DATA ANALYTICS ASSIGNMENT

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PROBLEM STATEMENT:

APPLYING UNIVARIATE AND MULTIVARIATE REGRESSION ON A DATASET.

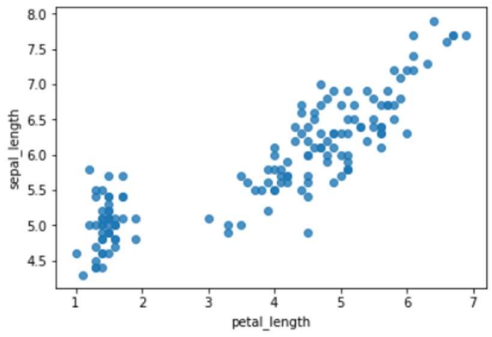
SCREENSHOTS

UNIVARIATE REGRESSION

In [29]:
```
%matplotlib inline

# Imports
import matplotlib.pyplot as plt
import matplotlib as mpl
import pandas as pd
import seaborn as sns
import sklearn
import numpy as np

df = pd.read_csv('iris.csv')
```

In [38]:
```
snsdata = df.drop(['petal_width','sepal_width'], axis=1)
```

In [39]:
```
sns.regplot(x='petal_length', y='sepal_length', data=df, fit_reg=False)
plt.show()
```



In [40]:
```
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = np.asarray(train_test_split(df['petal_length'], df['sepal_length'], test_size=0.1))
```

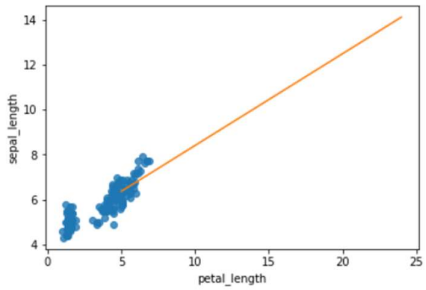
In [41]:
```
from sklearn.linear_model import LinearRegression

reg = LinearRegression()
reg.fit(X_train.values.reshape(-1,1), y_train.values.reshape(-1,1))
```

Out[41]:
```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None,
         normalize=False)
```

In [42]:
```
print('Score: ', reg.score(X_test.values.reshape(-1,1), y_test.values.reshape(-1,1)))
```

```
Score:  0.7341603491204893
```

In [43]:
```
x_line = np.arange(5,25).reshape(-1,1)
sns.regplot(x=df['petal_length'], y=df['sepal_length'], data=df, fit_reg=False)
plt.plot(x_line, reg.predict(x_line))
plt.show()
```



MULTIVARIATE REGRESSION

In [5]:
```
n = len(petal_length)
x0 = np.ones(n)
X = np.array([x0, petal_length, petal_width]).T
B = np.array([0, 0, 0])
Y = np.array(sepal_length)
alpha = 0.0001
```

In [6]:
```
def cost_function(X, Y, B):
    m = len(Y)
    J = np.sum((X.dot(B) - Y) ** 2)/(2 * m)
    return J
```

In [7]:
```
cost_function(X, Y, B)
```

Out[7]:
```
17.412833333333335
```

In [8]:
```
def gradient_descent(X, Y, B, alpha, iterations):
    cost_history = [0] * iterations
    m = len(Y)

    for iteration in range(iterations):
        h = X.dot(B)
        loss = h - Y
        gradient = X.T.dot(loss) / m
        B = B - alpha * gradient
        cost = cost_function(X, Y, B)
        cost_history[iteration] = cost

    return B, cost_history
```

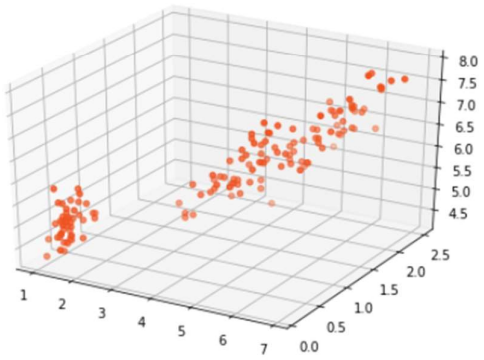
In [1]:
```
%matplotlib inline
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
plt.rcParams['figure.figsize'] = (20.0, 10.0)
from mpl_toolkits.mplot3d import Axes3D
```

In [2]:
```
df=pd.read_csv('iris.csv')
snsdata = df.drop(['sepal_width'], axis=1)
df.shape
```

Out[2]: (150, 5)

In [3]:
```
petal_length = df['petal_length'].values
petal_width = df['petal_width'].values
sepal_length = df['sepal_length'].values
```

In [4]:
```
fig = plt.figure()
ax = Axes3D(fig)
ax.scatter(petal_length,petal_width,sepal_length, color='#ef5423')
plt.show()
```



In [9]:
```
newB, cost_history = gradient_descent(X, Y, B, alpha, 100000)
```

In [10]:
```
cost_history[-1]
```

Out[10]: 0.1150121617429721

In [11]:
```
newB
```

Out[11]: array([3.42528853, 0.88122025, -0.82959902])

In [12]:
```
def rmse(Y, Y_pred):
    rmse = np.sqrt(sum((Y - Y_pred) ** 2) / len(Y))
    return rmse
```

In [13]:
```
Y_pred = X.dot(newB)
```

In [14]:
```
rmse(Y, Y_pred)
```

Out[14]: 0.4796085106479496