

1 Simple Power Method

1. Choose a starting vector $\mathbf{x}^{(0)} \in \mathcal{R}^n$ with $\|\mathbf{x}^{(0)}\| = 1$.
2. $k = 0$
3. **while** some convergence criteria is not satisfied

- i. $k := k + 1$
- ii. $\mathbf{y}^{(k)} := A\mathbf{x}^{(k-1)}$
- iii. $\mu_k := \|\mathbf{y}^{(k)}\|$
- iv. $\mathbf{x}^{(k)} := \mathbf{y}^{(k)} / \mu_k$

```
import numpy.linalg, numpy.random, numpy as np, math
from random import random as rand
from numpy.linalg import eig
```

```
B = numpy.array([[2,-12],[1,-5]])
y = numpy.array([1,1])
x = y
for i in range(100):
    y = B.dot(x)
    mu = math.sqrt(y.dot(y))
    x = y/mu
print numpy.transpose(eig(B)[1])
print x
```

```
[[ 0.9701425  0.24253563]
 [ 0.9486833  0.31622777]]
[ 0.9486833  0.31622777]
```

```
A = numpy.random.rand(3,3)
x = numpy.random.rand(3)
for i in range(20):
    y = A.dot(x)
    mu = math.sqrt(y.dot(y))
    x = y/mu
np.transpose(eig(A)[1]),x
```

Results

```
(array([[ 0.51063895,  0.65312477,  0.55917429],
        [ 0.87551464, -0.17084359, -0.45198073],
        [-0.00620138, -0.53208609,  0.84666755]]),
array([ 0.51063895,  0.65312477,  0.55917429]))
```