**Data visualization Solutions:**

**1**

**a.**

import pandas as pd

df=pd.read\_csv("E:\\Automobile\_data.csv")

df.head(5)

df.tail(5)

**b.**

import pandas as pd

df=pd.read\_csv("E:\\Automobile\_data.csv",na\_values={

'price':["?","n.a"],

'stroke':["?","n.a"],

'horsepower':["?","n.a"],

'peak-rpm':["?","n.a"],

'average-mileage':["?","n.a"]})

print (df)

**c.**

import pandas as pd

df=pd.read\_csv("E:\\Automobile\_data.csv")

df = df [['company','price']][df.price==df['price'].max()]

df

**d.**

import pandas as pd

df=pd.read\_csv("E:\\Automobile\_data.csv")

car\_Manufacturers = df.groupby('company')

toyotaDf = car\_Manufacturers.get\_group('toyota')

toyotaDf

**e.**

import pandas as pd

df=pd.read\_csv("E:\\Automobile\_data.csv")

df['company'].value\_counts()

**f.**

import pandas as pd

df=pd.read\_csv("E:\\Automobile\_data.csv")

car\_Manufacturers = df.groupby('company')

priceDf = car\_Manufacturers['company','price'].max()

priceDf

**g**

import pandas as pd

df=pd.read\_csv("E:\\Automobile\_data.csv")

car\_Manufacturers = df.groupby('company')

mileageDf = car\_Manufacturers['company','average-mileage'].mean()

mileageDf

**h.**

import pandas as pd

carsDf=pd.read\_csv("E:\\Automobile\_data.csv")

carsDf = carsDf.sort\_values(by=['price'], ascending=False)

carsDf.head(5)

2.

a

import pandas as pd

import matplotlib.pyplot as plt

df = pd.read\_csv("E:\\company\_sales\_data.csv")

profitList = df ['total\_profit'].tolist()

monthList = df ['month\_number'].tolist()

plt.plot(monthList, profitList)

plt.xlabel('Month number')

plt.ylabel('Profit in dollar')

plt.xticks(monthList)

plt.title('Company profit per month')

plt.yticks([100000, 200000, 300000, 400000, 500000])

plt.show()

b.

import pandas as pd

import matplotlib.pyplot as plt

df = pd.read\_csv("E:\\company\_sales\_data.csv")

monthList = df ['month\_number'].tolist()

faceCremSalesData = df ['facecream'].tolist()

faceWashSalesData = df ['facewash'].tolist()

toothPasteSalesData = df ['toothpaste'].tolist()

bathingsoapSalesData = df ['bathingsoap'].tolist()

shampooSalesData = df ['shampoo'].tolist()

moisturizerSalesData = df ['moisturizer'].tolist()

plt.plot(monthList, faceCremSalesData, label = 'Facecream', marker='o', linewidth=1)

plt.plot(monthList, faceWashSalesData, label = 'FaceWash', marker='o', linewidth=1)

plt.plot(monthList, toothPasteSalesData, label = 'ToothPaste', marker='o', linewidth=1)

plt.plot(monthList, bathingsoapSalesData, label = 'bathingsoap', marker='o', linewidth=1)

plt.plot(monthList, shampooSalesData, label = 'shampoo', marker='o', linewidth=1)

plt.plot(monthList, moisturizerSalesData, label = 'moisturizer', marker='o', linewidth=1)

plt.xlabel('Month Number')

plt.ylabel('Sales units in number')

plt.legend(loc='upper left')

plt.xticks(monthList)

plt.yticks([1000, 2000, 4000, 6000, 8000, 10000, 12000, 15000, 18000])

plt.title('Sales data')

plt.show()

c.

import pandas as pd

import matplotlib.pyplot as plt

df = pd.read\_csv("E:\\company\_sales\_data.csv")

monthList = df ['month\_number'].tolist()

faceCrem= df ['facecream'].tolist()

faceWash= df ['facewash'].tolist()

plt.bar([a-0.25 for a in monthList], faceCrem, width= 0.25, label = 'FaceCream')

plt.bar([a+0.25 for a in monthList], faceWash, width= -0.25, label = 'Face Wash' )

plt.xlabel('Month Number')

plt.ylabel('Sales units in number')

plt.legend(loc='upper left')

plt.title(' Sales data')

plt.xticks(monthList)

plt.grid(True, linewidth= 1, linestyle="--")

plt.title('Facewash and facecream sales data')

plt.show()

d.

import pandas as pd

import matplotlib.pyplot as plt

df = pd.read\_csv("E:\\company\_sales\_data.csv")

monthList = df ['month\_number'].tolist()

bathingsoapSalesData = df ['bathingsoap'].tolist()

plt.bar(monthList, bathingsoapSalesData)

plt.xlabel('Month Number')

plt.ylabel('Sales units in number')

plt.title(' Sales data')

plt.xticks(monthList)

plt.grid(True, linewidth= 1, linestyle="--")

plt.title('bathingsoap sales data')

plt.savefig('D:\\sales\_data\_of\_bathingsoap.png', dpi=150)

plt.show()

e.

import pandas as pd

import matplotlib.pyplot as plt

df = pd.read\_csv("E:\\company\_sales\_data.csv")

monthList = df ['month\_number'].tolist()

labels = ['FaceCream', 'FaseWash', 'ToothPaste', 'Bathing soap', 'Shampoo', 'Moisturizer']

salesData = [df ['facecream'].sum(), df ['facewash'].sum(), df ['toothpaste'].sum(),

df ['bathingsoap'].sum(), df ['shampoo'].sum(), df ['moisturizer'].sum()]

plt.pie(salesData, labels=labels, autopct='%1.1f')

plt.title('Sales data')

plt.show()

f.

import pandas as pd

import matplotlib.pyplot as plt

df = pd.read\_csv("E:\\company\_sales\_data.csv")

profitList = df ['total\_profit'].tolist()

profit\_range = [150000, 175000, 200000, 225000, 250000, 300000, 350000]

plt.hist(profitList, profit\_range, label = 'Profit data')

plt.xlabel('profit range in dollar')

plt.ylabel('Actual Profit in dollar')

plt.legend(loc='upper left')

plt.xticks(profit\_range)

plt.title('Profit data')

plt.show()