Homework 1: Linear Algebra

Dr. Benjamin Roth
Profilierungsmodul II

Due: Tuesday October 23, 2018 18:00

Please submit your solution to [`beroth at cis dot uni-muenchen dot de`]
Please submit individually for this homework

Exercise 1: Linear Algebra [5 points]

Read Chapter 2 of the Deep Learning (DL) book (`www.deeplearningbook.org/`). **Note down and submit at least two questions that are still unclear after reading the chapter, and that you could not resolve easily** (e.g. by re-reading the paragraph or by consulting Wikipedia). (Only) If you don't have any questions, please answer the following:

- Name a property of a matrix A so that the left and right Eigenvectors of A are identical if A has that property.

- Which method would you recommend to use for solving an indeterminate system of linear equations, and why?

- The degree matrix of an undirected graph contains the number of edges attached to each vertex on its diagonal. How are the number of edges and the trace of the degree matrix related?

- Given a system of linear equations $\mathbf{A}\mathbf{x} = \mathbf{b}$, $\mathbf{A}$ is a $m \times n$ matrix.

    - Assume $m > n$. Is the column space of $\mathbf{A}$ all of $\mathbb{R}^m$? Is the system solvable for all values of b?

    - Assume $m = n$, and $\mathbf{A}$ is the identity matrix. Is the column space of $\mathbf{A}$ all of $\mathbb{R}^m$? Is the system solvable for all values of b?