**GOVERNAMENT POLYTECHNIC**

**NAGAMANGALA**

Department of computer science and eng.

"5th semester diploma"

Artificial Intalligents And Machine Learning(20CS51)

Assignment-3

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AIML (20CS51)

ASSIGNMENT – WEEK 03

1. Download any two datasets from the internet and perform the following operations.

a).Analyze the univariate dataset Ex- Mean, Mode, Median, Range, Std, and Variance and perform Univariate tests for the dataset.

b) Analyze the multivariate of the dataset Ex- co-variance, co-relation.

c) Visualize the univariate and multivariate with various plots

d) Push the code to your Github repository.

Dataset:01

a).Analyze the univariate dataset Ex- Mean, Mode, Median, Range, Std, and Variance and perform Univariate tests for the dataset.

import pandas as pd

path="/content/sample\_data/california\_housing\_test.csv"

df=pd.read\_csv(path)

🡪df.mean(numeric\_only=True)

output:

longitude -119.589200

latitude 35.635390

housing\_median\_age 28.845333

total\_rooms 2599.578667

total\_bedrooms 529.950667

population 1402.798667

households 489.912000

median\_income 3.807272

median\_house\_value 205846.275000

🡪df.median(numeric\_only=True)

Output:

longitude -118.48500

latitude 34.27000

housing\_median\_age 29.00000

total\_rooms 2106.00000

total\_bedrooms 437.00000

population 1155.00000

households 409.50000

median\_income 3.48715

median\_house\_value 177650.00000

🡪 df.mode(numeric\_only=True)

Output:

| **longitude** | **latitude** | **housing\_median\_age** | **total\_rooms** | **total\_bedrooms** | **population** | **households** | **median\_income** | **median\_house\_value** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **0** | -118.26 | 34.02 | 52.0 | 907.0 | 314.0 | 870.0 | 273.0 | 15.0001 | 500001.0 |
| **1** | -118.21 | NaN | NaN | 1778.0 | NaN | NaN | 375.0 | NaN | NaN |
| **2** | NaN | NaN | NaN | 1787.0 | NaN | NaN | 614.0 | NaN | NaN |
| **3** | NaN | NaN | NaN | 1966.0 | NaN | NaN | NaN | NaN | NaN |

🡪 df.max() - df.min()

Output:

longitude 9.6900

latitude 9.3600

housing\_median\_age 51.0000

total\_rooms 30444.0000

total\_bedrooms 5417.0000

population 11930.0000

households 4928.0000

median\_income 14.5002

median\_house\_value 477501.0000

🡪 df.var()

Output:

longitude 3.979771e+00

latitude 4.535492e+00

housing\_median\_age 1.576380e+02

total\_rooms 4.646583e+06

total\_bedrooms 1.727686e+05

population 1.062019e+06

households 1.335338e+05

median\_income 3.439214e+00

median\_house\_value 1.279606e+10

🡪 df.std()

Output:

longitude 1.994936

latitude 2.129670

housing\_median\_age 12.55539

total\_rooms 2155.593332

total\_bedrooms 415.654368

population 1030.543012

households 365.422710

median\_income 1.854512

median\_house\_value 113119.687470

🡪T-test:

import pandas as pd

import scipy.stats as stats

data = pd.read\_csv('//content/sample\_data/california\_housing\_test.csv')

population\_data = data['population'].values

t\_stat, p\_val = stats.ttest\_1samp(population\_data, popmean=0)

print(f"One-sample t-test: t\_stat={t\_stat}, p\_val={p\_val}")

output:

One-sample t-test: t\_stat=74.55724449317279, p\_val=0.0

🡪Chi-Square:

import pandas as pd

from scipy.stats import chi2\_contingency

data = pd.read\_csv('//content/sample\_data/california\_housing\_test.csv')

contingency\_table = pd.crosstab(data['population'], data['median\_house\_value'])

chi2, p, dof, ex = chi2\_contingency(contingency\_table)

print(f"Chi-Square Test of Independence: chi2={chi2}, p={p}, dof={dof}, expected={ex}")

output:

Chi-Square Test of Independence: chi2=3177677.433707531, p=1.0, dof=3211183, expected=[[0.00033333 0.00033333 0.00033333 ... 0.00033333 0.00133333 0.04166667]

[0.00066667 0.00066667 0.00066667 ... 0.00066667 0.00266667 0.08333333]

[0.00066667 0.00066667 0.00066667 ... 0.00066667 0.00266667 0.08333333]

...

[0.00033333 0.00033333 0.00033333 ... 0.00033333 0.00133333 0.04166667]

[0.00033333 0.00033333 0.00033333 ... 0.00033333 0.00133333 0.04166667]

[0.00033333 0.00033333 0.00033333 ... 0.00033333 0.00133333 0.04166667]]

🡪ANOVA:

import pandas as pd

from scipy import stats

df = pd.read\_csv('/content/sample\_data/california\_housing\_test.csv')

groups = df.groupby('total\_rooms')['population'].apply(list)

# Run Anova

f\_value, p\_value = stats.f\_oneway(\*groups)

print(f"F-value: {f\_value}")

print(f"P-value: {p\_value}")

output:

F-value: 7.411863112982161

P-value: 1.1921618495310367e-176

🡪Kruskal-wallis:

import pandas as pd

from scipy.stats import kruskal

data = pd. read\_csv('//content/sample\_data/california\_housing\_test.csv')

h\_stat, p\_val = kruskal('household', 'median\_house\_value', 'population')

print(f"Kruskal-Wallis Test: H\_stat={h\_stat}, p\_val={p\_val}")

output:

Kruskal-Wallis Test: H\_stat=2.0, p\_val=0.36787944117144245

Dataset:02

import pandas as pd

path="/content/P1-UK-Bank-Customers.csv"

df=pd.read\_csv(path)

🡪df.mean(numeric\_only=True)

Output:

Customer ID 1.696831e+08

Age 3.861111e+01

Balance 3.976645e+04

🡪 df.median(numeric\_only=True)

Output:

Customer ID 1.000038e+08

Age 3.700000e+01

Balance 3.356733e+04

🡪 df.mode(numeric\_only=True)

Output:

Customer IDAgeBalance010000000134.09867.561100000003NaN13162.582100000005NaNNaN310000000

aNNaN4100000010NaNNaN............4009400003443NaNNaN4010400003472NaNNaN4011400003743NaNNaN4012400003847NaNNaN4013400003848NaNNaN

🡪 df.max(numeric\_only=True) - df.min(numeric\_only=True)

Output:

Customer ID 3.000038e+08

Age 4.900000e+01

Balance 1.834562e+05

🡪 df.var(numeric\_only=True)

Output:

Customer ID 7.859485e+15

Age 9.641514e+01

Balance 8.915891e+08

🡪 df.std(numeric\_only=True)

Output:

Customer ID 8.865374e+07

Age 9.819121e+00

Balance 2.985949e+04

🡪T-test:

import pandas as pd

import scipy.stats as stats

data = pd.read\_csv('//content/P1-UK-Bank-Customers.csv')

balance\_data = data['Balance'].values

t\_stat, p\_val = stats.ttest\_1samp(balance\_data, popmean=0)

print(f"One-sample t-test: t\_stat={t\_stat}, p\_val={p\_val}")

output:

One-sample t-test: t\_stat=84.37681229712399, p\_val=0.0

🡪Chi-Square:

import pandas as pd

from scipy.stats import chi2\_contingency

data = pd.read\_csv('//content/P1-UK-Bank-Customers.csv')

contingency\_table = pd.crosstab(data['Age'], data['Balance'])

chi2, p, dof, ex = chi2\_contingency(contingency\_table)

print(f"Chi-Square Test of Independence: chi2={chi2}, p={p}, dof={dof}, expected={ex}")

output:

Chi-Square Test of Independence: chi2=192602.2780945864, p=0.4519404830556932, dof=192528, expected=[[0.00024913 0.00024913 0.00024913 ... 0.00024913 0.00024913 0.00024913]

[0.00099651 0.00099651 0.00099651 ... 0.00099651 0.00099651 0.00099651]

[0.00747384 0.00747384 0.00747384 ... 0.00747384 0.00747384 0.00747384]

...

[0.00249128 0.00249128 0.00249128 ... 0.00249128 0.00249128 0.00249128]

[0.00274041 0.00274041 0.00274041 ... 0.00274041 0.00274041 0.00274041]

[0.00373692 0.00373692 0.00373692 ... 0.00373692 0.00373692 0.00373692]]

🡪Kruskal-wallis:

import pandas as pd

from scipy.stats import kruskal

data = pd. read\_csv('//content/P1-UK-Bank-Customers.csv')

h\_stat, p\_val = kruskal('Balance', 'Age', 'Balance')

print(f"Kruskal-Wallis Test: H\_stat={h\_stat}, p\_val={p\_val}")

output:

Kruskal-Wallis Test: H\_stat=2.0, p\_val=0.36787944117144245

🡪ANOVA:

import pandas as pd

from scipy import stats

df = pd.read\_csv('/content/P1-UK-Bank-Customers.csv')

groups = df.groupby('Balance')['Age'].apply(list)

# Run Anova

f\_value, p\_value = stats.f\_oneway(\*groups)

print(f"F-value: {f\_value}")

print(f"P-value: {p\_value}")

output:

F-value: 0.9788233233025163

P-value: 0.6399004291283019

b) Analyze the multivariate of the dataset Ex- co-variance, co-relation.

Dataset:01

🡪 df.cov()

Output:

| **longitude** | **latitude** | **housing\_median\_age** | **total\_rooms** | **total\_bedrooms** | **population** | **households** | **median\_income** | **median\_house\_value** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **longitude** | 3.979771 | -3.929984 | -1.608112 | 2.144331e+02 | 5.876508e+01 | 2.293768e+02 | 3.722418e+01 | -0.069188 | -1.143276e+04 |
| **latitude** | -3.929984 | 4.535492 | -0.672300 | -1.819390e+02 | -6.041129e+01 | -2.574793e+02 | -5.314994e+01 | -0.285796 | -3.334838e+04 |
| **housing\_median\_age** | -1.608112 | -0.672300 | 157.637958 | -9.955608e+03 | -1.686447e+03 | -3.880217e+03 | -1.400132e+03 | -3.360256 | 1.298250e+05 |
| **total\_rooms** | 214.433055 | -181.938962 | -9955.608036 | 4.646583e+06 | 8.402063e+05 | 1.863485e+06 | 7.200520e+05 | 884.457656 | 3.911853e+07 |
| **total\_bedrooms** | 58.765078 | -60.411288 | -1686.447113 | 8.402063e+05 | 1.727686e+05 | 3.668332e+05 | 1.474479e+05 | 18.519657 | 3.868661e+06 |
| **population** | 229.376803 | -257.479345 | -3880.217212 | 1.863485e+06 | 3.668332e+05 | 1.062019e+06 | 3.372421e+05 | 61.845972 | -1.389295e+05 |
| **households** | 37.224178 | -53.149936 | -1400.131655 | 7.200520e+05 | 1.474479e+05 | 3.372421e+05 | 1.335338e+05 | 32.952200 | 4.140940e+06 |
| **median\_income** | -0.069188 | -0.285796 | -3.360256 | 8.844577e+02 | 1.851966e+01 | 6.184597e+01 | 3.295220e+01 | 3.439214 | 1.411192e+05 |
| **median\_house\_value** | -11432.762614 | -33348.376798 | 129825.029543 | 3.911853e+07 | 3.868661e+06 | -1.389295e+05 | 4.140940e+06 | 141119.191538 | 1.279606e+10 |

🡪 df.corr()

Output:

longitudelatitudehousing\_median\_agetotal\_roomstotal\_bedroomspopulationhouseholdsmedian\_incomemedian\_house\_valuelongitude1.000000-0.925017-0.0642030.0498650.0708690.1115720.051062-0.018701-0.050662latitude-0.9250171.000000-0.025143-0.039632-0.068245-0.117318-0.068296-0.072363-0.138428housing\_median\_age-0.064203-0.0251431.000000-0.367850-0.323154-0.299888-0.305171-0.1443150.091409total\_rooms0.049865-0.039632-0.3678501.0000000.9377490.8388670.9141160.2212490.160427total\_bedrooms0.070869-0.068245-0.3231540.9377491.0000000.8563870.9707580.0240250.082279population0.111572-0.117318-0.2998880.8388670.8563871.0000000.8955300.032361-0.001192households0.051062-0.068296-0.3051710.9141160.9707580.8955301.0000000.0486250.100176median\_income-0.018701-0.072363-0.1443150.2212490.0240250.0323610.0486251.0000000.672695median\_house\_value-0.050662-0.1384280.0914090.1604270.082279-0.0011920.1001760.6726951.000000

Dataset:02

🡪 df.cov(numeric\_only=True)

Output:

| **Customer ID** | **Age** | **Balance** |
| --- | --- | --- |
| **Customer ID** | 7.859485e+15 | 7.111205e+07 | 5.672418e+10 |
| **Age** | 7.111205e+07 | 9.641514e+01 | 2.744038e+03 |
| **Balance** | 5.672418e+10 | 2.744038e+03 | 8.915891e+08 |

🡪 df.corr(numeric\_only=True)

Output:

| **Customer ID** | **Age** | **Balance** |
| --- | --- | --- |
| **Customer ID** | 1.000000 | 0.081691 | 0.021428 |
| **Age** | 0.081691 | 1.000000 | 0.009359 |
| **Balance** | 0.021428 | 0.009359 | 1.000000 |
|  |  |  |  |

c) Visualize the univariate and multivariate with various plots

dataset:01

multiivariate plots:

import matplotlib.pyplot as plt

import seaborn as sns

import pandas as pd

data = pd.read\_csv('/content/sample\_data/california\_housing\_test.csv')

plt.figure(figsize=(16, 4))

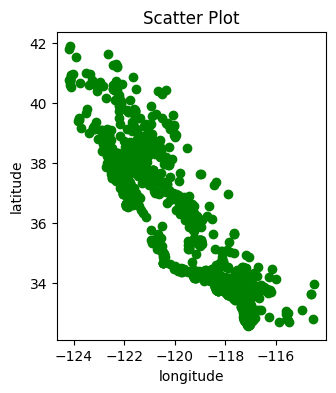
plt.subplot(1, 4, 1)

plt.scatter(data['longitude'], data['latitude'], color='green')

plt.xlabel('longitude')

plt.ylabel('latitude')plt.title('Scatter Plot')

output:



import matplotlib.pyplot as plt

import seaborn as sns

import pandas as pd

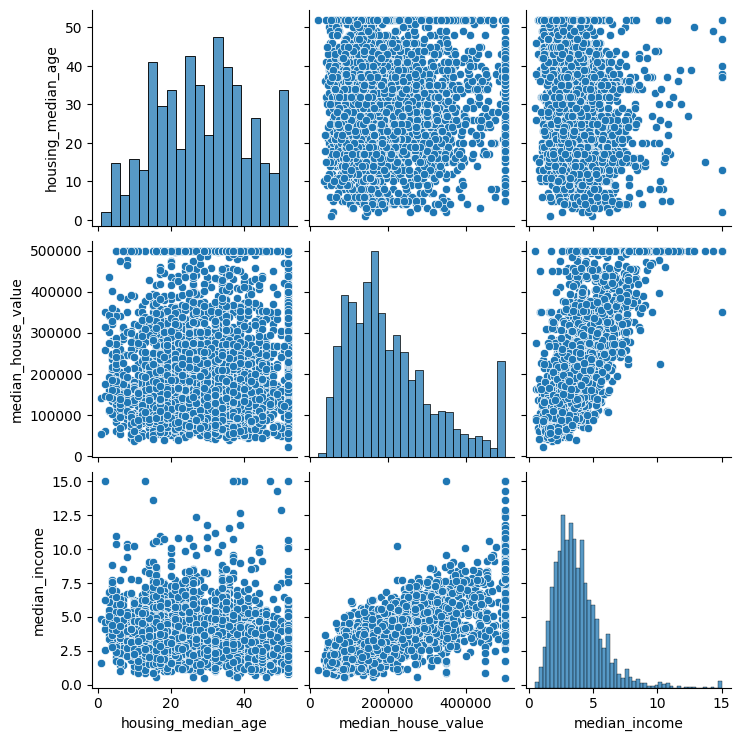
data = pd.read\_csv('/content/sample\_data/california\_housing\_test.csv')

plt.figure(figsize=(16, 4))

plt.subplot(1, 4, 2)

sns.pairplot(data, vars=['housing\_median\_age', 'median\_house\_value', 'median\_income'])

output:



import matplotlib.pyplot as plt

import seaborn as sns

import pandas as pd

data = pd.read\_csv('/content/sample\_data/california\_housing\_test.csv')

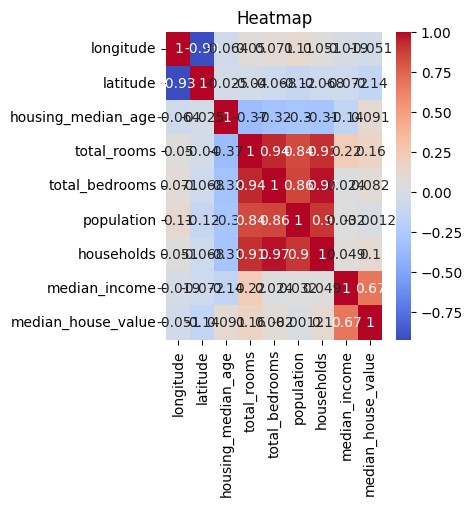
plt.figure(figsize=(16, 4))

plt.subplot(1, 4, 3)

sns.heatmap(data.corr(), annot=True, cmap='coolwarm')

plt.title('Heatmap')

output:



import matplotlib.pyplot as plt

import seaborn as sns

import pandas as pd

data = pd.read\_csv('/content/sample\_data/california\_housing\_test.csv')

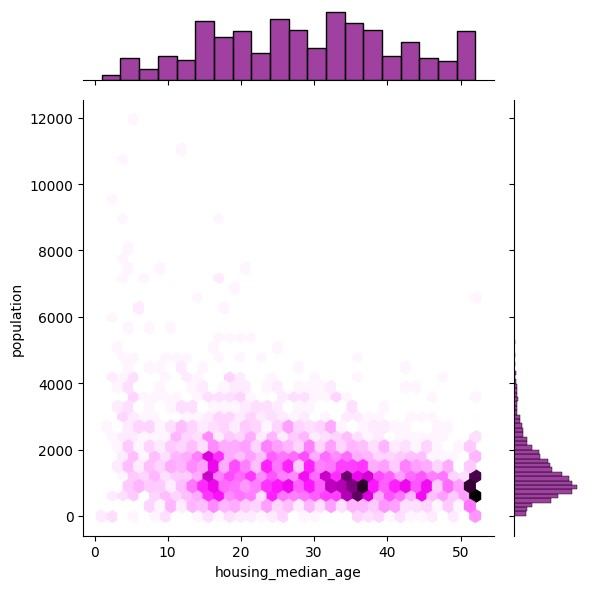
plt.subplot(1, 4, 4)

sns.jointplot(x='housing\_median\_age', y='population', data=data, kind='hex', color='purple')

plt.tight\_layout()

plt.show()

output:



Univariate plots:

import matplotlib.pyplot as plt

import seaborn as sns

import pandas as pd

data = pd.read\_csv('/content/sample\_data/california\_housing\_test.csv')

plt.figure(figsize=(16, 4))

plt.subplot(1, 4, 1)

plt.hist(data['total\_rooms'], bins=10, color='skyblue', edgecolor='black')

plt.xlabel('total\_rooms')

plt.ylabel('households')

plt.title('Histogram')

plt.subplot(1, 4, 2)

sns.boxplot(data=data, x='median\_income', color='salmon')

plt.xlabel('median\_income')

plt.title('Box Plot')

plt.subplot(1, 4, 3)

sns.violinplot(data=data, x='latitude', color='orange')

plt.xlabel('latitude')

plt.title('Violin Plot')

plt.subplot(1, 4, 4)

sns.displot(data['population'], kde=True, color='purple')

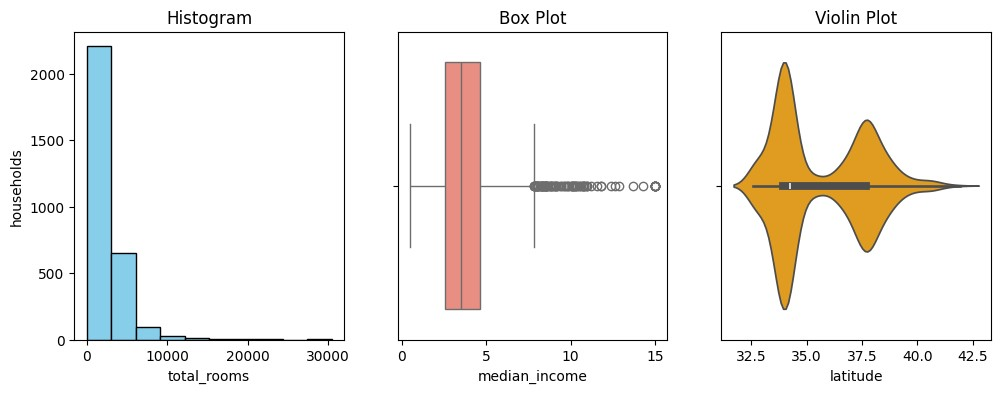
plt.xlabel('population')

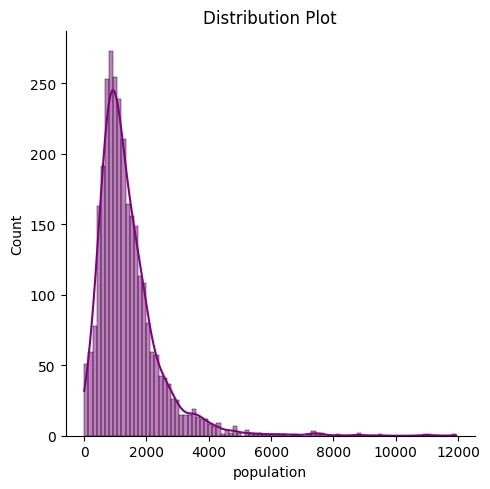
plt.title('Distribution Plot')

plt.tight\_layout()

plt.show()

output:





Dataset:02

Multivariate plots:

import matplotlib.pyplot as plt

import seaborn as sns

import pandas as pd

data = pd.read\_csv('//content/P1-UK-Bank-Customers.csv')

plt.figure(figsize=(16, 4))

plt.subplot(1, 4, 1)

plt.scatter(data['Age'], data['Balance'], color='green')

plt.xlabel('Age')

plt.ylabel('Balance')

plt.title('Scatter Plot')

plt.subplot(1, 4, 2)

sns.pairplot(data, vars=['Balance', 'Age', 'Balance'])

plt.subplot(1, 4, 3)

numeric\_data = data.apply(pd.to\_numeric, errors='coerce')

sns.heatmap(numeric\_data.corr(), annot=True, cmap='coolwarm')

plt.title('Heatmap')

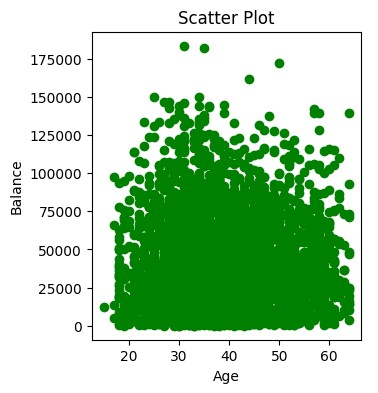
plt.subplot(1, 4, 4)

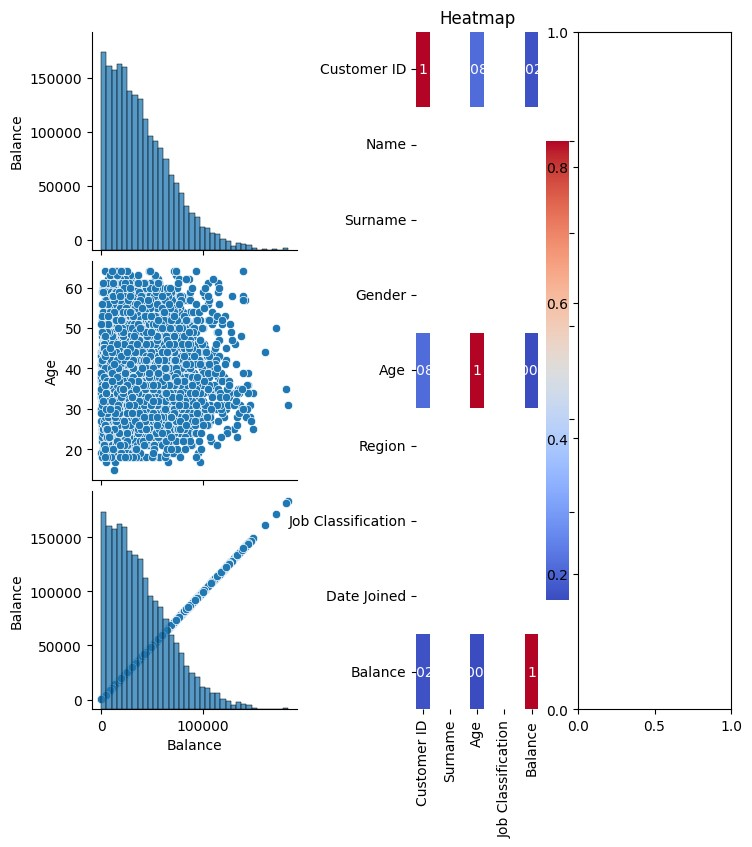
sns.jointplot(x='Balance', y='Balance', data=data, kind='hex', color='purple')

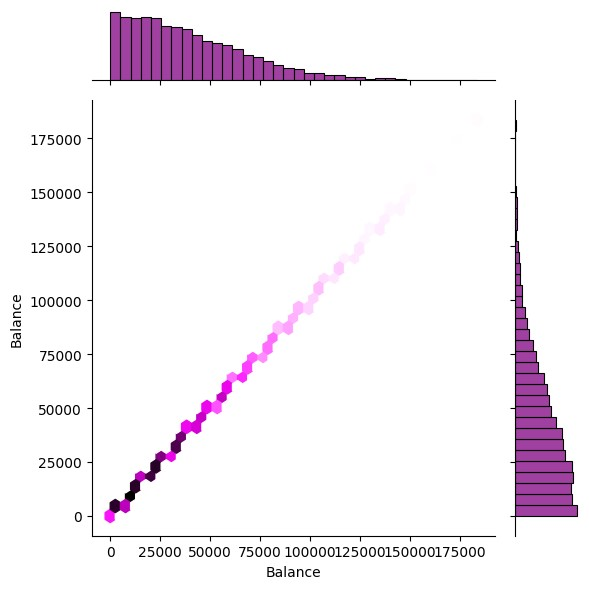
plt.tight\_layout()

plt.show()

output:







Univariate plots:

import matplotlib.pyplot as plt

import seaborn as sns

import pandas as pd

data = pd.read\_csv('//content/P1-UK-Bank-Customers.csv')

plt.figure(figsize=(16, 4))

plt.subplot(1, 4, 1)

plt.hist(data['Balance'], bins=10, color='skyblue', edgecolor='black')

plt.xlabel('Balance')

plt.ylabel('Age')

plt.title('Histogram')

plt.subplot(1, 4, 2)

sns.boxplot(data=data, x='Age', color='salmon')

plt.xlabel('Age')

plt.title('Box Plot')

plt.subplot(1, 4, 3)

sns.violinplot(data=data, x='Balance', color='orange')

plt.xlabel('Balance')

plt.title('Violin Plot')

plt.subplot(1, 4, 4)

sns.displot(data['Balance'], kde=True, color='purple')

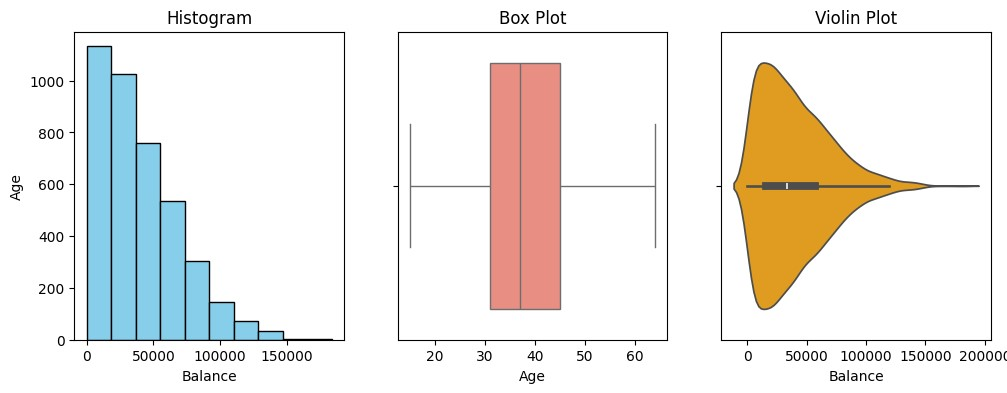
plt.xlabel('Balance')

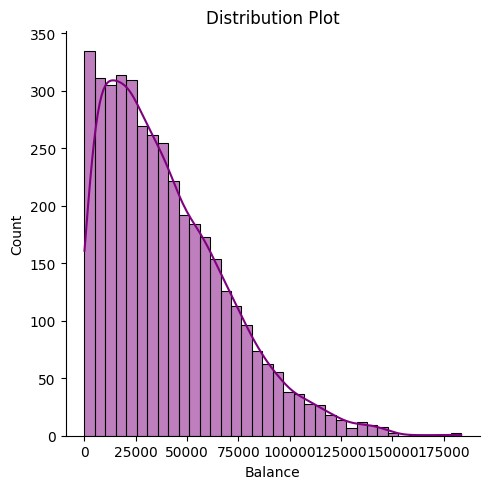
plt.title('Distribution Plot')

plt.tight\_layout()

plt.show()

output:





d)Perform any probability calcualtion.

Dataset:01

import pandas as pd

df = pd.read\_csv('//content/sample\_data/california\_housing\_test.csv')

condition\_count = df['latitude'].value\_counts()

probability = condition\_count / condition\_count.sum()

print(condition\_count)

print(probability)

print(f"The probability of getting values from {condition\_count.index[0]} to {condition\_count.index[-1]} are:")

for index, value in probability.items():

    print(f"{index}: {value:.4f}")

output:

latitude

34.02 35

34.06 33

34.05 32

34.07 31

34.11 31

..

37.08 1

39.19 1

38.21 1

36.55 1

34.68 1

Name: count, Length: 587, dtype: int64

latitude

34.02 0.011667

34.06 0.011000

34.05 0.010667

34.07 0.010333

34.11 0.010333

...

37.08 0.000333

39.19 0.000333

38.21 0.000333

36.55 0.000333

34.68 0.000333

Name: count, Length: 587, dtype: float64

The probability of getting values from 34.02 to 34.68 are:

34.02: 0.0117

34.06: 0.0110

34.05: 0.0107

34.07: 0.0103

34.11: 0.0103

34.09: 0.0103

33.93: 0.0100

33.91: 0.0100

33.84: 0.0093

34.1: 0.0090

34.03: 0.0090

34.04: 0.0090

34.08: 0.0090

33.97: 0.0090

34.12: 0.0087

33.92: 0.0083

34.01: 0.0083

33.98: 0.0083

33.87: 0.0083

33.9: 0.0080

33.94: 0.0080

33.96: 0.0080

33.79: 0.0077

34.0: 0.0077

34.15: 0.0077

34.18: 0.0073

33.8: 0.0073

33.88: 0.0073

34.16: 0.0070

33.99: 0.0070

33.89: 0.0067

33.83: 0.0067

34.17: 0.0067

37.76: 0.0067

33.77: 0.0067

37.97: 0.0063

33.82: 0.0060

34.14: 0.0060

37.73: 0.0060

34.2: 0.0060

33.73: 0.0060

33.95: 0.0060

34.13: 0.0057

34.19: 0.0057

32.8: 0.0053

33.86: 0.0053

37.8: 0.0053

34.26: 0.0050

37.75: 0.0050

37.72: 0.0050

32.76: 0.0050

37.79: 0.0050

38.01: 0.0047

37.77: 0.0047

33.85: 0.0047

33.81: 0.0047

37.68: 0.0047

37.78: 0.0043

33.76: 0.0043

37.74: 0.0043

37.96: 0.0043

37.71: 0.0043

34.27: 0.0043

34.24: 0.0043

37.31: 0.0043

34.21: 0.0040

37.67: 0.0040

37.33: 0.0040

37.35: 0.0040

33.65: 0.0040

34.22: 0.0040

32.79: 0.0037

37.69: 0.0037

34.23: 0.0037

33.78: 0.0037

37.66: 0.0037

32.75: 0.0037

33.72: 0.0037

32.74: 0.0033

32.81: 0.0033

38.66: 0.0033

37.37: 0.0033

38.0: 0.0033

37.65: 0.0033

37.27: 0.0030

37.99: 0.0030

37.7: 0.0030

37.93: 0.0030

37.56: 0.0030

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38.56: 0.0030

32.7: 0.0030

32.82: 0.0030

37.85: 0.0030

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37.61: 0.0027

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33.68: 0.0023

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37.3: 0.0023

37.28: 0.0023

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34.42: 0.0023

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37.98: 0.0023

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37.95: 0.0023

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36.76: 0.0017

36.81: 0.0017

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36.75: 0.0017

33.64: 0.0017

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37.01: 0.0010

38.5: 0.0010

33.06: 0.0010

38.16: 0.0010

32.86: 0.0010

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36.65: 0.0010

36.56: 0.0010

36.6: 0.0010

38.4: 0.0010

37.13: 0.0010

38.97: 0.0010

38.1: 0.0010

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36.83: 0.0010

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36.31: 0.0007

34.66: 0.0007

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40.52: 0.0007

38.81: 0.0007

40.61: 0.0007

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36.85: 0.0007

36.71: 0.0007

36.91: 0.0007

33.54: 0.0007

35.5: 0.0007

34.7: 0.0007

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33.12: 0.0007

36.86: 0.0007

36.34: 0.0007

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33.26: 0.0007

35.37: 0.0007

35.76: 0.0007

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38.7: 0.0007

38.25: 0.0007

37.12: 0.0007

38.74: 0.0007

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33.22: 0.0007

40.8: 0.0007

36.69: 0.0007

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34.36: 0.0007

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38.11: 0.0007

34.34: 0.0007

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36.94: 0.0007

33.58: 0.0007

38.24: 0.0007

40.77: 0.0007

32.9: 0.0007

33.28: 0.0007

37.42: 0.0007

38.98: 0.0007

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36.52: 0.0007

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36.9: 0.0007

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38.78: 0.0007

38.95: 0.0007

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38.76: 0.0007

39.5: 0.0007

33.08: 0.0007

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39.13: 0.0007

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38.27: 0.0007

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35.48: 0.0007

33.15: 0.0007

40.95: 0.0007

35.87: 0.0007

40.15: 0.0007

33.07: 0.0007

35.46: 0.0007

40.57: 0.0007

34.94: 0.0007

38.9: 0.0007

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36.35: 0.0007

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32.99: 0.0003

40.72: 0.0003

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36.08: 0.0003

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36.12: 0.0003

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39.9: 0.0003

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34.46: 0.0003

38.49: 0.0003

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39.48: 0.0003

32.96: 0.0003

39.09: 0.0003

35.85: 0.0003

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39.35: 0.0003

36.93: 0.0003

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36.92: 0.0003

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35.36: 0.0003

41.28: 0.0003

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39.27: 0.0003

39.34: 0.0003

32.67: 0.0003

40.87: 0.0003

40.12: 0.0003

40.97: 0.0003

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39.44: 0.0003

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39.21: 0.0003

35.32: 0.0003

35.02: 0.0003

38.2: 0.0003

34.64: 0.0003

36.2: 0.0003

34.55: 0.0003

40.09: 0.0003

37.07: 0.0003

35.34: 0.0003

35.05: 0.0003

38.05: 0.0003

41.2: 0.0003

39.06: 0.0003

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39.11: 0.0003

40.26: 0.0003

40.44: 0.0003

34.54: 0.0003

40.4: 0.0003

36.39: 0.0003

39.02: 0.0003

39.63: 0.0003

35.03: 0.0003

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39.7: 0.0003

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36.09: 0.0003

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36.14: 0.0003

37.05: 0.0003

40.18: 0.0003

33.29: 0.0003

36.37: 0.0003

35.08: 0.0003

41.92: 0.0003

36.13: 0.0003

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39.01: 0.0003

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37.04: 0.0003

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36.25: 0.0003

33.1: 0.0003

33.21: 0.0003

40.75: 0.0003

40.48: 0.0003

36.7: 0.0003

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39.92: 0.0003

39.2: 0.0003

39.32: 0.0003

35.0: 0.0003

40.2: 0.0003

38.71: 0.0003

35.17: 0.0003

34.56: 0.0003

36.89: 0.0003

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40.39: 0.0003

33.44: 0.0003

40.45: 0.0003

38.09: 0.0003

33.43: 0.0003

35.65: 0.0003

39.97: 0.0003

39.46: 0.0003

39.79: 0.0003

34.9: 0.0003

35.91: 0.0003

36.16: 0.0003

32.6: 0.0003

34.48: 0.0003

35.74: 0.0003

40.07: 0.0003

40.59: 0.0003

38.38: 0.0003

37.21: 0.0003

34.91: 0.0003

35.35: 0.0003

36.38: 0.0003

33.5: 0.0003

40.71: 0.0003

39.72: 0.0003

34.98: 0.0003

36.53: 0.0003

33.13: 0.0003

39.66: 0.0003

36.22: 0.0003

36.68: 0.0003

40.99: 0.0003

41.8: 0.0003

38.88: 0.0003

40.31: 0.0003

40.78: 0.0003

32.93: 0.0003

39.12: 0.0003

38.75: 0.0003

37.08: 0.0003

39.19: 0.0003

38.21: 0.0003

36.55: 0.0003

34.68: 0.0003

Dataset:02

import pandas as pd

df = pd.read\_csv('///content/P1-UK-Bank-Customers.csv')

condition\_count = df['Balance'].value\_counts()

probability = condition\_count / condition\_count.sum()

print(condition\_count)

print(probability)

print(f"The probability of getting values from {condition\_count.index[0]} to {condition\_count.index[-1]} are:")

for index, value in probability.items():

    print(f"{index}: {value:.4f}")

output:

Balance

9867.56 2

13162.58 2

21908.77 1

24433.04 1

23183.41 1

..

14121.70 1

96844.75 1

31392.78 1

60906.04 1

30293.19 1

Name: count, Length: 4012, dtype: int64

Balance

9867.56 0.000498

13162.58 0.000498

21908.77 0.000249

24433.04 0.000249

23183.41 0.000249

...

14121.70 0.000249

96844.75 0.000249

31392.78 0.000249

60906.04 0.000249

30293.19 0.000249

Name: count, Length: 4012, dtype: float64

The probability of getting values from 9867.56 to 30293.19 are:

9867.56: 0.0005

13162.58: 0.0005

21908.77: 0.0002

24433.04: 0.0002

23183.41: 0.0002

9564.07: 0.0002

11634.97: 0.0002

39171.72: 0.0002

113810.15: 0.0002

61333.01: 0.0002

19916.05: 0.0002

2559.52: 0.0002

56402.62: 0.0002

8257.62: 0.0002

31728.14: 0.0002

1153.98: 0.0002

13710.31: 0.0002

29854.64: 0.0002

49374.99: 0.0002

9169.82: 0.0002

42706.66: 0.0002

82077.52: 0.0002

15104.72: 0.0002

42471.07: 0.0002

16627.15: 0.0002

46393.55: 0.0002

34441.92: 0.0002

49048.13: 0.0002

16194.49: 0.0002

106232.34: 0.0002

61360.64: 0.0002

60277.8: 0.0002

49678.06: 0.0002

9905.53: 0.0002

4387.05: 0.0002

86983.68: 0.0002

73415.97: 0.0002

46452.14: 0.0002

52735.66: 0.0002

40414.88: 0.0002

47740.27: 0.0002

52050.39: 0.0002

73238.04: 0.0002

10911.82: 0.0002

30238.1: 0.0002

14693.74: 0.0002

38646.92: 0.0002

6844.11: 0.0002

20587.44: 0.0002

26851.86: 0.0002

53599.25: 0.0002

78006.49: 0.0002

66400.88: 0.0002

50078.57: 0.0002

24779.98: 0.0002

31117.71: 0.0002

101994.01: 0.0002

4959.12: 0.0002

25489.52: 0.0002

73869.26: 0.0002

94033.87: 0.0002

59189.09: 0.0002

13536.36: 0.0002

22186.17: 0.0002

10247.99: 0.0002

10423.88: 0.0002

39639.3: 0.0002

24265.54: 0.0002

7551.16: 0.0002

134.94: 0.0002

70803.13: 0.0002

26058.08: 0.0002

5519.53: 0.0002

34694.96: 0.0002

30189.87: 0.0002

77856.76: 0.0002

143808.39: 0.0002

59605.02: 0.0002

22810.16: 0.0002

45833.87: 0.0002

24726.17: 0.0002

32060.6: 0.0002

21577.22: 0.0002

69126.18: 0.0002

267.38: 0.0002

53586.79: 0.0002

31148.7: 0.0002

92921.99: 0.0002

38096.55: 0.0002

21717.51: 0.0002

23357.27: 0.0002

9293.04: 0.0002

33899.52: 0.0002

17130.26: 0.0002

49778.16: 0.0002

19045.64: 0.0002

20148.51: 0.0002

11224.82: 0.0002

20922.69: 0.0002

22690.73: 0.0002

48234.65: 0.0002

75592.09: 0.0002

92201.51: 0.0002

41652.84: 0.0002

6968.37: 0.0002

49863.23: 0.0002

17520.08: 0.0002

27955.18: 0.0002

6727.7: 0.0002

23072.45: 0.0002

1819.36: 0.0002

27843.26: 0.0002

60850.03: 0.0002

39120.91: 0.0002

62077.51: 0.0002

41348.08: 0.0002

12881.77: 0.0002

76455.17: 0.0002

50959.4: 0.0002

68310.37: 0.0002

37520.39: 0.0002

48227.16: 0.0002

57699.86: 0.0002

37254.18: 0.0002

128488.01: 0.0002

12548.21: 0.0002

5201.79: 0.0002

27284.71: 0.0002

20412.43: 0.0002

4706.69: 0.0002

41643.52: 0.0002

39445.7: 0.0002

41415.13: 0.0002

34118.28: 0.0002

28142.18: 0.0002

55821.07: 0.0002

29990.71: 0.0002

27806.65: 0.0002

5062.51: 0.0002

5396.97: 0.0002

87684.33: 0.0002

9622.64: 0.0002

23025.61: 0.0002

44978.01: 0.0002

31476.35: 0.0002

11246.02: 0.0002

14599.55: 0.0002

3961.9: 0.0002

28221.97: 0.0002

40691.52: 0.0002

34772.99: 0.0002

42008.82: 0.0002

54711.28: 0.0002

99502.56: 0.0002

33551.51: 0.0002

53388.21: 0.0002

14800.36: 0.0002

37946.24: 0.0002

118379.33: 0.0002

48247.85: 0.0002

60385.3: 0.0002

10512.25: 0.0002

83595.79: 0.0002

76601.08: 0.0002

96359.91: 0.0002

47942.04: 0.0002

6697.68: 0.0002

675.08: 0.0002

94722.42: 0.0002

9707.95: 0.0002

58691.17: 0.0002

41371.52: 0.0002

20953.3: 0.0002

12798.63: 0.0002

30002.9: 0.0002

8121.14: 0.0002

3014.85: 0.0002

24177.3: 0.0002

33703.11: 0.0002

35992.01: 0.0002

20362.27: 0.0002

17274.32: 0.0002

34890.3: 0.0002

11663.35: 0.0002

96381.84: 0.0002

3575.21: 0.0002

30345.62: 0.0002

136365.52: 0.0002

89329.33: 0.0002

51621.8: 0.0002

60076.55: 0.0002

81245.5: 0.0002

23571.9: 0.0002

90250.17: 0.0002

1795.2: 0.0002

38282.11: 0.0002

83131.72: 0.0002

12028.2: 0.0002

23011.89: 0.0002

18393.7: 0.0002

56035.34: 0.0002

56449.04: 0.0002

12813.83: 0.0002

133050.09: 0.0002

104867.33: 0.0002

2965.82: 0.0002

26913.26: 0.0002

68344.02: 0.0002

81370.16: 0.0002

6958.19: 0.0002

32247.97: 0.0002

10708.34: 0.0002

39124.62: 0.0002

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56070.28: 0.0002

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25407.37: 0.0002

24237.4: 0.0002

139509.54: 0.0002

36582.31: 0.0002

18299.03: 0.0002

14961.53: 0.0002

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1949.08: 0.0002

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42472.71: 0.0002

23676.9: 0.0002

65640.07: 0.0002

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51208.53: 0.0002

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24745.8: 0.0002

74534.05: 0.0002

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57068.72: 0.0002

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e)push the code Github Repository.