11-29_Linear

November 29, 2021

[1]:
```
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

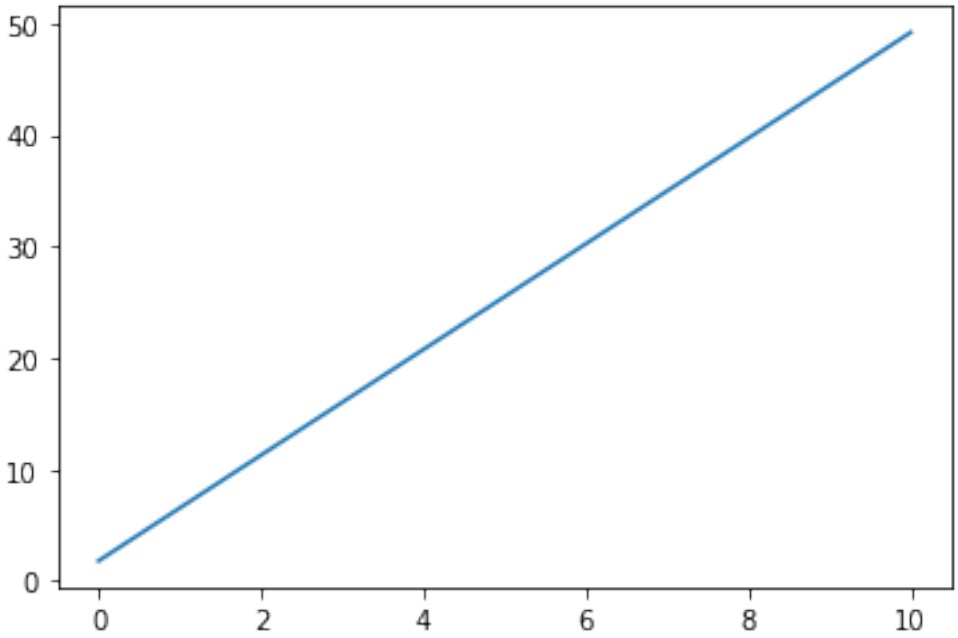
[2]:
```
m = np.random.uniform(3, 5)
b = np.random.uniform(-2, 2)
```

[3]:
```
x = np.linspace(0, 10)
```

[4]:
```
y = m * x + b
```

[5]:
```
plt.plot(x, y)
```

[5]:
```
[<matplotlib.lines.Line2D at 0x7f958f61bfa0>]
```



[7]:
```
A = np.vstack((x, np.ones_like(x))).T
A
```

[7]:
```
array([[ 0.        ,  1.        ],
       [ 0.20408163,  1.        ],
       [ 0.40816327,  1.        ],
       [ 0.6122449 ,  1.        ],
       [ 0.81632653,  1.        ],
       [ 1.02040816,  1.        ],
       [ 1.2244898 ,  1.        ],
       [ 1.42857143,  1.        ],
       [ 1.63265306,  1.        ],
       [ 1.83673469,  1.        ],
       [ 2.04081633,  1.        ],
       [ 2.24489796,  1.        ],
       [ 2.44897959,  1.        ],
       [ 2.65306122,  1.        ],
       [ 2.85714286,  1.        ],
       [ 3.06122449,  1.        ],
       [ 3.26530612,  1.        ],
       [ 3.46938776,  1.        ],
       [ 3.67346939,  1.        ],
       [ 3.87755102,  1.        ],
       [ 4.08163265,  1.        ],
       [ 4.28571429,  1.        ],
       [ 4.48979592,  1.        ],
       [ 4.69387755,  1.        ],
       [ 4.89795918,  1.        ],
       [ 5.10204082,  1.        ],
       [ 5.30612245,  1.        ],
       [ 5.51020408,  1.        ],
       [ 5.71428571,  1.        ],
       [ 5.91836735,  1.        ],
       [ 6.12244898,  1.        ],
       [ 6.32653061,  1.        ],
       [ 6.53061224,  1.        ],
       [ 6.73469388,  1.        ],
       [ 6.93877551,  1.        ],
       [ 7.14285714,  1.        ],
       [ 7.34693878,  1.        ],
       [ 7.55102041,  1.        ],
       [ 7.75510204,  1.        ],
       [ 7.95918367,  1.        ],
       [ 8.16326531,  1.        ],
       [ 8.36734694,  1.        ],
       [ 8.57142857,  1.        ],
       [ 8.7755102 ,  1.        ],
```

```
       [ 8.97959184,  1.        ],
       [ 9.18367347,  1.        ],
       [ 9.3877551 ,  1.        ],
       [ 9.59183673,  1.        ],
       [ 9.79591837,  1.        ],
       [10.        ,  1.        ]])
```

[9]:
```
X = np.linalg.inv(A.T @ A) @ A.T @ y
X
```

[9]:
```
array([4.73573619, 1.80846273])
```

[10]:
```
m_est = X[0]
b_est = X[1]
```

[11]:
```
m, m_est
```

[11]:
```
(4.735736188715885, 4.7357361887158875)
```

[12]:
```
b, b_est
```

[12]:
```
(1.8084627281977572, 1.8084627281977388)
```

[ ]: