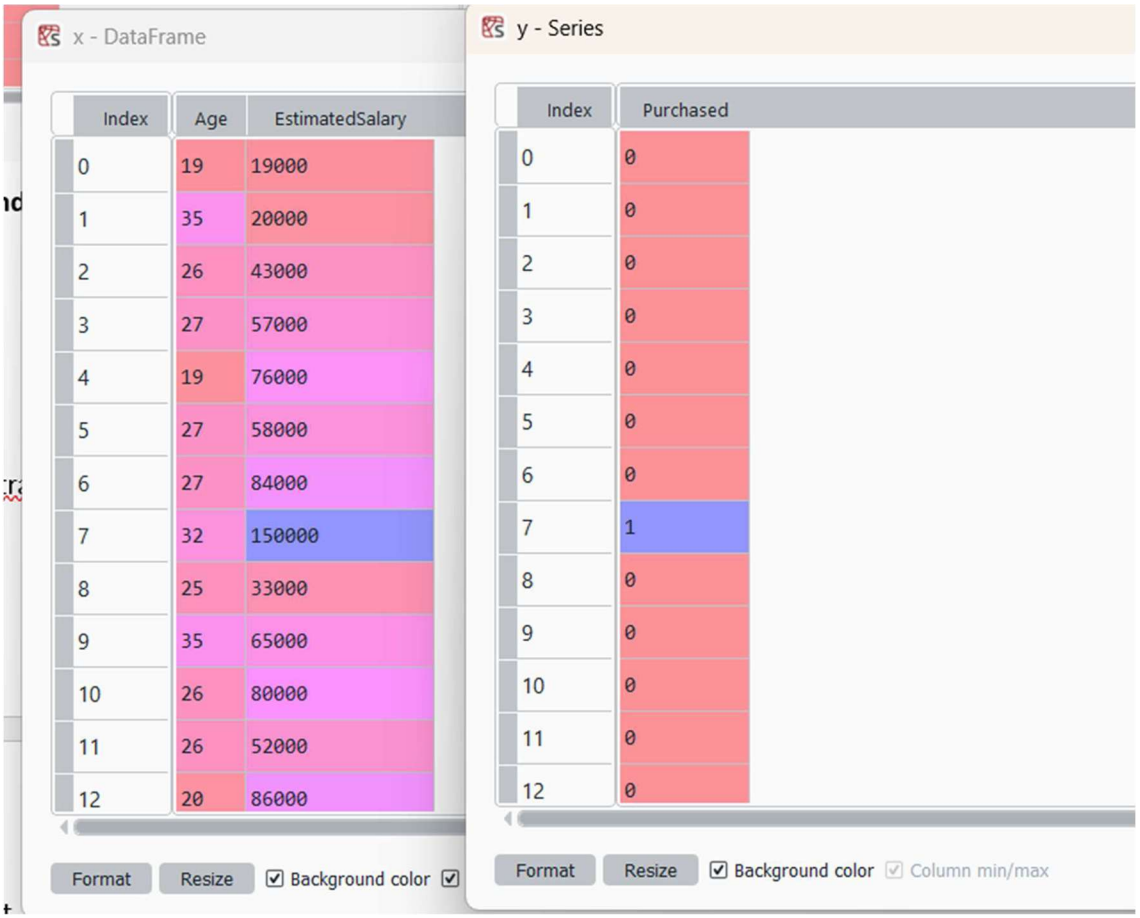


Index	User ID	Gender	Age	EstimatedSalary	Purchased
0	15624510	Male	19	19000	0
1	15810944	Male	35	20000	0
2	15668575	Female	26	43000	0
3	15603246	Female	27	57000	0
4	15804002	Male	19	76000	0
5	15728773	Male	27	58000	0
6	15598044	Female	27	84000	0
7	15694829	Female	32	150000	1
8	15600575	Male	25	33000	0
9	15727311	Female	35	65000	0
10	15570769	Female	26	80000	0
11	15606274	Female	26	52000	0
12	15746139	Male	20	86000	0

#lets divide them into dependent & independent

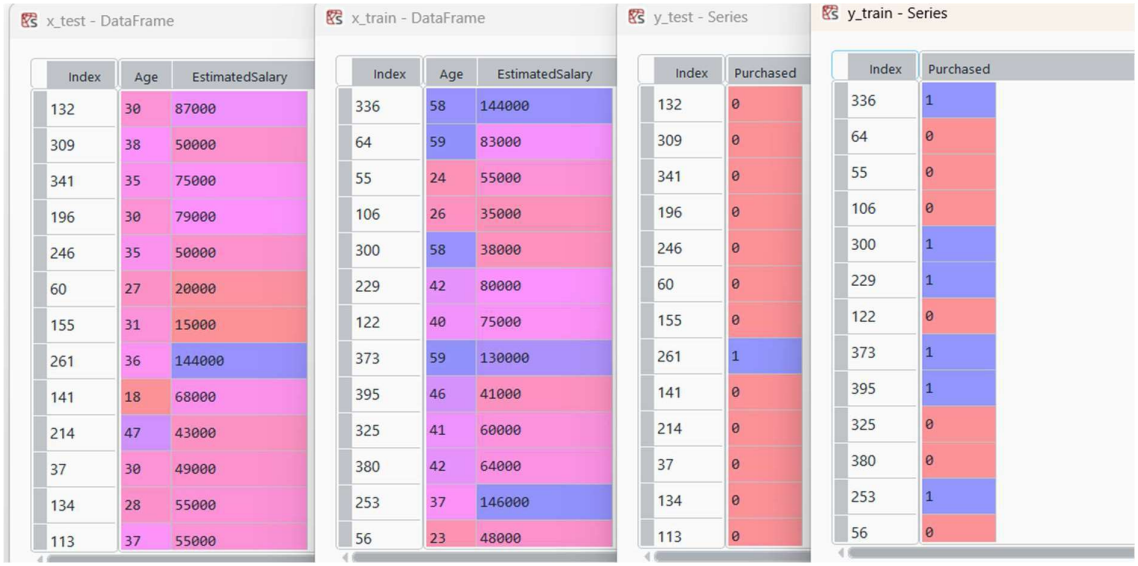
x=data.iloc[:,2:4] #age,salary

y=data.iloc[:,-1] #purchased



#splitting data

```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.20,
random_state=0)
```



x_test - DataFrame

Index	Age	EstimatedSalary
132	30	87000
309	38	50000
341	35	75000
196	30	79000
246	35	50000
60	27	20000
155	31	15000
261	36	144000
141	18	68000
214	47	43000
37	30	49000
134	28	55000
113	37	55000

x_train - DataFrame

Index	Age	EstimatedSalary
336	58	144000
64	59	83000
55	24	55000
106	26	35000
300	58	38000
229	42	80000
122	40	75000
373	59	130000
395	46	41000
325	41	60000
380	42	64000
253	37	146000
56	23	48000

y_test - Series

Index	Purchased
132	0
309	0
341	0
196	0
246	0
60	0
155	0
261	1
141	0
214	0
37	0
134	0
113	0

y_train - Series

Index	Purchased
336	1
64	0
55	0
106	0
300	1
229	1
122	0
373	1
395	1
325	0
380	0
253	1
56	0

#model building

```
from sklearn.ensemble import RandomForestClassifier
model=RandomForestClassifier(criterion='entropy',random_state=0,max_depth=7)
model.fit(x_train,y_train)
```

#prediction

```
y_pred=model.predict(x_test)
```

y_test - Series

Index	Purchased
132	0
309	0
341	0
196	0
246	0
60	0
155	0
261	1
141	0
214	0
37	0
134	0
113	0

y_pred - NumPy object array

	0
0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	1
8	0
9	1
10	0
11	0
12	0

#confusion Matrix

from sklearn.metrics import confusion_matrix

cm=confusion_matrix(y_test, y_pred)

cm - NumPy object array

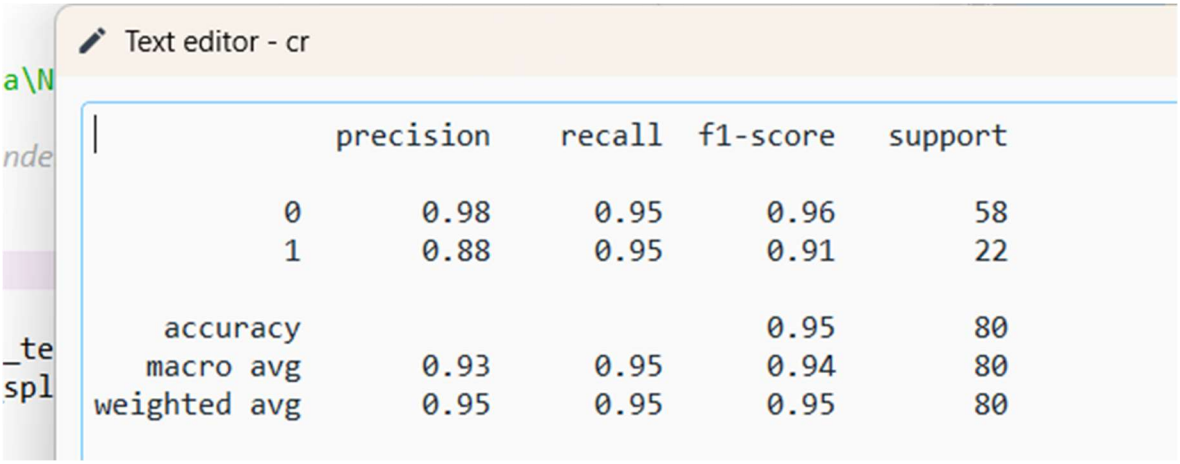
	0	1
0	55	3
1	1	21

from sklearn.metrics import accuracy_score

ac=**accuracy_score**(y_test,y_pred) ->**0.95**

from sklearn.metrics import classification_report

cr=classification_report(y_test,y_pred)



bias=model.score(x_train,y_train) **-> 0.9625**

variance=model.score(x_test,y_test)-**> 0.95**

Deployment Code

 # importing libraries

```
# importing libraries

import streamlit as st

import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

from sklearn.model_selection import train_test_split

from sklearn.ensemble import RandomForestClassifier

from sklearn.metrics
import(confusion_matrix,accuracy_score,classification_report,roc_curve,ro
c_auc_score)

import seaborn as sns


st.title("Random Forest Classifier")


# Uploading File

file=st.file_uploader('Upload Your File for Model Building',type=['csv'])

if file is not None:

    # Load

    data=pd.read_csv(file)

    st.write('- Preview')

    st.dataframe(data.head())


    # FeatureSelection

    x=data.iloc[:,2:4]
```

```
y=data.iloc[:,-1]

# SplittingData

x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.20,random_
state=0)

# model building

model=RandomForestClassifier(random_state=0,max_depth=7,criterion=
'entropy')

model.fit(x_train,y_train)



# prediction

y_pred=model.predict(x_test)

y_prob=model.predict_proba(x_test)[:,1]

# Metrics

st.subheader("Confusion Matrix")

cm = confusion_matrix(y_test, y_pred)

fig_cm, ax = plt.subplots()

sns.heatmap(cm, annot=True, fmt="d", cmap="Blues", ax=ax)

st.pyplot(fig_cm)


ac = accuracy_score(y_test, y_pred)

st.write(f"**Accuracy:** {ac:.2f}")


st.subheader("Classification Report")

st.text(classification_report(y_test, y_pred))
```

```
    st.write(f"**Training Accuracy (Bias):** {model.score(x_train, y_train):.2f}")
    st.write(f"**Testing Accuracy (Variance):** {model.score(x_test, y_test):.2f}")

    # ROC Curve and AUC
    fpr, tpr, _ = roc_curve(y_test, y_prob)
    auc_score = roc_auc_score(y_test, y_prob)
    st.write(f"**AUC Score:** {auc_score:.2f}")

    st.subheader("ROC Curve")
    fig_roc, ax = plt.subplots()
    ax.plot(fpr, tpr, color="blue", label=f"ROC curve (AUC = {auc_score:.2f})")
    ax.plot([0, 1], [0, 1], color="gray", linestyle="--")
    ax.set_xlabel("False Positive Rate")
    ax.set_ylabel("True Positive Rate")
    ax.set_title("ROC Curve")
    ax.legend(loc="lower right")
    st.pyplot(fig_roc)
```

Deployment code

localhost:8501

Deploy

Random Forest Classifier

Upload Your File for Model Building

Drag and drop file here
Limit 200MB per file • CSV

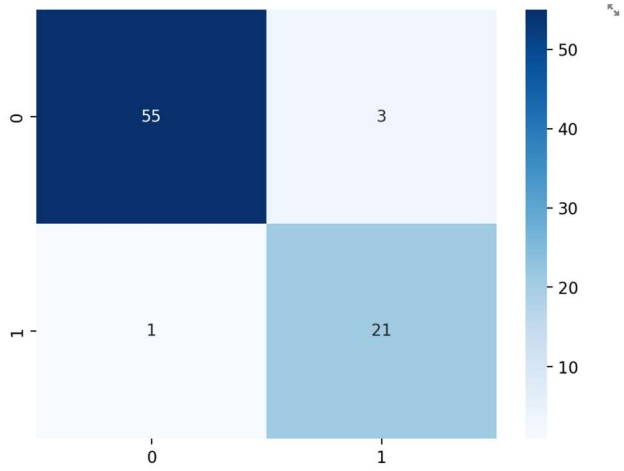
Browse files

ClassificationData.csv 10.7KB

- Preview

	User ID	Gender	Age	EstimatedSalary	Purchased
0	15,624,510	Male	19	19,000	0
1	15,810,944	Male	35	20,000	0
2	15,668,575	Female	26	43,000	0
3	15,603,246	Female	27	57,000	0
4	15,804,002	Male	19	76,000	0

Confusion Matrix



Accuracy: 0.95

Classification Report

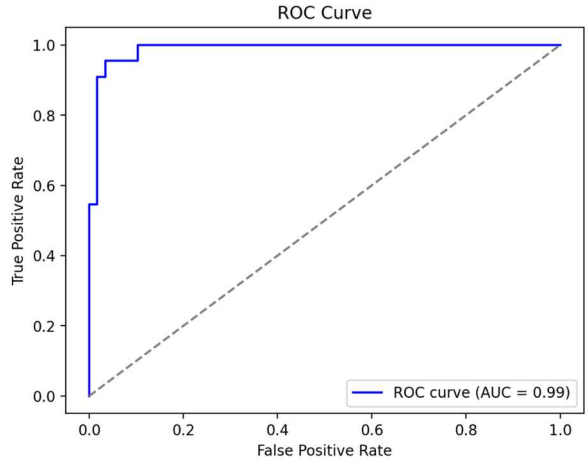
	precision	recall	f1-score	support
0	0.98	0.95	0.96	58
1	0.88	0.95	0.91	22
accuracy			0.95	80
macro avg	0.93	0.95	0.94	80
weighted avg	0.95	0.95	0.95	80

Training Accuracy (Bias): 0.96

Testing Accuracy (Variance): 0.95

AUC Score: 0.99

ROC Curve


ROC Curve
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
ROC curve (AUC = 0.99)

Random Forest Classification

Importing the libraries

In [12]:
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
```

Importing the dataset

In [13]:
```
dataset = pd.read_csv(r'C:\Users\TharunMahendra\NIT\6.Algorithms\2.Classificatio
X = dataset.iloc[:, [2, 3]].values
y = dataset.iloc[:, -1].values
```

Splitting the dataset into the Training set and Test set

In [14]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.25, rand
```

Feature Scaling

In [15]:
```
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
X_train = sc.fit_transform(X_train)
X_test = sc.transform(X_test)
```

Training the Random Forest Classification model on the Training set

In [16]:
```
from sklearn.ensemble import RandomForestClassifier
classifier = RandomForestClassifier(n_estimators = 10, criterion = 'entropy', ra
classifier.fit(X_train, y_train)
```

Out[16]:
```
RandomForestClassifier(criterion='entropy', n_estimators=10, random_sta
te=0)
```

Predicting the Test set results

In [17]:
```
y_pred = classifier.predict(X_test)
```

Making the Confusion Matrix

In [18]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, y_pred)
print(cm)
```

```
[[63  5]
 [ 4 28]]
```

Visualising the Training set results

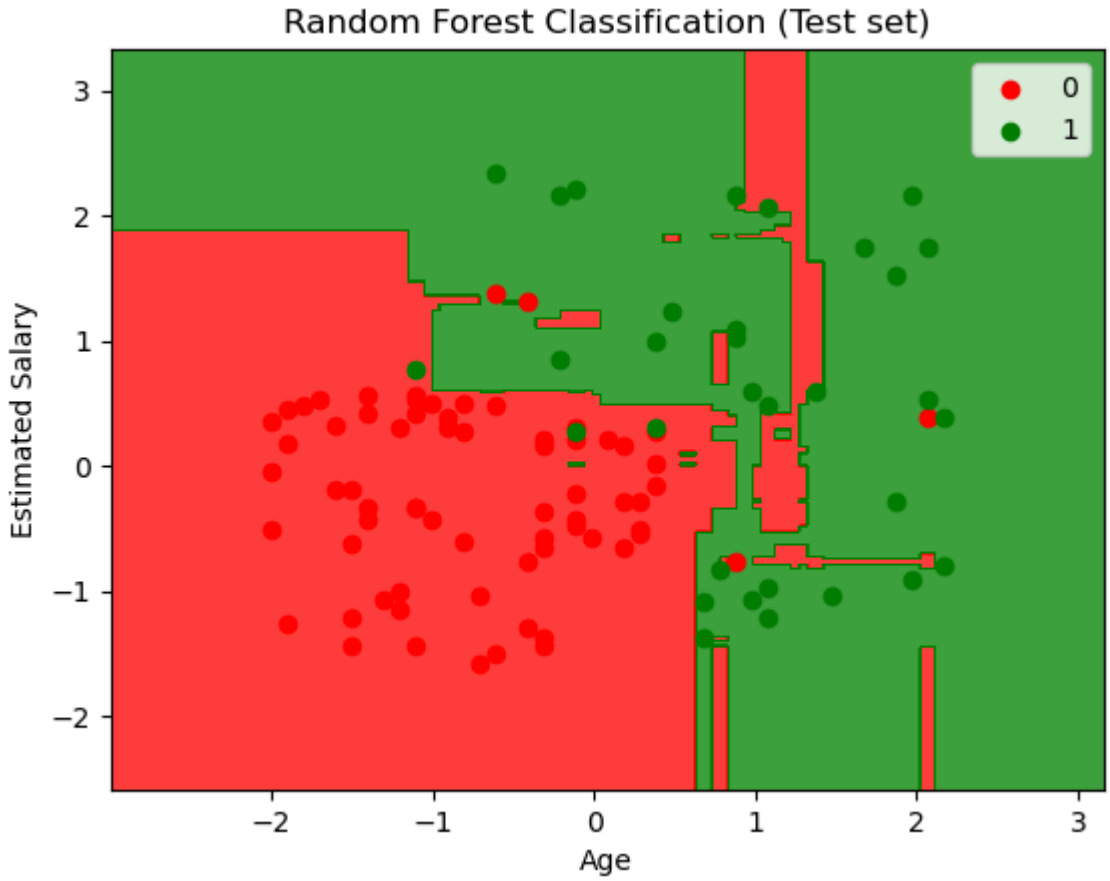
In [19]:
```
import warnings
warnings.filterwarnings('ignore')
```

In [20]:
```
from matplotlib.colors import ListedColormap
X_set, y_set = X_train, y_train
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop = X_set[:, 0]
                     np.arange(start = X_set[:, 1].min() - 1, stop = X_set[:, 1]
plt.contourf(X1, X2, classifier.predict(np.array([X1.ravel(), X2.ravel()]).T).re
             alpha = 0.75, cmap = ListedColormap(('red', 'green')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'green'))(i), label = j)
plt.title('Random Forest Classification (Training set)')
plt.xlabel('Age')
plt.ylabel('Estimated Salary')
plt.legend()
plt.show()
```

Visualising the Test set results

In [21]:

```
from matplotlib.colors import ListedColormap
X_set, y_set = X_test, y_test
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop = X_set[:, 0]
                     np.arange(start = X_set[:, 1].min() - 1, stop = X_set[:, 1]
plt.contourf(X1, X2, classifier.predict(np.array([X1.ravel(), X2.ravel()]).T).re
             alpha = 0.75, cmap = ListedColormap(('red', 'green')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'green'))(i), label = j)
plt.title('Random Forest Classification (Test set)')
plt.xlabel('Age')
plt.ylabel('Estimated Salary')
plt.legend()
plt.show()
```


Random Forest Classification (Test set)
Estimated Salary
Age
0
1
3
2
1
0
−1
−2
−2
−1
0
1
2
3