f-23-jupyter-iter

April 27, 2021

[1]:
```
import numpy as np
```

[2]:
```
rng = np.random.default_rng()
```

[3]:
```
b = rng.standard_normal((3,3))
```

[4]:
```
b
```

[4]:
```
array([[-1.38533763, -2.79773022,  0.98921333],
       [ 0.49714253, -0.43667423,  0.73081317],
       [ 1.51051107, -2.64341824,  0.09833306]])
```

[5]:
```
a = b + b.T
a
```

[5]:
```
array([[-2.77067525, -2.30058769,  2.4997244 ],
       [-2.30058769, -0.87334846, -1.91260507],
       [ 2.4997244 , -1.91260507,  0.19666611]])
```

[6]:
```
w = rng.standard_normal((3,1))
w
```

[6]:
```
array([[-1.11159689],
       [-1.35057041],
       [-1.80160413]])
```

[10]:
```
v0 = w / np.linalg.norm(w)
v0
```

[10]:
```
array([[-0.44267882],
       [-0.53784688],
       [-0.71746512]])
```

[11]:
```
w1 = a @ v0
v1 = w1 / np.linalg.norm(w1)
v1
```

[11]:
```
array([[ 0.22756561],
       [ 0.97092149],
       [-0.07433274]])
```

[12]:
```
w2 = a @ v1
v2 = w2 / np.linalg.norm(w2)
v2
```

[12]:
```
array([[-0.8622953 ],
       [-0.34755123],
       [-0.36831368]])
```

[14]:
```
v = w / np.linalg.norm(w)
for i in range(20):
    w_nye = a @ v
    v = w_nye / np.linalg.norm(w_nye)
    print(v)
```

```
[[ 0.22756561]
 [ 0.97092149]
 [-0.07433274]]
[[-0.8622953 ]
 [-0.34755123]
 [-0.36831368]]
[[ 0.55770525]
 [ 0.73566899]
 [-0.38439041]]
[[-0.96188278]
 [-0.2727089 ]
 [-0.02028238]]
[[ 0.72006018]
 [ 0.55304838]
 [-0.41910718]]
[[-0.94511227]
 [-0.29305404]
 [ 0.14450653]]
[[ 0.79479042]
 [ 0.46849022]
 [-0.38577858]]
[[-0.91977749]
 [-0.32502348]
 [ 0.21992978]]
[[ 0.83176715]
 [ 0.42805799]
 [-0.35345404]]
[[-0.90145962]
 [-0.34810333]
 [ 0.25728318]]
```

```
[[ 0.85096106]
 [ 0.40713107]
 [-0.33182762]]
[[-0.88998157]
 [-0.36226861]
 [ 0.27693728]]
[[ 0.86125316]
 [ 0.39576301]
 [-0.3187705 ]]
[[-0.88316724]
 [-0.37050787]
 [ 0.28764482]]
[[ 0.86688928]
 [ 0.38944447]
 [-0.3111848 ]]
[[-0.87922027]
 [-0.37520695]
 [ 0.29358382]]
[[ 0.87001537]
 [ 0.38589841]
 [-0.30684797]]
[[-0.87696201]
 [-0.37786749]
 [ 0.29690706]]
[[ 0.87176218]
 [ 0.38390083]
 [-0.30438602]]
[[-0.87567816]
 [-0.37936991]
 [ 0.29877454]]
```

[16]:
```
v, a @ v
```

[16]:
```
(array([[-0.87567816],
        [-0.37936991],
        [ 0.29877454]]),
 array([[ 4.04584757],
        [ 1.77445884],
        [-1.40461042]]))
```

[17]:
```
lambda_v = (a @ v)[0,0]/v[0,0]
```

[18]:
```
lambda_v
```

[18]:
```
-4.620244906368844
```

[19]:
```
lambda_v * v
```

[19]:
```
array([[ 4.04584757],
       [ 1.75278191],
       [-1.38041153]])
```

[ ]: