```
#importing required libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from pandas.plotting import scatter_matrix
from sklearn.linear_model import LinearRegression
from time import time
from sklearn.model_selection import train_test_split
from sklearn import linear_model
import sklearn.metrics as sm


#connecting to cloud
from google.colab import drive
drive.mount("/content/gdrive")
```

```
Drive already mounted at /content/gdrive; to attempt to forcibly remount, call drive
```

```
%cd /content/gdrive/My Drive/Colab Notebooks/
```

```
/content/gdrive/My Drive/Colab Notebooks
```

```
#data exploration
df = pd.read_csv("CeoCompensation.csv")
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 12 columns):
 #   Column   Non-Null Count  Dtype  
---  ------   --------------  -----  
 0   COMP     100 non-null    int64  
 1   AGE      100 non-null    int64  
 2   EDUCATN  100 non-null    int64  
 3   BACKGRD  100 non-null    int64  
 4   TENURE   100 non-null    int64  
 5   EXPER    100 non-null    float64
 6   SALES    100 non-null    int64  
 7   VAL      100 non-null    float64
 8   PCNTOWN  100 non-null    float64
 9   PROF     100 non-null    int64  
 10  COMPANY  100 non-null    object 
 11  BIRTH    99 non-null     object 
dtypes: float64(3), int64(7), object(2)
memory usage: 9.5+ KB
```

```
df.head()
```

	COMP	AGE	EDUCATN	BACKGRD	TENURE	EXPER	SALES	VAL	PCNTOWN	PROF	COMPANY	BI
0	1948	55	1	1	23	23.0	1227	7.6	0.55	145	AdvM	
1	809	59	1	2	38	0.5	19196	0.4	0.01	505	aetna	
2	721	53	2	1	26	0.5	839	1.5	0.10	-60	aller	

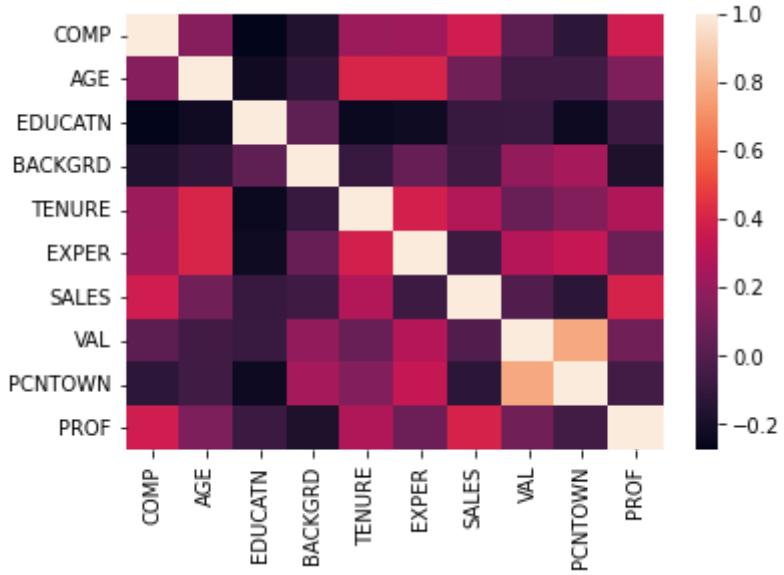
```
#checking for null
print(df.isnull().sum())
df[df.isnull() == True].head()
```

```
COMP        0
AGE         0
EDUCATN     0
BACKGRD     0
TENURE      0
EXPER       0
SALES       0
VAL         0
PCNTOWN     0
PROF        0
COMPANY     0
BIRTH       1
dtype: int64
```

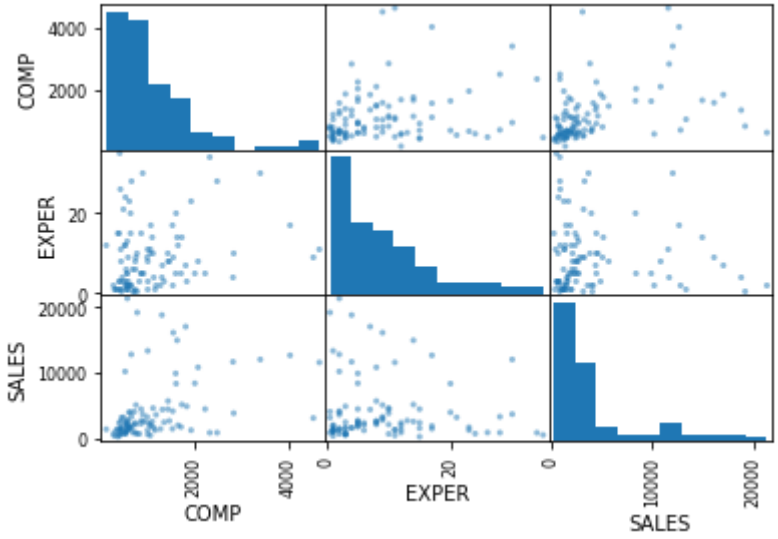
	COMP	AGE	EDUCATN	BACKGRD	TENURE	EXPER	SALES	VAL	PCNTOWN	PROF	COMPANY	E
0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	

```
sns.heatmap(df.corr())
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f3b4eba4810>
```

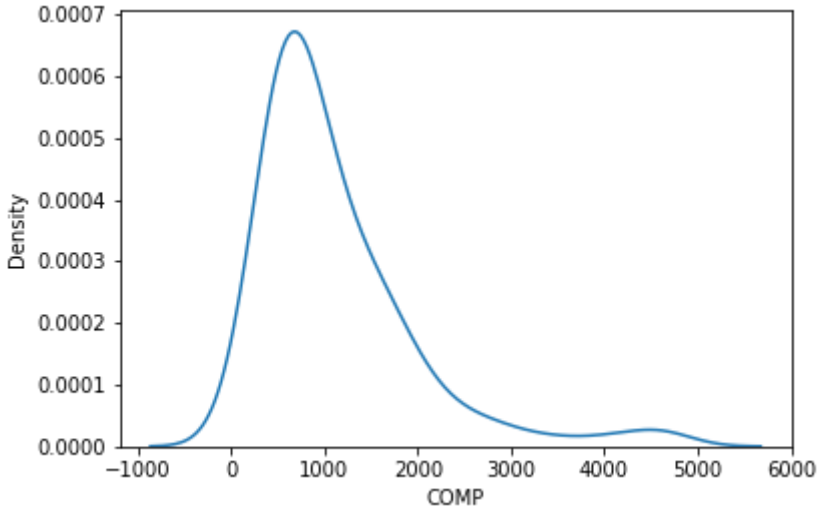


```
#multivariate analysis
comp_sm = scatter_matrix(df[['COMP', 'EXPER', 'SALES']])
```




```
ax = sns.kdeplot(df['COMP'])
ax
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f3b4620e090>
```



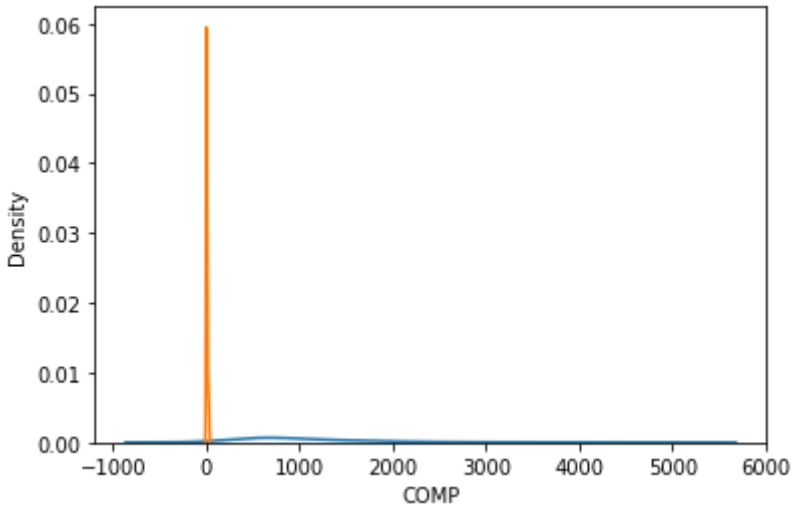

```
df['COMP'].describe()
```

```
count     100.000000
mean     1121.670000
std       852.723504
min       155.000000
25%       575.500000
50%       806.500000
75%      1457.250000
max      4657.000000
Name: COMP, dtype: float64
```

```
comp = ['COMP', 'EXPER']

for col in comp:
```

```
    ax_comp = sns.kdeplot(df[col])
    ax_comp
```




```
plt.figure(figsize=(15,8))
for col in list(df['EXPER'].unique()):
    sns.kdeplot(df['COMP'][df['EXPER'] == col], label = col)
```

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/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:316: UserWarning: Dat
  warnings.warn(msg, UserWarning)
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:316: UserWarning: Dat
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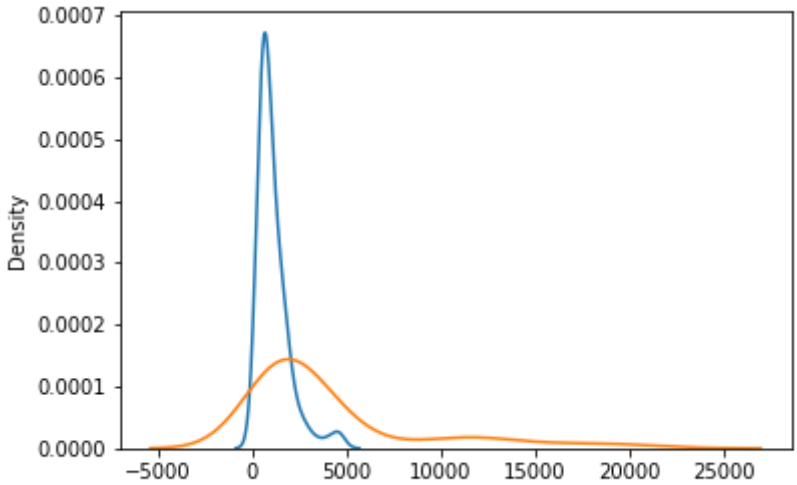
  warnings.warn(msg, UserWarning)
```

```
comp = ['COMP', 'SALES']

for col in comp:
    ax_comp2 = sns.kdeplot(df[col])
    ax_comp2
```




```
plt.figure(figsize=(15,8))
for col in list(df['SALES'].unique()):
    sns.kdeplot(df['COMP'][df['SALES'] == col], label = col)
```

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  warnings.warn(msg, UserWarning)
```
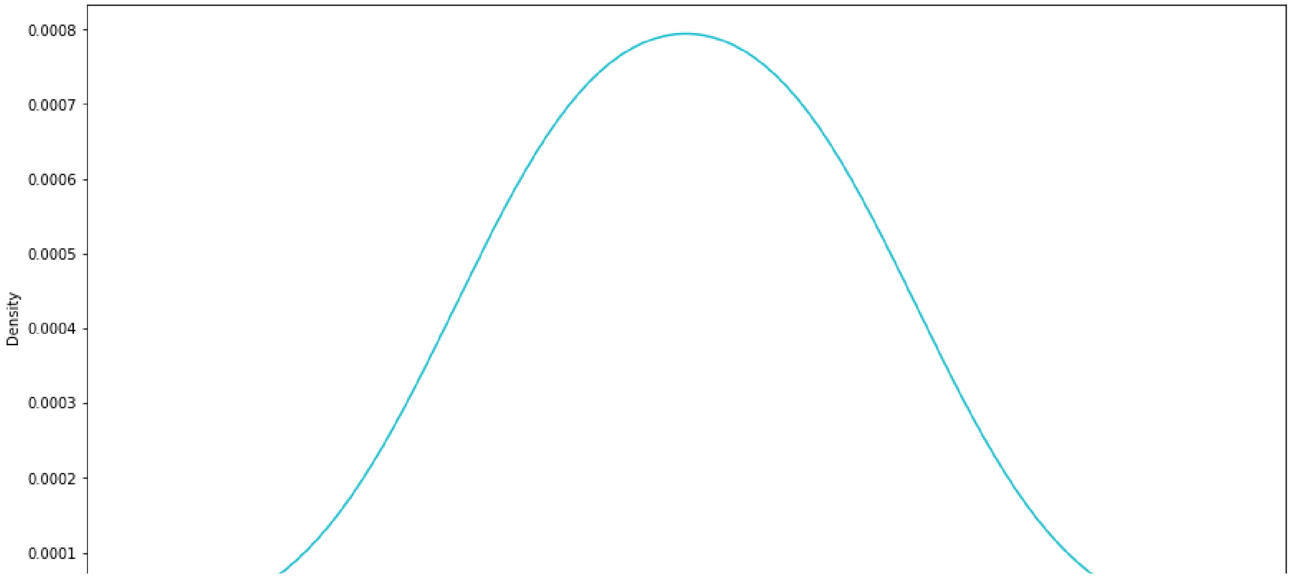



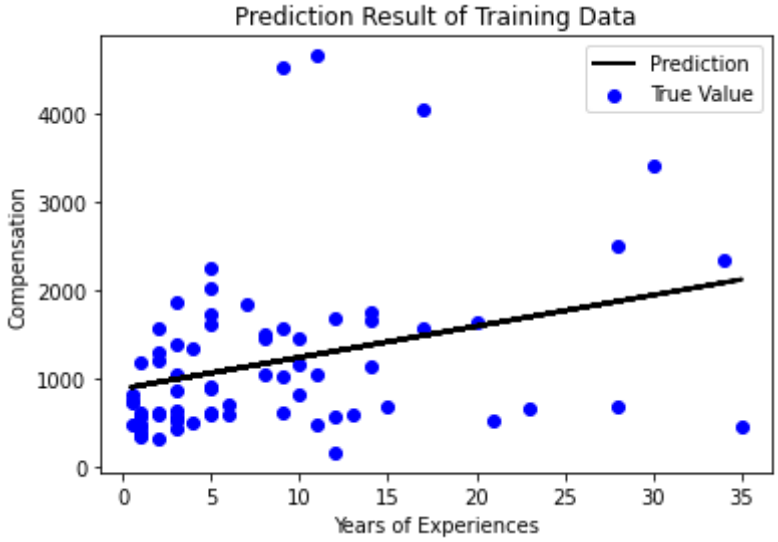

```
#linear regression model for compensation and experience
X = df['EXPER']
Y = df['COMP']


#training and dataset
X_train, X_test, Y_train, Y_test = train_test_split(X,Y, test_size=0.3, random_state=42)


X_train = np.array(X_train).reshape((len(X_train),1))
Y_train = np.array(Y_train).reshape((len(Y_train),1))

X_test = np.array(X_test).reshape(len(X_test), 1)
Y_test = np.array(Y_test).reshape(len(Y_test), 1)
```

```
model = linear_model.LinearRegression()
model.fit(X_train, Y_train)
```

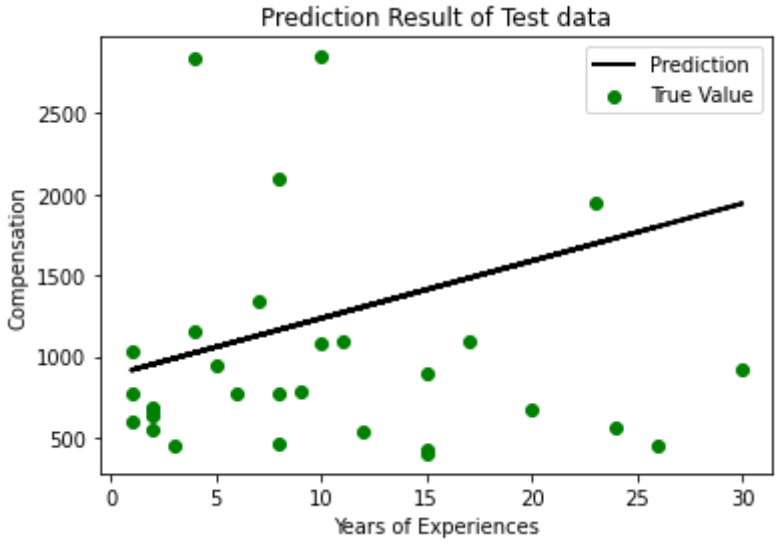
```
LinearRegression()
```

```
#Prediction Result of Training Data
Y_train_pred = model.predict(X_train)

plt.figure()
plt.scatter(X_train, Y_train, color='blue', label="True Value")
```

```
plt.scatter(X_train, Y_train, color= blue , label= True Value )
plt.plot(X_train, Y_train_pred, color='black', linewidth=2, label="Prediction")
plt.xlabel("Years of Experiences")
plt.ylabel("Compensation")
plt.title('Prediction Result of Training Data')
plt.legend()
plt.show()
```




```
#Prediction Result of Testing Data
Y_test_pred = model.predict(X_test)

plt.figure()
plt.scatter(X_test, Y_test, color='green', label='True Value')
plt.plot(X_test, Y_test_pred, color='black', linewidth=2, label='Prediction')
plt.xlabel("Years of Experiences")
plt.ylabel("Compensation")
plt.title('Prediction Result of Test data')
plt.legend()
plt.show()
```




```
print("Mean squared error =", round(sm.mean_squared_error(Y_test, Y_test_pred), 2))
print("Explain variance score =", round(sm.explained_variance_score(Y_test, Y_test_pred),
```

```
print("R2 score =", round(sm.r2_score(Y_test, Y_test_pred), 2))
```

```
Mean squared error = 558290.99
Explain variance score = -0.23
R2 score = -0.39
```

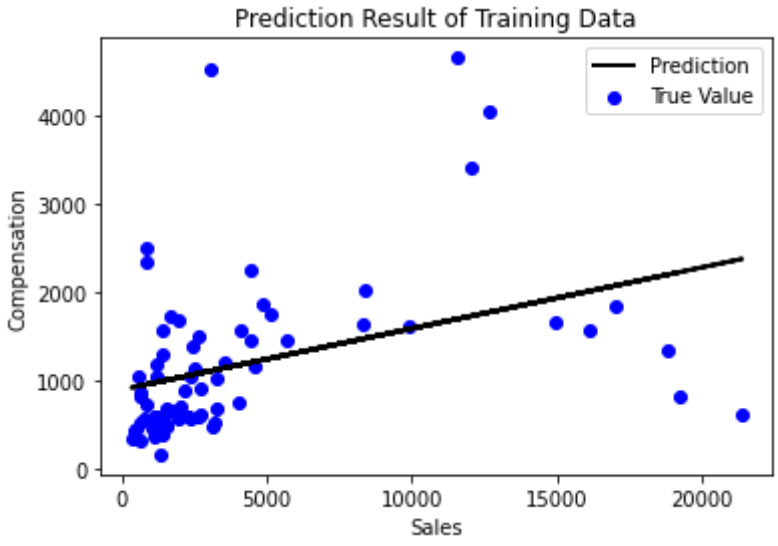
```
#linear regression model for compensation and sales

X = df['SALES']
Y = df['COMP']
```

```
X_train, X_test, Y_train, Y_test = train_test_split(X,Y, test_size=0.3, random_state=42)
X_train = np.array(X_train).reshape((len(X_train),1))
Y_train = np.array(Y_train).reshape((len(Y_train),1))

X_test = np.array(X_test).reshape(len(X_test), 1)
Y_test = np.array(Y_test).reshape(len(Y_test), 1)
model = linear_model.LinearRegression()
model.fit(X_train, Y_train)
```

```
LinearRegression()
```

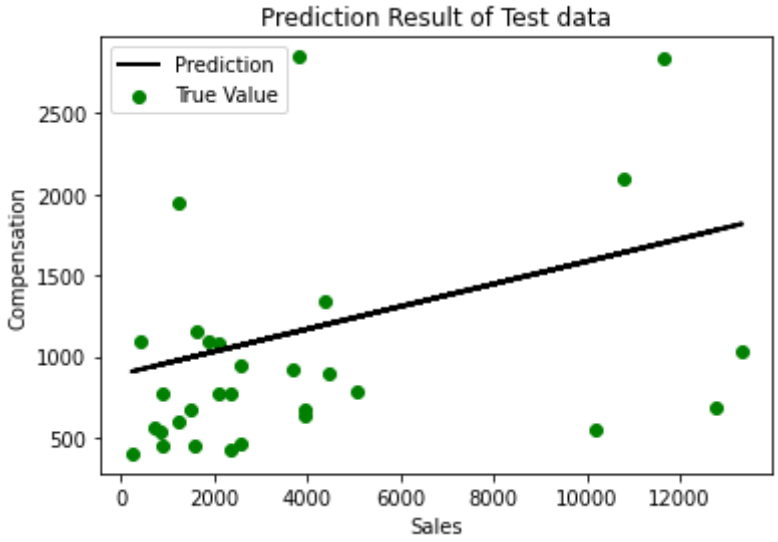
```
Y_train_pred = model.predict(X_train)
```

```
#Prediction Result of Training data
plt.figure()
plt.scatter(X_train, Y_train, color='blue', label="True Value")
plt.plot(X_train, Y_train_pred, color='black', linewidth=2, label="Prediction")
plt.xlabel("Sales")
plt.ylabel("Compensation")
plt.title('Prediction Result of Training Data')
plt.legend()
plt.show()
```




```
#Prediction Result of Testing data
Y_test_pred = model.predict(X_test)
```

```
plt.figure()
plt.scatter(X_test, Y_test, color='green', label='True Value')
plt.plot(X_test, Y_test_pred, color='black', linewidth=2, label='Prediction')
plt.xlabel("Sales")
plt.ylabel("Compensation")
plt.title('Prediction Result of Test data')
plt.legend()
plt.show()
```




```
print("Mean squared error =", round(sm.mean_squared_error(Y_test, Y_test_pred), 2))
print("Explain variance score =", round(sm.explained_variance_score(Y_test, Y_test_pred),
print("R2 score =", round(sm.r2_score(Y_test, Y_test_pred), 2))
```

```
Mean squared error = 382854.66
Explain variance score = 0.12
R2 score = 0.05
```