Numerical Methods for Visual Computing
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Winter Semester 18/19

Weekly Exercises 7

To be discussed on Friday, 01.12.2017, 10:15-11:45, in room H-C 6336
Submission deadline: Tuesday, 28.11.2017, in the lecture

Theory

Exercise 1 (4 points)**.** Determine all eigenvalues and corresponding eigenvectors of the matrix

$$A = \begin{pmatrix} 2 & 0 & -1 \\ 3 & -1 & 2 \\ -6 & 0 & 3 \end{pmatrix}.$$

Programming

Exercise 2 (4 points)**.** Implement the power method for finding the eigenvalue of largest magnitude of a matrix A. Test your program using the matrix from exercise 1, and plot the decay of $\|(A-\lambda^k I)u^k\|$ and $|\lambda^k-\lambda_1|$, where λ^k and u^k are your current estimates of the eigenvalue with largest magnitude and a corresponding eigenvector.

Now initialize your power method with a vector $\alpha_2 u_2+\alpha_3 u_3$ with random weights α_2 and α_3. How does the power method behave now?