

# Getting Max. Eigenvalue with Power Iteration:

given a diagonalizable matrix  $A$ , the algorithm will produce a number  $\lambda$ , which is the greatest (in absolute value) eigenvalue of  $A$ , and a nonzero vector which is a corresponding eigenvector of  $\lambda$ .

## MATLAB CODE:

```
function [eigval, x, nit] = powerit(A, etol, maxit)
%this function calculates the max eigenvalue of a given matrix
% INPUTS:
%   A = the matrix
%   etol = the error tolerance
%   maxit = maximum number of iterations
% OUTPUTS:
%   eigval = the maximum eigenvalue
%   x = the corresponding eigenvector
%   nit = actual no. of iterations

n = size(A) (1);
x = ones(n,1);
b = A*x;
eigval = norm(b, 2);
nit = 0;
while nit < maxit
    nit = nit + 1;
    x = (1/eigval)*b;
    b = A*x;
    eigvalnew = norm(b, 2);
    if abs((eigvalnew - eigval)/eigvalnew) <= etol, break, end
    eigval = eigvalnew;
end
end
```

```
>> [max, vec, nit] = powerit(A, 10^-10, 100)
max = 17.290
vec =

    0.40450
    0.70318
    0.58474

nit = 8
```