

一般化固有値問題

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1 目的

$Ax = \lambda Bx$, A :実対称行列, B :実対称正値行列, λ :スカラー, x :列行列としたとき, 一般化固有値問題を解く。

2 使用法

```
from geneig import geneig
geneig2(a, b)
```

2.1 引数

a	実対称行列
b	実対称正値行列

2.2 戻り値の名前

"value"	固有値
"vec"	固有ベクトル

3 使用例

```
A = [[1, 1, 0.5], [1, 1, 0.25], [0.5, 0.25, 2]]
B = [[2, 2, 2], [2, 5, 5], [2, 5, 11]]
```

```
import sys
sys.path.append("statlib")
from geneig import geneig
```

```
val, vec = geneig(A, B)
```

```
val
```

```
array([ 0.61064415,  0.31504683, -0.00902431])
```

```
vec
```

```
array([[ -0.52639102, -0.51459871,  0.53984627],
       [ -0.28177985,  0.40261967, -0.50842651],
       [ 0.24794352, -0.31839951, -0.06174487]])
```

```
v2 = vec**2
v2.sum(axis=0)
```

```
array([0.41796338, 0.52829268, 0.55374394])
```

```
import scipy as sp
```

```
A = sp.array(A)
```

```
A
```

```
array([[1. , 1. , 0.5 ],
       [1. , 1. , 0.25],
       [0.5 , 0.25, 2.  ]])
```

```
B = sp.array(B)
```

```
B
```

```
array([[ 2,  2,  2],
       [ 2,  5,  5],
       [ 2,  5, 11]])
```

```
x = vec[:, 0]
```

```
A@x
```

```
array([-0.68419911, -0.74618499, 0.16224657])
```

```
val[0]*B@x
```

```
array([-0.68419911, -0.74618499, 0.16224657])
```

```
x = vec[:, 1]
```

```
A@x
```

```
array([-0.2711788 , -0.19157892, -0.79344346])
```

```
val[1]*B@x
```

```
array([-0.2711788 , -0.19157892, -0.79344346])
```

```
from scipy.linalg import eig
val2, vec2=eig(A, B)
g = sp.diag(1/sp.sqrt(val2))
val2@g@vec2
```

```
array([-0.88089881+0.03643265j, -0.24233763-0.04161426j,
       0.18340789-0.00788231j])
```