```
%first create a diagonal matrix with egienvalue on its diagonal
A = diag(1:10);
%generate a unsymmetric matrix (downtrangular)
Us_A = A;
for i = 1:9
    random_number = round((rand*2-1)*10);
    Us_A(i+1,:) = Us_A(i+1,:) + Us_A(i,:)*random_number;
end
Us_A
```

```
Us_A =
           1           0           0           0           0           0 ···
           0           2           0           0           0           0
           0          -2           3           0           0           0
           0          -6           9           4           0           0
           0         -24          36          16           5           0
           0        -120         180          80          25           6
           0         480        -720        -320        -100         -24
           0        1920       -2880       -1280        -400         -96
           0        5760       -8640       -3840       -1200        -288
           0      -40320       60480       26880        8400        2016
```

•

```
%generate a symmetric matrix
Q = gallery('orthog',10);
U_A = Q'*A*Q
```

```
U_A =
    5.5000   -1.9809   -0.0000   -0.1574   -0.0000   -0.0418   -0.0000   -0.0149 ···
   -1.9809    5.5000   -2.1383   -0.0000   -0.1992   -0.0000   -0.0566   -0.0000
   -0.0000   -2.1383    5.5000   -2.1801   -0.0000   -0.2140   -0.0000   -0.0605
   -0.1574   -0.0000   -2.1801    5.5000   -2.1949    0.0000   -0.2179    0.0000
    0.0000   -0.1992   -0.0000   -2.1949    5.5000   -2.1988   -0.0000   -0.2140
   -0.0418   -0.0000   -0.2140    0.0000   -2.1988    5.5000   -2.1949    0.0000
   -0.0000   -0.0566   -0.0000   -0.2179   -0.0000   -2.1949    5.5000   -2.1801
   -0.0149   -0.0000   -0.0605    0.0000   -0.2140    0.0000   -2.1801    5.5000
   -0.0000   -0.0188   -0.0000   -0.0566   -0.0000   -0.1992   -0.0000   -2.1383
   -0.0039    0.0000   -0.0149    0.0000   -0.0418    0.0000   -0.1574    0.0000
```

•

```
eig(U_A)
```

```
ans =
   10.0000
    1.0000
    9.0000
    2.0000
    8.0000
    7.0000
    3.0000
    6.0000
    5.0000
    4.0000
```

•

```
%power interation
%%for symmetric matrix
v = ones(10,1);
for k = 1:100
    v = U_A*v;
    v = v/(v'*v)^0.5;
    miu = v'*U_A*v;
    error = abs(miu - 10);
    Notation = 0.9^(2*k);
    distance(k) = abs(Notation - error)/Notation;
end
distance
```

```
distance =
   1.0e+04 * ···
    0.0007    0.0005    0.0004    0.0004    0.0004    0.0004    0.0005    0.0005
```

-

```
%%for nonsymmetric matrix
v = ones(10,1);
for k = 1:100
    v = Us_A*v;
    v = v/(v'*v)^0.5;
    miu = v'*Us_A*v;
    error = abs(miu - 10);
    notation = 0.9^(k);
    distance_2(k) = abs(notation - error)/notation;
end
distance_2
```

```
distance_2 =
   40.9249   20.8134   14.1216   10.7860    8.7939    7.4740    6.5383    5.8429···
```

-

```
%Here I use the distance to measure the relative distance between the error and 0.9^k
%we can find that as the k becomes larger the error becomes closer to 0.9^k
%the same thing happens to the symmetric matrix, but abvious the distance decreases faster
%than the nonsymmetrix matrix.
```