ASSIGNMENT NO.3

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Problem Statement

Load the dataset: birthwt Risk Factors Associated with Low Infant Birth Weight at
https://raw.github.com/neurospin/pystatsml/master/datasets/birthwt.csv

1.Test the association of mother's (bwt) age and birth weight using the correlation test and linear regeression.

2.Test the association of mother's weight (lwt) and birth weight using the correlation testand linear regeression.

3.Produce two scatter plot of:
(i) age by birth weight;
(ii) mother's weight by birth weight. Elaborate the Conclusion

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
```

```
df = pd.read_csv("/work/BIRTHWT/birthwt.csv")
```

```
def calc_covariance(dataset1,dataset2):
    '''
 Def : Covariance measures the relationship trend
 between two sets of data.
 Formula : 1) Σ((X - X_mean)*(Y - Y_mean)) / n
    '''

    mean1 = np.mean(dataset1)
    mean2 = np.mean(dataset2)
    return np.sum(np.multiply(dataset1-mean1,dataset2-mean2))/len(dataset1)
```

```
def correlation(dataset1,dataset2):
    '''
 Def : Covariance measures the relationship trend between two sets of data.
 Formula : 1) cov(x,y)/(std(x)*std(y))
 '''
    cov =calc_covariance(dataset1,dataset2)
    sd1 = np.std(dataset1)
    sd2 = np.std(dataset2)

    return cov/(sd1*sd2)
```

1. Test the association of mother's (bwt) age and birth weight using the correlation test and linear regeression.

- Using correlation coefficients test :

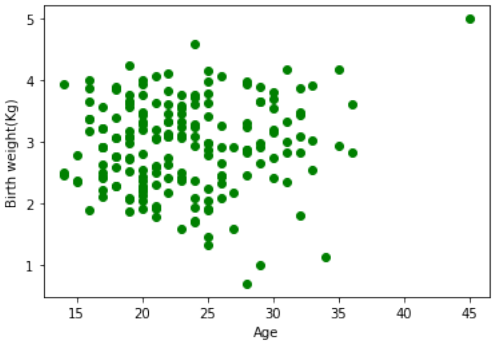
```
# Age of mother
age = df["age"]
age = age.to_numpy()

# Birth weight in grams
birthwt = df["bwt"]
birthwt = birthwt.to_numpy()
```

```
correlation(age, birthwt)
```

```
0.0903178136685326
```

```
# Converting birth weight from gram to kg for better scaling
plt.scatter(age,birthwt/1000,c ="green")
plt.xlabel("Age")
plt.ylabel("Birth weight(Kg)")
```

```
Text(0, 0.5, 'Birth weight(Kg)')
```



Conclusion:

The corellation value is 0.09 which is very low, this means the correlation is non-existent between the maternal age and birth weight.

- Using simple linear regression :

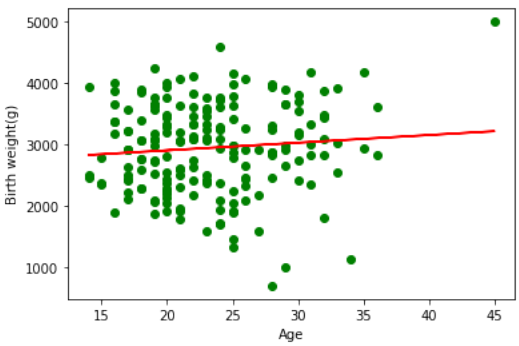
```
lr = LinearRegression()
age = age.reshape(-1,1)
lr.fit(age,birthwt)
```

```
LinearRegression()
```

```
y = lr.predict(age)
print("Coefficients :",lr.coef_[0])
print("intercept :",lr.intercept_)
```

```
Coefficients : 12.429712027714634
intercept : 2655.744469705171
```

```
plt.plot(age,y,color= "red")
plt.scatter(age,birthwt,c= "green")
plt.xlabel("Age")
plt.ylabel("Birth weight(g)")
plt.show()
```



2. Test the association of mother's weight (lwt) and birth weight using the correlation testand linear regeression.

- Using correlation coefficients test :

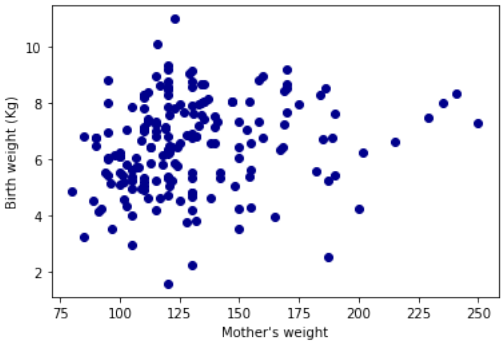
```
# Mother's weight during last menstrual period.(in pounds)
motherswt = df["lwt"]
motherswt =motherswt.to_numpy()

# converting in grams to pounds
birthwt = birthwt/454
```

```
correlation(motherswt,birthwt)
```

```
0.18573328444909923
```

```
plt.xlabel("Mother's weight")
plt.ylabel("Birth weight (Kg)")
plt.scatter(motherswt,birthwt,c = "darkblue")
```

```
<matplotlib.collections.PathCollection at 0x7f98602fef10>
```



Conclusion:

The correlation value is 0.18573328444909923 which is positive correlation, but the value is small which means the correlation is positive and small between the maternal weight and birth weight.

- Using simple linear regression :

```
motherswt =motherswt.reshape(-1,1)
lr.fit(motherswt,birthwt)
```

```
LinearRegression()
```

```
z = lr.predict(motherswt)
print("Coefficients :",lr.coef_[0])
print("intercept :",lr.intercept_)
```

```
Coefficients : 0.009755743626323136
intercept : 5.219435061396471
```

```
plt.plot(motherswt,z,c="orange")
plt.scatter(motherswt,birthwt,c ="darkblue")
plt.xlabel("Mother's weight")
plt.ylabel("Birth weight")
plt.show()
```