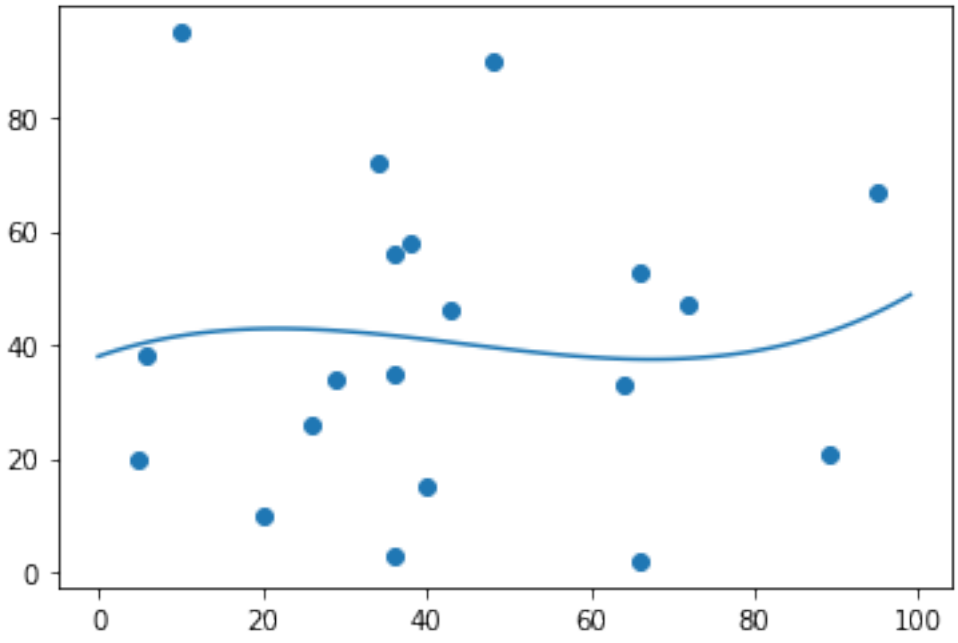
08_Polynomial_regression

June 18, 2023

1 Bad Fit

[ ]:
```
import numpy as np
import matplotlib.pyplot as plt

x=[89,43,36,36,95,10,66,34,38,20,26,29,48,64,6,5,36,66,72,40]
y=[21,46,3,35,67,95,53,72,58,10,26,34,90,33,38,20,56,2,47,15]

model = np.poly1d(np.polyfit(x,y,3))    # 3 degree curve
myline = np.linspace(1,95,100)          # 100 is showing no of sample point

plt.scatter(x,y)
plt.plot(model(myline))
plt.show()
```

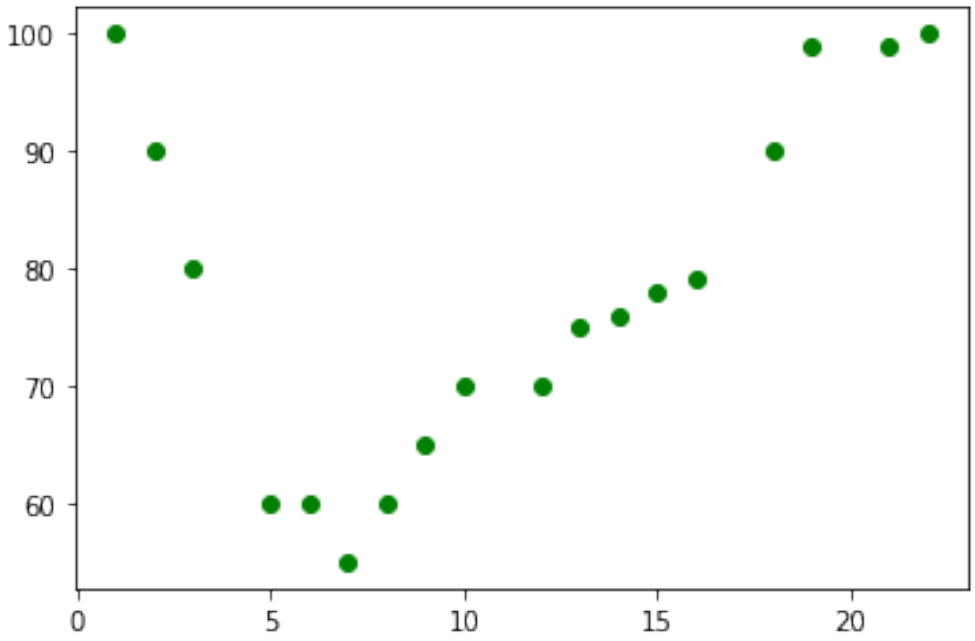


[ ]:
```
# R square value
from sklearn.metrics import r2_score
print(r2_score(y,model(x)))
```

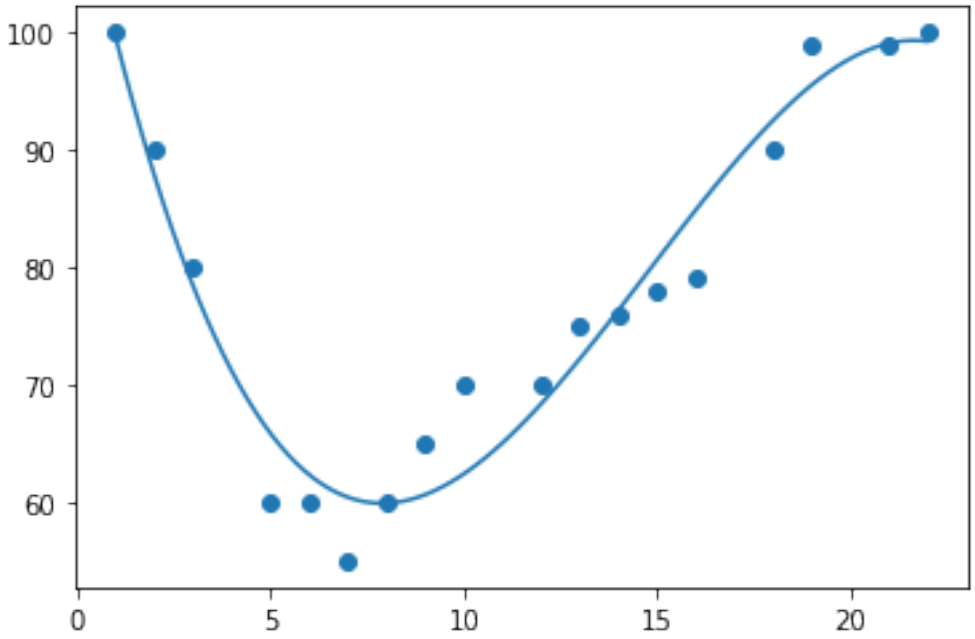
```
0.009952707566680652
```

2 Best Fit

[ ]:
```
# Step-1 Data
import matplotlib.pyplot as plt
x = [1,2,3,5,6,7,8,9,10,12,13,14,15,16,18,19,21,22]
y = [100,90,80,60,60,55,60,65,70,70,75,76,78,79,90,99,99,100]

plt.scatter(x,y, color ="green")
plt.show()
```



[ ]:
```
# Step-2 Darw line
model = np.poly1d(np.polyfit(x,y,3))    # 3 degree curve
myline = np.linspace(1,22,100)          # 100 is no of sample points showing

plt.scatter(x,y)
plt.plot(myline, model(myline))
plt.show()
```



[ ]:
```
# step-3 Required
from sklearn.metrics import r2_score
print(r2_score(y,model(x)))
```

0.9432150416451026

[ ]:
```
# Prediction
model = np.poly1d(np.polyfit(x,y,3))
pred = model(1)
print(pred)
```

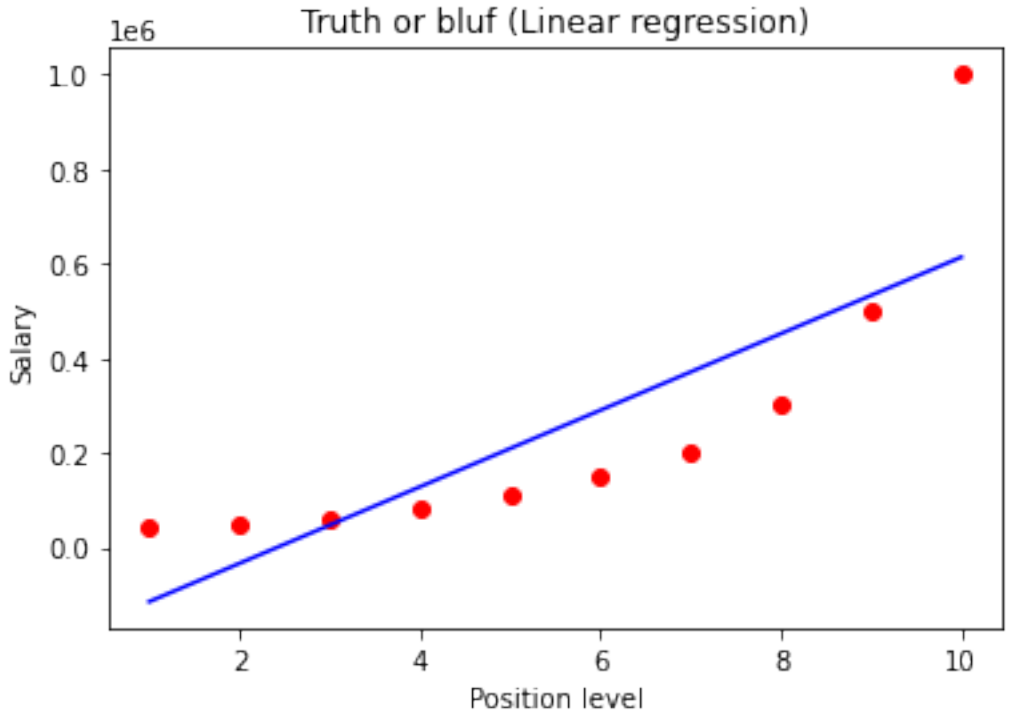
99.54274392967326

3 Hands on Example

[ ]:
```
# Another important example
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
dataset = pd.read_csv('https://s3.us-west-2.amazonaws.com/public.gamelab.fun/
 ↪dataset/position_salaries.csv')
X= dataset.iloc[:,1:2].values
y= dataset.iloc[:,2].values
```

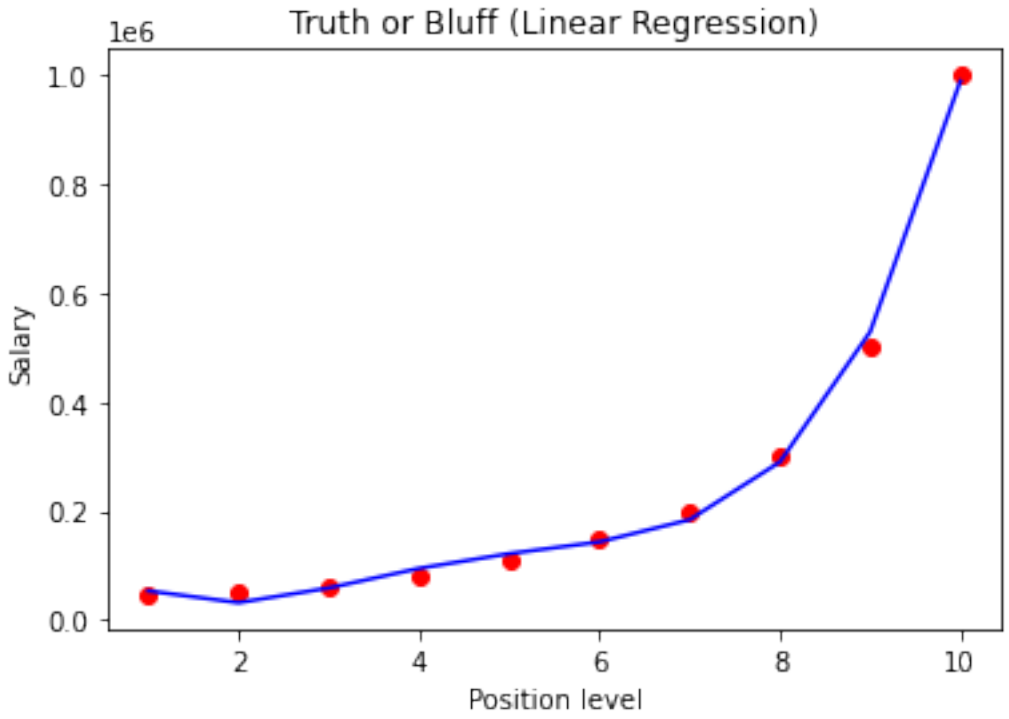
[ ]:
```
# spliting data set into training and testing
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.2,␣
 ↪random_state=0)
```

[ ]:
```
# fitting linear regression to dataset
from sklearn.linear_model import LinearRegression
lin_reg = LinearRegression().fit(X,y)

# Visualizing the linear regression model result
def viz_linear():
    plt.scatter(X,y,color="red")
    plt.plot(X,lin_reg.predict(X),color="blue")
    plt.title("Truth or bluf (Linear regression)")
    plt.xlabel("Position level")
    plt.ylabel("Salary")
    plt.show()
    return
viz_linear()
```



[ ]:
```
# Fitting Polynomial Regression to the dataset
from sklearn.preprocessing import PolynomialFeatures
poly_reg = PolynomialFeatures(degree=4)
```

```
X_poly = poly_reg.fit_transform(X)
pol_reg = LinearRegression()
pol_reg.fit(X_poly, y)

# Visualizing the Polymonial Regression results
def viz_polymonial():
    plt.scatter(X, y, color='red')
    plt.plot(X, pol_reg.predict(poly_reg.fit_transform(X)), color='blue')
    plt.title('Truth or Bluff (Linear Regression)')
    plt.xlabel('Position level')
    plt.ylabel('Salary')
    plt.show()
    return
viz_polymonial()
```



[ ]:
```
# Predicting a new result with linear regression
pred_linear = lin_reg.predict([[11]])
```

[ ]:
```
# Predicting a new result with polynomial regression
pred_poly = pol_reg.predict(poly_reg.fit_transform([[11]]))
```

[ ]:
```
print("Linear Regression Results:          = ", pred_linear)
print("polynomial Regression Results:      = ", pred_poly)
```

```
print("The Difference is                    = ", pred_linear-pred_poly)
```

```
Linear Regression Results:          =  [694333.33333333]
polynomial Regression Results:      =  [1780833.33333359]
The Difference is                   =  [-1086500.00000025]
```