

Lecture_8

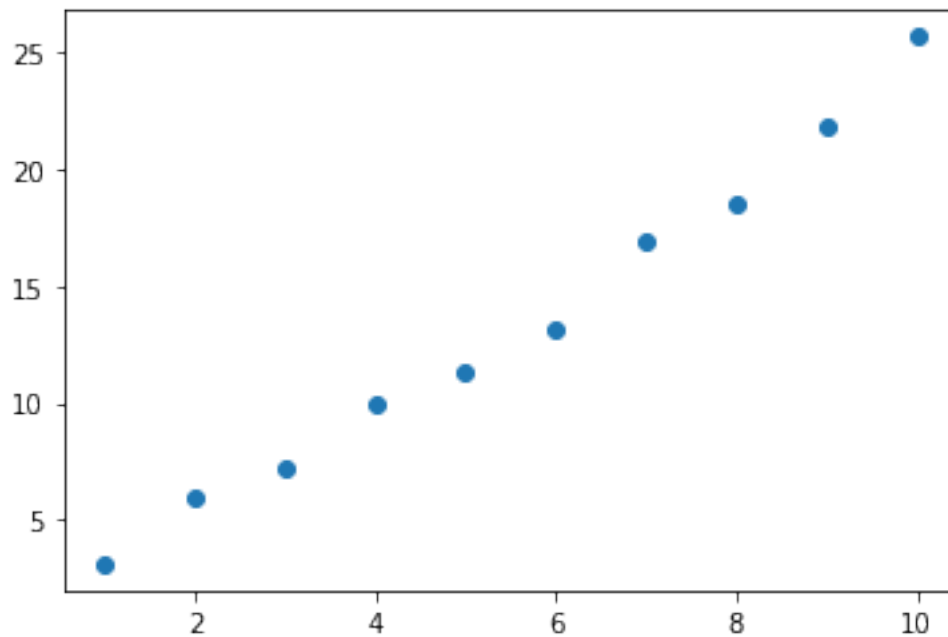
February 18, 2023

1 Curve Fitting

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

```
[7]: x = np.array([1, 2, 3, 4, 5, 6, 7, 8, 9, 10])  
y = np.array([3.1, 5.9, 7.2, 10.0, 11.3, 13.2, 16.9, 18.5, 21.8, 25.7])  
  
plt.plot(x, y, 'o')
```

```
[7]: [<matplotlib.lines.Line2D at 0x12db6282f80>]
```



1.1 Least Square Method

1.1.1 Linear Fit

```
[9]: from numpy import *
n = int(input("number of data points: "))
x = zeros(n)
y = zeros(n)

for i in range(n):
    x[i] = float(input("x["+str(i)+"]:"))
    y[i] = float(input("y["+str(i)+"]:"))

sx2 = 0.0
sxy = 0.0
sx = 0.0
sy = 0.0

for i in range(n):
    sx2 = sx2 + x[i]*x[i]
    sxy = sxy + x[i]*y[i]
    sx = sx + x[i]
    sy = sy + y[i]

a1 = (n * sxy - sx*sy)/(n* sx2 - sx**2)
a0 = (sy * sx2 - sx * sxy)/(n* sx2 - sx**2)
```

number of data points: 10

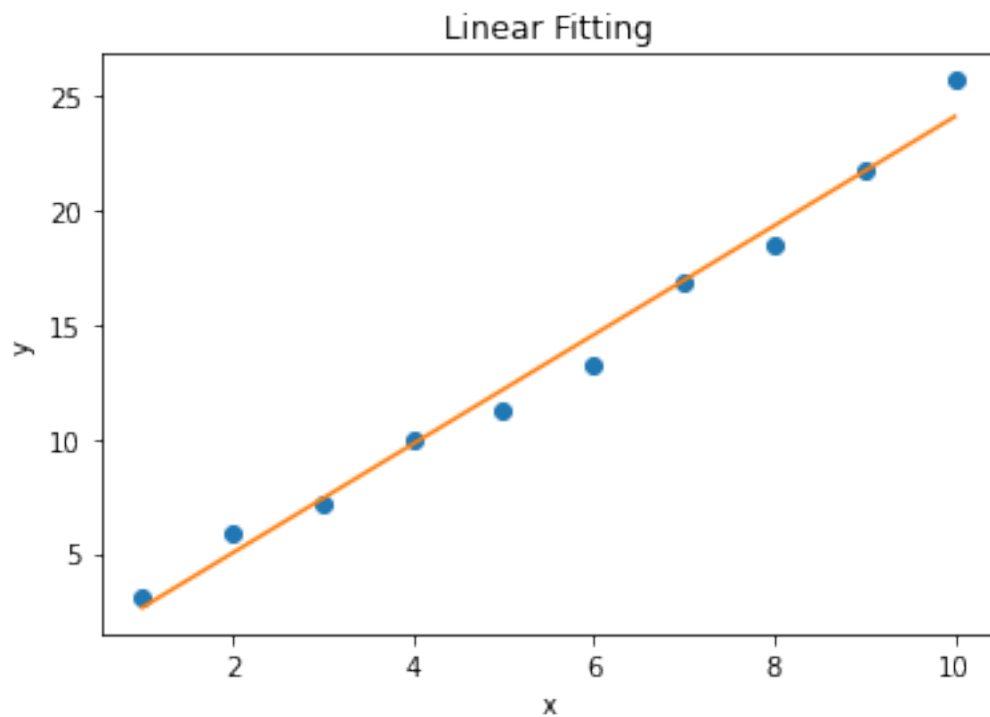
```
x[0]:1
y[0]:3.1
x[1]:2
y[1]:5.9
x[2]:3
y[2]:7.2
x[3]:4
y[3]:10.0
x[4]:5
y[4]:11.3
x[5]:6
y[5]:13.2
x[6]:7
y[6]:16.9
x[7]:8
y[7]:18.5
x[8]:9
y[8]:21.8
x[9]:10
y[9]:25.7
```

```
[10]: print(a0,a1)
```

```
0.23333333333333334 2.3866666666666667
```

```
[15]: yfit = a1*x + a0  
plt.plot(x,y, 'o')  
plt.plot(x,yfit)  
plt.xlabel("x")  
plt.ylabel("y")  
plt.title("Linear Fitting")
```

```
[15]: Text(0.5, 1.0, 'Linear Fitting')
```



For non linear curve fitting program, refer to the book by Abhijit Kar Gupta.