Lab Assignment 3

AIM:-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.

1. 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.

Provide the codes with outputs and explain everything that you do in this step.

import pandas as pd file\_path=r"C:\Users\shrey\OneDrive\Desktop\MALL\_CUSTOMER.csv" df=pd.read\_csv(file\_path)

df.head()

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | CustomerID | Age | Annual Income($) | Spending Score Gender | | |  |
| 0 | 1 | 33.0 | 186.0 | 56.0 male | | |  |
| 1 | 2 | 18.0 | 127.0 | 26.0 male | | |  |
| 2 | 3 | 25.0 | 132.0 | 37.0 male | | |  |
| 3 | 4 | 25.0 | 100.0 | 63.0 male | | |  |
| 4 | 5 | 29.0 | 104.0 | 42.0 male | | |  |
| df |  |  |  |  |  |  | |
|  | CustomerID | Age | Annual Income($) | Spending | Score | Gender | |
| 0 | 1 | 33.0 | 186.0 |  | 56.0 | male | |
| 1 | 2 | 18.0 | 127.0 |  | 26.0 | male | |
| 2 | 3 | 25.0 | 132.0 |  | 37.0 | male | |
| 3 | 4 | 25.0 | 100.0 |  | 63.0 | male | |
| 4 | 5 | 29.0 | 104.0 |  | 42.0 | male | |
| .. | ... | ... | ... |  | ... | ... | |
| 195 | 196 | 25.0 | 161.0 |  | 93.0 | male | |
| 196 | 197 | 25.0 | 189.0 |  | 40.0 | male | |
| 197 | 198 | 33.0 | 125.0 |  | 5.0 | male | |
| 198 | 199 | 19.0 | 108.0 |  | 14.0 | male | |

199 200 34.0 112.0 36.0 male

[200 rows x 5 columns] df.info()

<class 'pandas.core.frame.DataFrame'> RangeIndex: 200 entries, 0 to 199 Data columns (total 5 columns):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Column  CustomerID | Non-Null Count  200 non-null | Dtype |  |
| 0 | int64 |
| 1 | Age | 184 non-null | float64 | |
| 2 | Annual Income($) | 184 non-null | float64 | |
| 3 | Spending Score | 185 non-null | float64 | |

4 Gender 200 non-null object dtypes: float64(3), int64(1), object(1) memory usage: 7.9+ KB

df.head

<bound method NDFrame.head of CustomerID Age Annual Income($)

Spending Score Gender

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 0 | 1 | 33.0 | 186.0 | 56.0 | male |
| 1 | 2 | 18.0 | 127.0 | 26.0 | male |
| 2 | 3 | 25.0 | 132.0 | 37.0 | male |
| 3 | 4 | 25.0 | 100.0 | 63.0 | male |
| 4 | 5 | 29.0 | 104.0 | 42.0 | male |
| .. | ... | ... | ... | ... | ... |
| 195 | 196 | 25.0 | 161.0 | 93.0 | male |
| 196 | 197 | 25.0 | 189.0 | 40.0 | male |
| 197 | 198 | 33.0 | 125.0 | 5.0 | male |
| 198 | 199 | 19.0 | 108.0 | 14.0 | male |
| 199 | 200 | 34.0 | 112.0 | 36.0 | male |

[200 rows x 5 columns]> df.tail

<bound method NDFrame.tail of CustomerID Age Annual Income($) Spending Score Gender

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 0 | 1 | 33.0 | 186.0 | 56.0 | male |
| 1 | 2 | 18.0 | 127.0 | 26.0 | male |
| 2 | 3 | 25.0 | 132.0 | 37.0 | male |
| 3 | 4 | 25.0 | 100.0 | 63.0 | male |
| 4 | 5 | 29.0 | 104.0 | 42.0 | male |
| .. | ... | ... | ... | ... | ... |
| 195 | 196 | 25.0 | 161.0 | 93.0 | male |
| 196 | 197 | 25.0 | 189.0 | 40.0 | male |
| 197 | 198 | 33.0 | 125.0 | 5.0 | male |
| 198 | 199 | 19.0 | 108.0 | 14.0 | male |

199 200 34.0 112.0 36.0 male

[200 rows x 5 columns]> df.describe()

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | CustomerID | Age | Annual Income($) | Spending Score |
| count | 200.000000 | 184.000000 | 184.000000 | 185.000000 |
| mean | 100.500000 | 26.342391 | 148.244565 | 49.470270 |
| std | 57.879185 | 5.133959 | 29.339728 | 28.099985 |
| min | 1.000000 | 18.000000 | 100.000000 | 1.000000 |
| 25% | 50.750000 | 22.000000 | 122.000000 | 26.000000 |
| 50% | 100.500000 | 26.000000 | 150.000000 | 47.000000 |
| 75% | 150.250000 | 30.000000 | 170.250000 | 72.000000 |
| max | 200.000000 | 35.000000 | 200.000000 | 100.000000 |

df.Age.mean() 26.342391304347824

df.Age.mode()

0 30.0

Name: Age, dtype: float64 df.Age.median()

26.0

df.groupby(['Age']).count()

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Age | CustomerID | Annual | Income($) | Spending | Score | Gender |
| 18.0 | 15 |  | 14 |  | 13 | 15 |
| 19.0 | 12 |  | 11 |  | 11 | 12 |
| 20.0 | 3 |  | 3 |  | 3 | 3 |
| 21.0 | 8 |  | 8 |  | 7 | 8 |
| 22.0 | 13 |  | 12 |  | 12 | 13 |
| 23.0 | 9 |  | 7 |  | 9 | 9 |
| 24.0 | 5 |  | 5 |  | 5 | 5 |
| 25.0 | 16 |  | 15 |  | 16 | 16 |
| 26.0 | 14 |  | 14 |  | 12 | 14 |
| 27.0 | 12 |  | 9 |  | 12 | 12 |
| 28.0 | 6 |  | 5 |  | 6 | 6 |
| 29.0 | 10 |  | 10 |  | 9 | 10 |
| 30.0 | 18 |  | 17 |  | 16 | 18 |
| 31.0 | 10 |  | 7 |  | 10 | 10 |
| 32.0 | 8 |  | 7 |  | 7 | 8 |
| 33.0 | 5 |  | 5 |  | 4 | 5 |
| 34.0 | 9 |  | 9 |  | 7 | 9 |
| 35.0 | 11 |  | 10 |  | 10 | 11 |

df.groupby(['Gender']).count()

Age

Annual Income($) Spending Score

26.342391

148.244565

49.470270

Age

Annual Income($) Spending Score

26.0

150.0

47.0

Age

Annual Income($) Spending Score

35.0

200.0

100.0

Age

Annual Income($) Spending Score

5.133959

29.339728

28.099985

CustomerID Age Annual Income($) Spending Score Gender

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| female | 20 | 20 | 8 | 20 |
| male | 180 | 164 | 176 | 165 |

df.Age.std() 5.133959234335101

df[['Age' , 'Annual Income($)', 'Spending Score']].mean()

dtype: float64

df[['Age' , 'Annual Income($)', 'Spending Score']].mode()

Age Annual Income($) Spending Score

0 30.0 170.0 26.0

df[['Age' , 'Annual Income($)', 'Spending Score']].median()

dtype: float64

df[['Age' , 'Annual Income($)', 'Spending Score']].max()

dtype: float64

df[['Age' , 'Annual Income($)', 'Spending Score']].std()

dtype: float64

df2 = df.groupby('Gender') df

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | CustomerID | Age | Annual Income($) | Spending Score Gender |
| 0 | 1 | 33.0 | 186.0 | 56.0 male |
| 1 | 2 | 18.0 | 127.0 | 26.0 male |
| 2 | 3 | 25.0 | 132.0 | 37.0 male |
| 3 | 4 | 25.0 | 100.0 | 63.0 male |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| 4 | 5 | 29.0 | 104.0 | 42.0 | male |
| .. | ... | ... | ... | ... | ... |
| 195 | 196 | 25.0 | 161.0 | 93.0 | male |
| 196 | 197 | 25.0 | 189.0 | 40.0 | male |
| 197 | 198 | 33.0 | 125.0 | 5.0 | male |
| 198 | 199 | 19.0 | 108.0 | 14.0 | male |
|  | 199 | 200 | 34.0 | 112.0 | 36.0 | male |

[200 rows x 5 columns]

for Gender, Gender\_f in df2: print(Gender) print(Gender\_f)

female

CustomerID Age Annual Income($) Spending Score Gender

5 6 35.0 174.0 68.0 female

6 7 32.0 114.0 71.0 female

7 8 32.0 127.0 49.0 female

8 9 28.0 NaN 19.0 female

9 10 30.0 NaN 58.0 female

10 11 35.0 NaN 34.0 female

11 12 32.0 NaN 17.0 female

12 13 27.0 NaN 18.0 female

13 14 27.0 NaN 26.0 female

14 15 31.0 NaN 65.0 female

15 16 22.0 NaN 39.0 female

16 17 25.0 NaN 65.0 female

17 18 19.0 NaN 89.0 female

18 19 31.0 NaN 76.0 female

22 23 23.0 NaN 93.0 female

28 29 29.0 198.0 4.0 female

33 34 31.0 176.0 30.0 female

56 57 24.0 107.0 74.0 female

94 95 28.0 106.0 9.0 female

172 173 25.0 152.0 93.0 female

male

CustomerID Age Annual Income($) Spending Score Gender

0 1 33.0 186.0 56.0 male

1 2 18.0 127.0 26.0 male

2 3 25.0 132.0 37.0 male

3 4 25.0 100.0 63.0 male

4 5 29.0 104.0 42.0 male

.. ... ... ... ... ...

195 196 25.0 161.0 93.0 male

196 197 25.0 189.0 40.0 male

197 198 33.0 125.0 5.0 male

198 199 19.0 108.0 14.0 male

199 200 34.0 112.0 36.0 male

[180 rows x 5 columns] df2.get\_group('male')

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | CustomerID | Age | Annual | Income($) | Spending | Score | Gender |
| 0 | 1 | 33.0 |  | 186.0 |  | 56.0 | male |
| 1 | 2 | 18.0 |  | 127.0 |  | 26.0 | male |
| 2 | 3 | 25.0 |  | 132.0 |  | 37.0 | male |
| 3 | 4 | 25.0 |  | 100.0 |  | 63.0 | male |
| 4 | 5 | 29.0 |  | 104.0 |  | 42.0 | male |
| .. | ... | ... |  | ... |  | ... | ... |
| 195 | 196 | 25.0 |  | 161.0 |  | 93.0 | male |
| 196 | 197 | 25.0 |  | 189.0 |  | 40.0 | male |
| 197 | 198 | 33.0 |  | 125.0 |  | 5.0 | male |
| 198 | 199 | 19.0 |  | 108.0 |  | 14.0 | male |
| 199 | 200 | 34.0 |  | 112.0 |  | 36.0 | male |

[180 rows x 5 columns] df2.get\_group('female')

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | CustomerID | Age | Annual | Income($) | Spending | Score | Gender |
| 5 | 6 | 35.0 |  | 174.0 |  | 68.0 | female |
| 6 | 7 | 32.0 |  | 114.0 |  | 71.0 | female |
| 7 | 8 | 32.0 |  | 127.0 |  | 49.0 | female |
| 8 | 9 | 28.0 |  | NaN |  | 19.0 | female |
| 9 | 10 | 30.0 |  | NaN |  | 58.0 | female |
| 10 | 11 | 35.0 |  | NaN |  | 34.0 | female |
| 11 | 12 | 32.0 |  | NaN |  | 17.0 | female |
| 12 | 13 | 27.0 |  | NaN |  | 18.0 | female |
| 13 | 14 | 27.0 |  | NaN |  | 26.0 | female |
| 14 | 15 | 31.0 |  | NaN |  | 65.0 | female |
| 15 | 16 | 22.0 |  | NaN |  | 39.0 | female |
| 16 | 17 | 25.0 |  | NaN |  | 65.0 | female |
| 17 | 18 | 19.0 |  | NaN |  | 89.0 | female |
| 18 | 19 | 31.0 |  | NaN |  | 76.0 | female |
| 22 | 23 | 23.0 |  | NaN |  | 93.0 | female |
| 28 | 29 | 29.0 |  | 198.0 |  | 4.0 | female |
| 33 | 34 | 31.0 |  | 176.0 |  | 30.0 | female |
| 56 | 57 | 24.0 |  | 107.0 |  | 74.0 | female |
| 94 | 95 | 28.0 |  | 106.0 |  | 9.0 | female |
| 172 | 173 | 25.0 |  | 152.0 |  | 93.0 | female |

df2[['Age' , 'Annual Income($)', 'Spending Score']].median()

Age Annual Income($) Spending Score Gender

|  |  |  |  |
| --- | --- | --- | --- |
| female | 28.5 | 139.5 | 53.5 |
| male | 26.0 | 150.0 | 47.0 |

df2[['Age' , 'Annual Income($)', 'Spending Score']].mean()

Age Annual Income($) Spending Score Gender

|  |  |  |  |
| --- | --- | --- | --- |
| female | 28.300000 | 144.250000 | 49.850000 |
| male | 26.103659 | 148.426136 | 49.424242 |

df2[['Age' , 'Annual Income($)', 'Spending Score']].max()

Age Annual Income($) Spending Score Gender

|  |  |  |  |
| --- | --- | --- | --- |
| female | 35.0 | 198.0 | 93.0 |
| male | 35.0 | 200.0 | 100.0 |

df2[['Age' , 'Annual Income($)', 'Spending Score']].min()

Age Annual Income($) Spending Score Gender

|  |  |  |  |
| --- | --- | --- | --- |
| female | 19.0 | 106.0 | 4.0 |
| male | 18.0 | 100.0 | 1.0 |

df2[['Age' , 'Annual Income($)', 'Spending Score']].std()

Age Annual Income($) Spending Score Gender

|  |  |  |  |
| --- | --- | --- | --- |
| female | 4.317650 | 35.668113 | 28.995962 |
| male | 5.185656 | 29.129371 | 28.079841 |

url =

"https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.d ata"

df3 = pd.read\_csv(url) df3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 5.1 | 3.5 | 1.4 | 0.2 | Iris-setosa |
| 0 | 4.9 | 3.0 | 1.4 | 0.2 | Iris-setosa |
| 1 | 4.7 | 3.2 | 1.3 | 0.2 | Iris-setosa |
| 2 | 4.6 | 3.1 | 1.5 | 0.2 | Iris-setosa |
| 3 | 5.0 | 3.6 | 1.4 | 0.2 | Iris-setosa |
| 4 | 5.4 | 3.9 | 1.7 | 0.4 | Iris-setosa |
| .. | ... | ... | ... | ... | ... |
| 144 | 6.7 | 3.0 | 5.2 | 2.3 | Iris-virginica |
| 145 | 6.3 | 2.5 | 5.0 | 1.9 | Iris-virginica |
| 146 | 6.5 | 3.0 | 5.2 | 2.0 | Iris-virginica |
| 147 | 6.2 | 3.4 | 5.4 | 2.3 | Iris-virginica |
| 148 | 5.9 | 3.0 | 5.1 | 1.8 | Iris-virginica |

[149 rows x 5 columns] df3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  | A | B | C | D | E |
| 0 | 4.9 | 3.0 | 1.4 | 0.2 | Iris-setosa |
| 1 | 4.7 | 3.2 | 1.3 | 0.2 | Iris-setosa |
| 2 | 4.6 | 3.1 | 1.5 | 0.2 | Iris-setosa |
| 3 | 5.0 | 3.6 | 1.4 | 0.2 | Iris-setosa |
| 4 | 5.4 | 3.9 | 1.7 | 0.4 | Iris-setosa |
| .. | ... | ... | ... | ... | ... |
| 144 | 6.7 | 3.0 | 5.2 | 2.3 | Iris-virginica |
| 145 | 6.3 | 2.5 | 5.0 | 1.9 | Iris-virginica |
| 146 | 6.5 | 3.0 | 5.2 | 2.0 | Iris-virginica |
| 147 | 6.2 | 3.4 | 5.4 | 2.3 | Iris-virginica |
|  | 148 | 5.9 | 3.0 | 5.1 | 1.8 | Iris-virginica |

[149 rows x 5 columns] df4.get\_group("Iris-setosa")

A B C D E

0 4.9 3.0 1.4 0.2 Iris-setosa

1 4.7 3.2 1.3 0.2 Iris-setosa

2 4.6 3.1 1.5 0.2 Iris-setosa

3 5.0 3.6 1.4 0.2 Iris-setosa

4 5.4 3.9 1.7 0.4 Iris-setosa

5 4.6 3.4 1.4 0.3 Iris-setosa

6 5.0 3.4 1.5 0.2 Iris-setosa

7 4.4 2.9 1.4 0.2 Iris-setosa

8 4.9 3.1 1.5 0.1 Iris-setosa

9 5.4 3.7 1.5 0.2 Iris-setosa

10 4.8 3.4 1.6 0.2 Iris-setosa

11 4.8 3.0 1.4 0.1 Iris-setosa

12 4.3 3.0 1.1 0.1 Iris-setosa

13 5.8 4.0 1.2 0.2 Iris-setosa

14 5.7 4.4 1.5 0.4 Iris-setosa

15 5.4 3.9 1.3 0.4 Iris-setosa

16 5.1 3.5 1.4 0.3 Iris-setosa

17 5.7 3.8 1.7 0.3 Iris-setosa

18 5.1 3.8 1.5 0.3 Iris-setosa

19 5.4 3.4 1.7 0.2 Iris-setosa

20 5.1 3.7 1.5 0.4 Iris-setosa

21 4.6 3.6 1.0 0.2 Iris-setosa

22 5.1 3.3 1.7 0.5 Iris-setosa

23 4.8 3.4 1.9 0.2 Iris-setosa

24 5.0 3.0 1.6 0.2 Iris-setosa

25 5.0 3.4 1.6 0.4 Iris-setosa

26 5.2 3.5 1.5 0.2 Iris-setosa

27 5.2 3.4 1.4 0.2 Iris-setosa

28 4.7 3.2 1.6 0.2 Iris-setosa

29 4.8 3.1 1.6 0.2 Iris-setosa

30 5.4 3.4 1.5 0.4 Iris-setosa

31 5.2 4.1 1.5 0.1 Iris-setosa

32 5.5 4.2 1.4 0.2 Iris-setosa

33 4.9 3.1 1.5 0.1 Iris-setosa

34 5.0 3.2 1.2 0.2 Iris-setosa

35 5.5 3.5 1.3 0.2 Iris-setosa

36 4.9 3.1 1.5 0.1 Iris-setosa

37 4.4 3.0 1.3 0.2 Iris-setosa

38 5.1 3.4 1.5 0.2 Iris-setosa

39 5.0 3.5 1.3 0.3 Iris-setosa

40 4.5 2.3 1.3 0.3 Iris-setosa

41 4.4 3.2 1.3 0.2 Iris-setosa

42 5.0 3.5 1.6 0.6 Iris-setosa

43 5.1 3.8 1.9 0.4 Iris-setosa

44 4.8 3.0 1.4 0.3 Iris-setosa

45 5.1 3.8 1.6 0.2 Iris-setosa

46 4.6 3.2 1.4 0.2 Iris-setosa

47 5.3 3.7 1.5 0.2 Iris-setosa

48 5.0 3.3 1.4 0.2 Iris-setosa

df4.get\_group("Iris-virginica")

A B C D E

1. 6.3 3.3 6.0 2.5 Iris-virginica
2. 5.8 2.7 5.1 1.9 Iris-virginica
3. 7.1 3.0 5.9 2.1 Iris-virginica
4. 6.3 2.9 5.6 1.8 Iris-virginica
5. 6.5 3.0 5.8 2.2 Iris-virginica
6. 7.6 3.0 6.6 2.1 Iris-virginica
7. 4.9 2.5 4.5 1.7 Iris-virginica
8. 7.3 2.9 6.3 1.8 Iris-virginica
9. 6.7 2.5 5.8 1.8 Iris-virginica
10. 7.2 3.6 6.1 2.5 Iris-virginica
11. 6.5 3.2 5.1 2.0 Iris-virginica
12. 6.4 2.7 5.3 1.9 Iris-virginica
13. 6.8 3.0 5.5 2.1 Iris-virginica
14. 5.7 2.5 5.0 2.0 Iris-virginica
15. 5.8 2.8 5.1 2.4 Iris-virginica
16. 6.4 3.2 5.3 2.3 Iris-virginica
17. 6.5 3.0 5.5 1.8 Iris-virginica
18. 7.7 3.8 6.7 2.2 Iris-virginica
19. 7.7 2.6 6.9 2.3 Iris-virginica
20. 6.0 2.2 5.0 1.5 Iris-virginica
21. 6.9 3.2 5.7 2.3 Iris-virginica
22. 5.6 2.8 4.9 2.0 Iris-virginica
23. 7.7 2.8 6.7 2.0 Iris-virginica
24. 6.3 2.7 4.9 1.8 Iris-virginica
25. 6.7 3.3 5.7 2.1 Iris-virginica
26. 7.2 3.2 6.0 1.8 Iris-virginica
27. 6.2 2.8 4.8 1.8 Iris-virginica
28. 6.1 3.0 4.9 1.8 Iris-virginica
29. 6.4 2.8 5.6 2.1 Iris-virginica

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1. 7.2 3.0 5.8 1.6 Iris-virginica
2. 7.4 2.8 6.1 1.9 Iris-virginica
3. 7.9 3.8 6.4 2.0 Iris-virginica
4. 6.4 2.8 5.6 2.2 Iris-virginica
5. 6.3 2.8 5.1 1.5 Iris-virginica
6. 6.1 2.6 5.6 1.4 Iris-virginica
7. 7.7 3.0 6.1 2.3 Iris-virginica
8. 6.3 3.4 5.6 2.4 Iris-virginica
9. 6.4 3.1 5.5 1.8 Iris-virginica
10. 6.0 3.0 4.8 1.8 Iris-virginica
11. 6.9 3.1 5.4 2.1 Iris-virginica
12. 6.7 3.1 5.6 2.4 Iris-virginica
13. 6.9 3.1 5.1 2.3 Iris-virginica
14. 5.8 2.7 5.1 1.9 Iris-virginica
15. 6.8 3.2 5.9 2.3 Iris-virginica
16. 6.7 3.3 5.7 2.5 Iris-virginica
17. 6.7 3.0 5.2 2.3 Iris-virginica
18. 6.3 2.5 5.0 1.9 Iris-virginica
19. 6.5 3.0 5.2 2.0 Iris-virginica
20. 6.2 3.4 5.4 2.3 Iris-virginica
21. 5.9 3.0 5.1 1.8 Iris-virginica

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| df4.mean() |  | | | |
| E | A | B | C | D |
| Iris-setosa | 5.004082 | 3.416327 | 1.465306 | 0.244898 |
| Iris-versicolor | 5.936000 | 2.770000 | 4.260000 | 1.326000 |
| Iris-virginica | 6.588000 | 2.974000 | 5.552000 | 2.026000 |
| df4.std() |  |  |  |  |
|  | A | B | C | D |
| E |  |  |  |  |
| Iris-setosa | 0.355879 | 0.384787 | 0.175061 | 0.108130 |
| Iris-versicolor | 0.516171 | 0.313798 | 0.469911 | 0.197753 |
| Iris-virginica | 0.635880 | 0.322497 | 0.551895 | 0.274650 |