prac4-1-1

March 4, 2025

Descriptive Statistics - Measures of Central Tendency and variability Perform the following operations on any open source dataset (e.g., data.csv) 1. Provide summary statistics (mean, median, minimum, maximum, standard deviation) for a dataset (age, income etc.) with numeric variables grouped by one of the qualitative (categorical) variable. For example, if your categorical variable is age groups and quantitative variable is income, then provide summary statistics of income grouped by the age groups. Create a list that contains a numeric value for each response to the categorical variable. 2. Write a Python program to display some basic statistical details like percentile, mean, standard deviation etc. of the species of 'Iris-setosa', 'Iris-versicolor' and 'Iris-versicolor' of iris.csv dataset.

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

[2]:
```
x=np.array([95,85,80,70,60])
```

[3]:
```
y=np.array([85,95,70,65,70])
```

[4]:
```
model= np.polyfit(x, y, 1)
```

[5]:
```
model
```

[5]:
```
array([ 0.64383562, 26.78082192])
```

[6]:
```
predict = np.poly1d(model)
```

[7]:
```
predict(65)
```

[7]:
```
68.63013698630137
```

[8]:
```
y_pred= predict(x)
y_pred
```

[8]:
```
array([87.94520548, 81.50684932, 78.28767123, 71.84931507, 65.4109589 ])
```

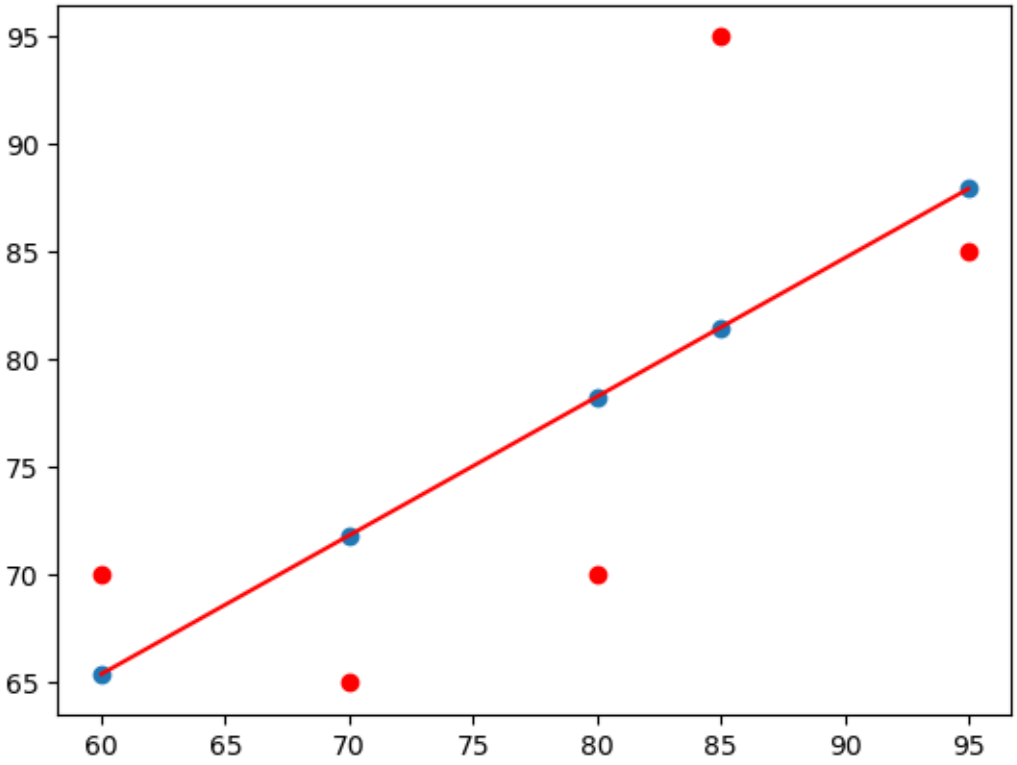
[9]:
```
from sklearn.metrics import r2_score
```

[10]:
```
r2_score(y, y_pred)
```

[10]: 0.4803218090889326

[11]:
```
y_line = model[1] + model[0]* x
plt.plot(x, y_line, c = 'r')
plt.scatter(x, y_pred)
plt.scatter(x,y,c='r')
```

[11]: <matplotlib.collections.PathCollection at 0x12ebf394fd0>



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

[3]:
```
import pandas as pd
from sklearn.datasets import fetch_openml
from sklearn.datasets import fetch_california_housing
housing = fetch_california_housing()
```

[4]:
```
housing
```

[4]: {'data': array([[8.3252 , 41. , 6.98412698, …,
2.55555556,

```
          37.88      , -122.23      ],
       [   8.3014    ,   21.        ,    6.23813708, …,    2.10984183,
          37.86      , -122.22      ],
       [   7.2574    ,   52.        ,    8.28813559, …,    2.80225989,
          37.85      , -122.24      ],
       …,
       [   1.7       ,   17.        ,    5.20554273, …,    2.3256351 ,
          39.43      , -121.22      ],
       [   1.8672    ,   18.        ,    5.32951289, …,    2.12320917,
          39.43      , -121.32      ],
       [   2.3886    ,   16.        ,    5.25471698, …,    2.61698113,
          39.37      , -121.24      ]]),
 'target': array([4.526, 3.585, 3.521, …, 0.923, 0.847, 0.894]),
 'frame': None,
 'target_names': ['MedHouseVal'],
 'feature_names': ['MedInc',
  'HouseAge',
  'AveRooms',
  'AveBedrms',
  'Population',
  'AveOccup',
  'Latitude',
  'Longitude'],
 'DESCR': '.. _california_housing_dataset:\n\nCalifornia Housing
dataset\n--------------------------\n\n**Data Set Characteristics:**\n\n
:Number of Instances: 20640\n\n    :Number of Attributes: 8 numeric, predictive
attributes and the target\n\n    :Attribute Information:\n        - MedInc
median income in block group\n        - HouseAge      median house age in block
group\n        - AveRooms      average number of rooms per household\n        -
AveBedrms     average number of bedrooms per household\n        - Population
block group population\n        - AveOccup      average number of household
members\n        - Latitude      block group latitude\n        - Longitude
block group longitude\n\n    :Missing Attribute Values: None\n\nThis dataset was
obtained from the StatLib
repository.\nhttps://www.dcc.fc.up.pt/~ltorgo/Regression/cal_housing.html\n\nThe
target variable is the median house value for California districts,\nexpressed
in hundreds of thousands of dollars ($100,000).\n\nThis dataset was derived from
the 1990 U.S. census, using one row per census\nblock group. A block group is
the smallest geographical unit for which the U.S.\nCensus Bureau publishes
sample data (a block group typically has a population\nof 600 to 3,000
people).\n\nA household is a group of people residing within a home. Since the
average\nnumber of rooms and bedrooms in this dataset are provided per
household, these\ncolumns may take surprisingly large values for block groups
with few households\nand many empty houses, such as vacation resorts.\n\nIt can
be downloaded/loaded using
the\n:func:`sklearn.datasets.fetch_california_housing` function.\n\n.. topic::
References\n\n    - Pace, R. Kelley and Ronald Barry, Sparse Spatial
```

```
Autoregressions,\n      Statistics and Probability Letters, 33 (1997)
291-297\n'}
```

[7]:
```
df=pd.DataFrame(housing.data,columns=housing.feature_names)
df
```

[7]:

	MedInc	HouseAge	AveRooms	AveBedrms	Population	AveOccup	Latitude	\
0	8.3252	41.0	6.984127	1.023810	322.0	2.555556	37.88	
1	8.3014	21.0	6.238137	0.971880	2401.0	2.109842	37.86	
2	7.2574	52.0	8.288136	1.073446	496.0	2.802260	37.85	
3	5.6431	52.0	5.817352	1.073059	558.0	2.547945	37.85	
4	3.8462	52.0	6.281853	1.081081	565.0	2.181467	37.85	
…	…	…	…	…	…	…	…	
20635	1.5603	25.0	5.045455	1.133333	845.0	2.560606	39.48	
20636	2.5568	18.0	6.114035	1.315789	356.0	3.122807	39.49	
20637	1.7000	17.0	5.205543	1.120092	1007.0	2.325635	39.43	
20638	1.8672	18.0	5.329513	1.171920	741.0	2.123209	39.43	
20639	2.3886	16.0	5.254717	1.162264	1387.0	2.616981	39.37	

	Longitude
0	-122.23
1	-122.22
2	-122.24
3	-122.25
4	-122.25
…	…
20635	-121.09
20636	-121.21
20637	-121.22
20638	-121.32
20639	-121.24

[20640 rows x 8 columns]

[9]:
```
df.head()
```

[9]:

	MedInc	HouseAge	AveRooms	AveBedrms	Population	AveOccup	Latitude	\
0	8.3252	41.0	6.984127	1.023810	322.0	2.555556	37.88	
1	8.3014	21.0	6.238137	0.971880	2401.0	2.109842	37.86	
2	7.2574	52.0	8.288136	1.073446	496.0	2.802260	37.85	
3	5.6431	52.0	5.817352	1.073059	558.0	2.547945	37.85	
4	3.8462	52.0	6.281853	1.081081	565.0	2.181467	37.85	

	Longitude
0	-122.23
1	-122.22
2	-122.24

```
3    -122.25
4    -122.25
```

[10]:
```
df['PRICE'] = housing.target
```

[11]:
```
df.isnull().sum()
```

[11]:
```
MedInc        0
HouseAge      0
AveRooms      0
AveBedrms     0
Population    0
AveOccup      0
Latitude      0
Longitude     0
PRICE         0
dtype: int64
```

[16]:
```
x = df.drop(['PRICE'], axis = 1)
y = df['PRICE']
```

[19]:
```
from sklearn.model_selection import train_test_split

xtrain, xtest, ytrain, ytest = train_test_split(x, y, test_size=0.2,␣
 ↪random_state=0)
```

[20]:
```
import sklearn
from sklearn.linear_model import LinearRegression
lm = LinearRegression()
model=lm.fit(xtrain, ytrain)
```

[21]:
```
ytrain_pred = lm.predict(xtrain)
ytest_pred = lm.predict(xtest)
```

[22]:
```
df=pd.DataFrame(ytrain_pred,ytrain)
df=pd.DataFrame(ytest_pred,ytest)
```

[23]:
```
from sklearn.metrics import mean_squared_error, r2_score
```

[24]:
```
mse = mean_squared_error(ytest, ytest_pred)
print(mse)
```

```
0.5289841670367221
```

[25]:
```
mse = mean_squared_error(ytrain_pred,ytrain)
print(mse)
```

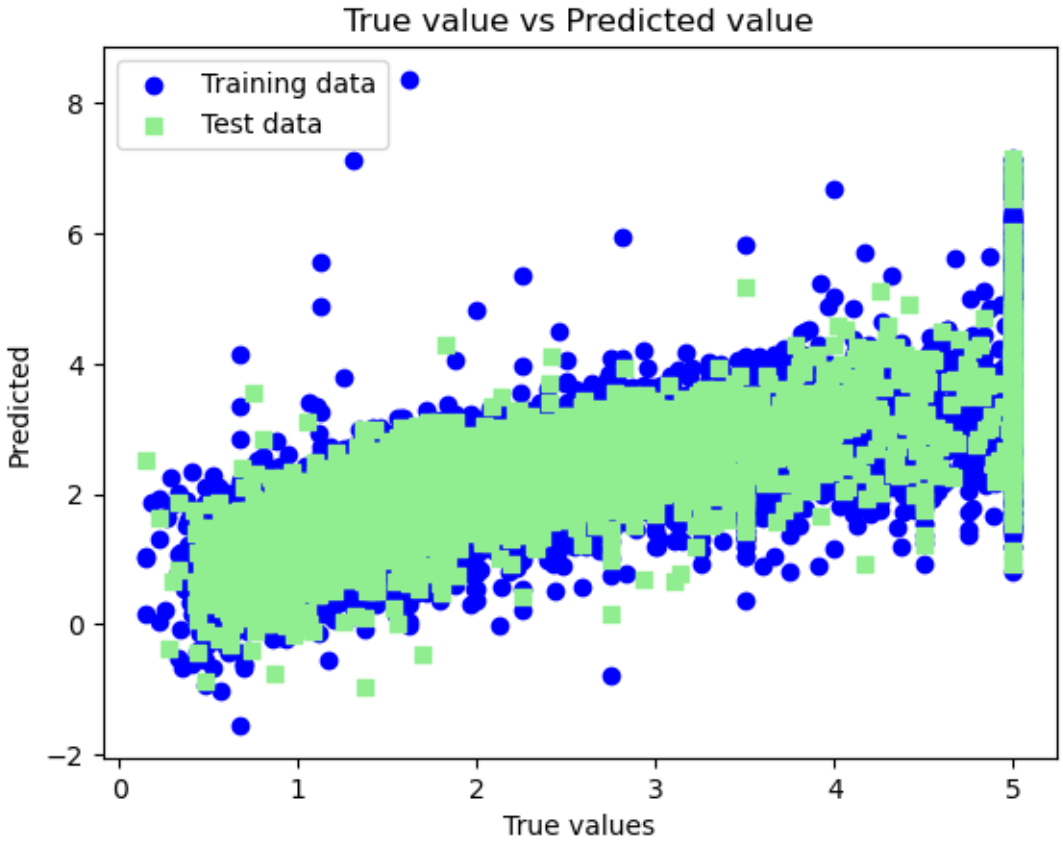
```
0.5234413607125449
```

[26]:
```
mse = mean_squared_error(ytest, ytest_pred)
print(mse)
```

```
0.5289841670367221
```

[28]:
```
import matplotlib.pyplot as plt


plt.scatter(ytrain, ytrain_pred, c='blue', marker='o', label='Training data')
plt.scatter(ytest, ytest_pred, c='lightgreen', marker='s', label='Test data')
plt.xlabel('True values')
plt.ylabel('Predicted')
plt.title("True value vs Predicted value")
plt.legend(loc='upper left')
plt.plot()
plt.show()
```



[ ]:
```
Name= akash pachrne
roll no :13254
```