11-29_Sinusoid

September 27, 2023

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

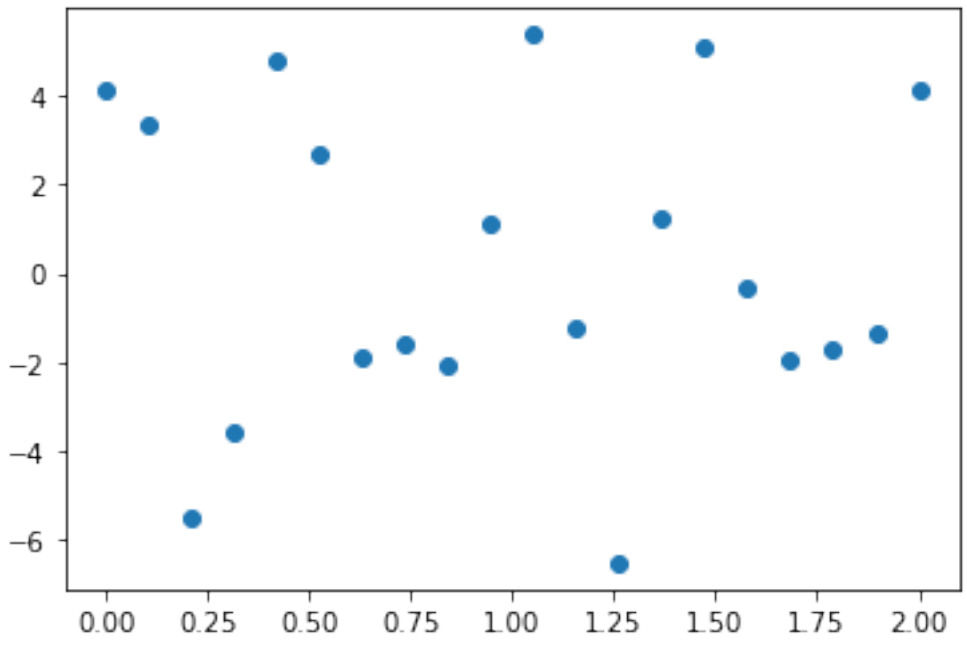
[2]:
```
t = np.linspace(0, 2, 20)
```

[3]:
```
a1 = np.random.uniform(4, 6)
a2 = np.random.uniform(1, 3)
```

[4]:
```
y = a1 * np.cos(4 * np.pi * t) + a2 * np.sin(6 * np.pi * t)
```

[5]:
```
plt.plot(t, y, 'o')
```

[5]:
```
[<matplotlib.lines.Line2D at 0x7fa9aa8f9760>]
```



[6]:
```
A = np.vstack((np.cos(4 * np.pi * t), np.sin(6 * np.pi * t))).T
A
```

[6]:
```
array([[ 1.00000000e+00,  0.00000000e+00],
       [ 2.45485487e-01,  9.15773327e-01],
       [-8.79473751e-01, -7.35723911e-01],
       [-6.77281572e-01, -3.24699469e-01],
       [ 5.46948158e-01,  9.96584493e-01],
       [ 9.45817242e-01, -4.75947393e-01],
       [-8.25793455e-02, -6.14212713e-01],
       [-9.86361303e-01,  9.69400266e-01],
       [-4.01695425e-01, -1.64594590e-01],
       [ 7.89140509e-01, -8.37166478e-01],
       [ 7.89140509e-01,  8.37166478e-01],
       [-4.01695425e-01,  1.64594590e-01],
       [-9.86361303e-01, -9.69400266e-01],
       [-8.25793455e-02,  6.14212713e-01],
       [ 9.45817242e-01,  4.75947393e-01],
       [ 5.46948158e-01, -9.96584493e-01],
       [-6.77281572e-01,  3.24699469e-01],
       [-8.79473751e-01,  7.35723911e-01],
       [ 2.45485487e-01, -9.15773327e-01],
       [ 1.00000000e+00, -1.46957616e-15]])
```

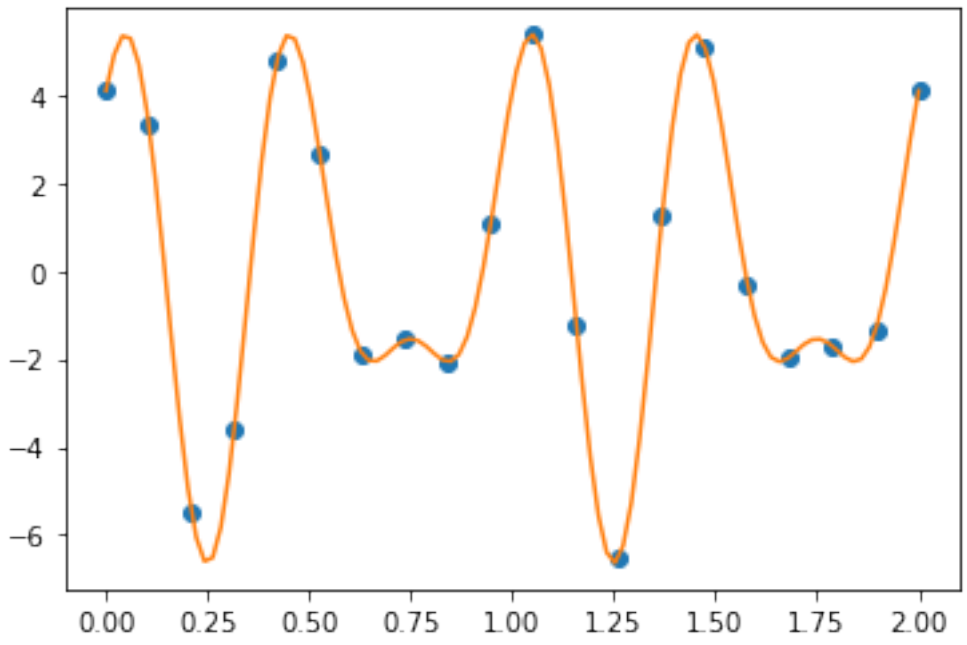
[7]:
```
x = np.linalg.inv(A.T @ A) @ A.T @ y
```

[8]:
```
x
```

[8]:
```
array([4.09375649, 2.54862499])
```

[9]:
```
plt.plot(t, y, 'o')
tf = np.linspace(0, 2, 100)
plt.plot(tf, x[0] * np.cos(4 * np.pi * tf) + x[1] * np.sin(6 * np.pi * tf))
```

[9]:
```
[<matplotlib.lines.Line2D at 0x7fa9aa813e20>]
```


4
2
0
−2
−4
−6
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00

[ ]: