Algorithm Foundations of Data Science and Engineering
Welcome Tutorial :-)

Tutorial 5

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1. Given a matrix
$$A = \begin{pmatrix} 1 & 3 \\ 3 & 4 \end{pmatrix}$$
   a. Using the Rayleigh Quotient method to find the largest eigenvalue λ_1;
   b. Knowing that 1 is closer to the other eigenvalue λ_2 than to λ_1, find it and corresponding eigenvector.
2. By using power method, find the second largest eigenvalue λ_2 and corresponding eigenvector $\mathbf{v}_2$ of a matrix A, where λ_1 and $\mathbf{v}_1$ are the largest eigenvalue and corresponding eigenvector.
3. Find the eigenpairs for the following matrix:
$$\begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 3 & 6 \end{pmatrix}$$
4. For any matrix A, prove that both AA^T and A^TA are symmetric and semi-positive definite.