# Polynomial Regression

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**Problem Statement**

**Lets imagine we are an HR and we ant to hire , we found a great fit for the job . But the question comes what is your salary expectiation he demands $160,000 per year in prev company We are gonna build a plynomial regression to predict his previous salary to know wether its the truth of the bluff:**

**Data Set:**

- **Positions**
- **Level**
- **Salary**

**We need to check which position this person had according to salary .**

**But chance is he has been Regional Manager for Dunder Mifflin for quite a while. Hence his salary shouldnt be 150,000 but it should be between 150,000 to 160,000 i.e position level 6 and 7**

## Importing the libraries

In [0]:

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
```

## Importing the dataset

In [0]:

```
dataset = pd.read_csv('Position_Salaries.csv')
X=dataset.iloc[:,1:-1].values
#select only level column cuz its like the  encoded version of position
y = dataset.iloc[:,-1].values
```

## Training the Linear Regression model on the whole dataset

In [3]:

```
from sklearn.linear_model import LinearRegression
regressor = LinearRegression()
regressor.fit(X,y)
```

Out[3]:

```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)
```

## Training the Polynomial Regression model on the whole dataset

In [11]:

```
#now instead of x1 x2 and xn , we will have the x1^2 x2^2
from sklearn.preprocessing import PolynomialFeatures
ply_reg= PolynomialFeatures(degree=4) #x^4 max
X_poly= ply_reg.fit_transform(X)
#X_poly is the x1 linearity is converted into a polynomial of degree 2
```

```
linear_reg_2 = LinearRegression()
linear_reg_2.fit(X_poly,y)
```

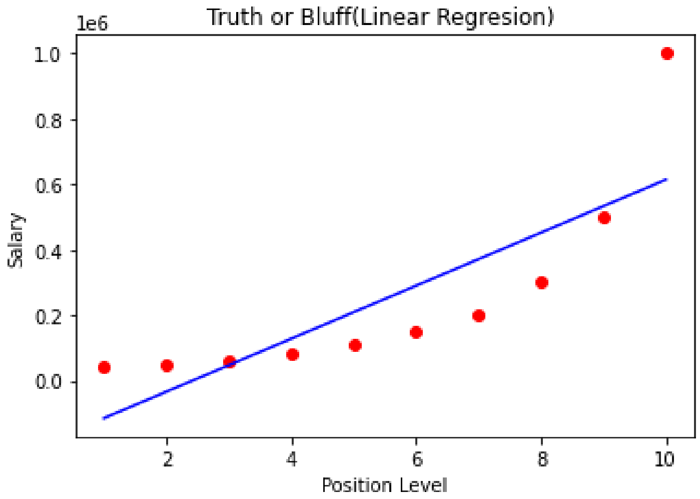
Out[11]:

```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)
```

## Visualising the Linear Regression results

In [12]:

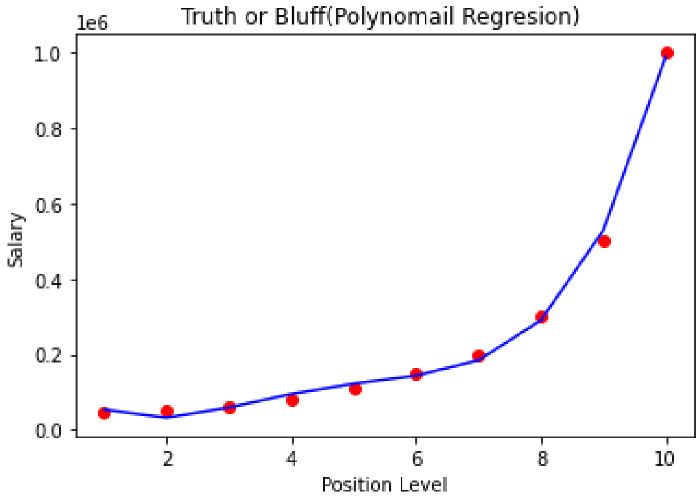
```
plt.scatter(X,y,color="red")
plt.plot(X,regressor.predict(X),color="blue")
plt.title("Truth or Bluff(Linear Regresion) ")
plt.xlabel('Position Level')
plt.ylabel("Salary")
plt.show()
```



## Visualising the Polynomial Regression results

In [13]:

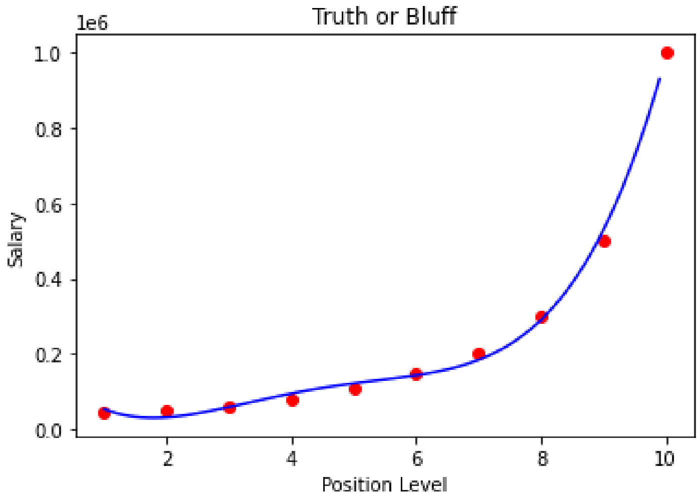
```
plt.scatter(X,y,color="red")
plt.plot(X,linear_reg_2.predict(X_poly),color="blue")
plt.title("Truth or Bluff(Polynomail Regresion) ")
plt.xlabel('Position Level')
plt.ylabel("Salary")
plt.show()
```



## Visualising the Polynomial Regression results (for higher resolution and smoother curve)

In [15]:

```
#as we have small Data set ,we will increase x vals plots
X_grid= np.arange(min(X),max(X),0.1)#create array at differnece of 0.1 cuz small dataset
X_grid= X_grid.reshape((len(X_grid),1))
plt.scatter(X,y,color="red")
plt.plot(X_grid,linear_reg_2.predict(ply_reg.fit_transform(X_grid)),color='blue')
plt.title('Truth or Bluff')
plt.xlabel('Position Level')
plt.ylabel("Salary")
plt.show()
```



## Predicting a new result with Linear Regression

In [19]:

```
regressor.predict([[6.5]])
#we are in loss cuz the person asked for 160,000 but we are getting 330,000
```

Out[19]:

```
array([330378.78787879])
```

## Predicting a new result with Polynomial Regression

In [21]:

```
linear_reg_2.predict(ply_reg.fit_transform([[6.5]]))
```

Out[21]:

```
array([158862.45265155])
```

# RESULTS

**Here the linear rgeressor model says 330,000 which is a bad prediction**

**But polynomail regression says 158K which is similar to his demand**

**Hence we can hire the person as Regional Manager of New York**