Assignment 11 - Interpolation

June 29, 2019

0.1 Assignment 11

0.1.1 Problem

Using a proper Python library, develop an interpolation model for the example 1 presented in the regression lecture. Plot and compare the results.

0.1.2 Resolution

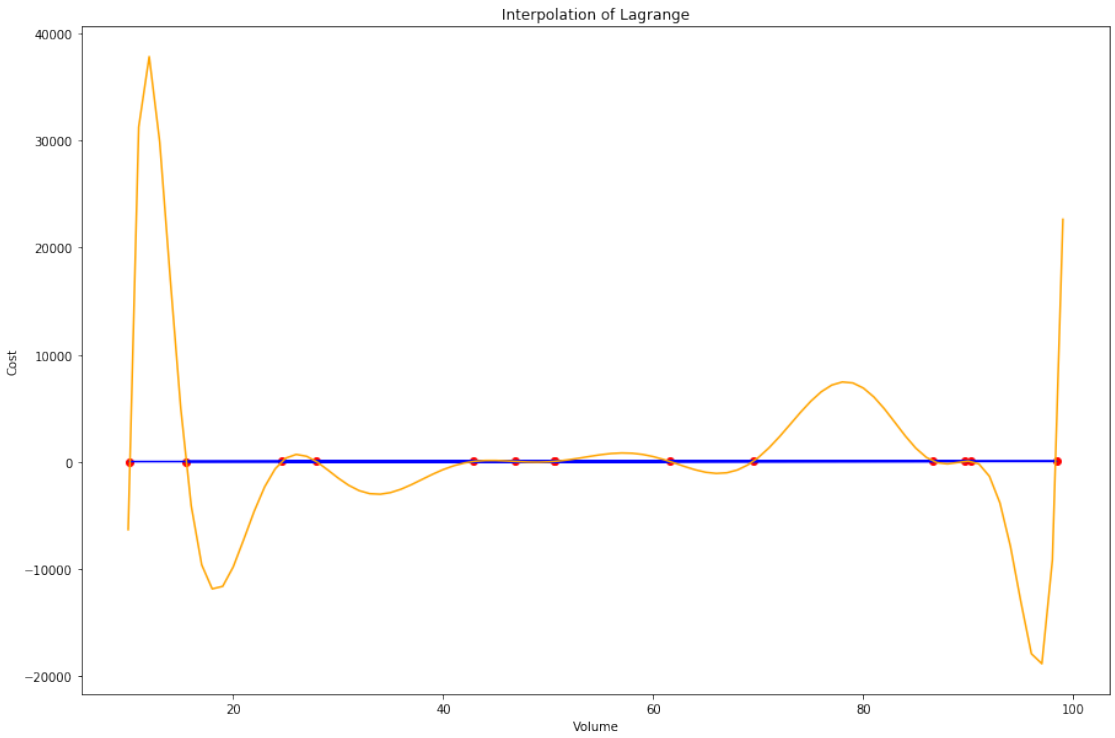
We can use a function from the *scipy* library called *lagrange()* that implement automatically the Lagrange interpolation.

```
In [1]: import matplotlib.pyplot as plt
        from scipy.interpolate import lagrange

        x = [10.11, 50.56, 90.28, 15.50, 69.52, 98.40, 86.66, 42.87, 61.53, 24.60, 46.85, 50.63
        y = [1.53, 13.14, 31.24, 5.47, 22.27, 26.47, 24.32, 13.51, 23.65, 9.43, 15.12, 18.94, 1

        poly = lagrange(x, y)
        print(poly)
```

```
          13             12             11             10             9
6.15e-15 x  - 4.394e-12 x  + 1.415e-09 x  - 2.715e-07 x  + 3.456e-05 x
            8          7        6         5        4            3
 - 0.003075 x + 0.1962 x - 9.07 x + 302.7 x - 7177 x + 1.17e+05 x
             2
 - 1.235e+06 x + 7.529e+06 x - 1.987e+07
```

```
In [2]: xnew=[]
        for i in range (10,100):
            xnew.append(i)
        plt.figure(figsize=(15, 10))
        plt.plot(x,y, 'ro')
        plt.plot(x,y, 'b')
        plt.plot(xnew, poly(xnew), color='orange')
        plt.title('Interpolation of Lagrange')
        plt.xlabel('Volume')
        plt.ylabel('Cost')
```

```
plt.show()
```


Interpolation of Lagrange
40000
30000
20000
10000
0
−10000
−20000
Cost
20
40
60
80
100
Volume