Homeworks
Computational Linear Algebra for Large Scale Problems

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General information

Work to do

- 2 mandatory homeworks
  - Project on PageRank
  - Project on Principal Component Analysis
- 1 non-mandatory homework

How to do it

- Groups of 1 or 2 people.
- Code in your favorite programming language.
- Write a report presenting the results.

Exam

1. Present your work using slides or in any other convincing way you find appropriate.
2. Answer questions about the mathematical content of your report.

How to deliver

Upload to the "Homeworks" section of the teaching portal a zip archive containing:

- the reports presenting the results
- the code used to produce the results

One deliverable per group. File name must contain your surnames.
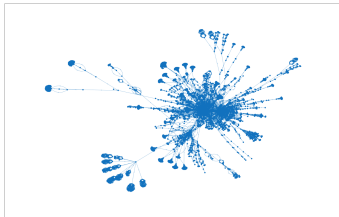
Project on PageRank

Figure: The paper

Figure: Graph of the dataset

Inside the folder `Homeworks/PageRank` on the teaching portal, you will find the paper on the left and a file containing a dataset.

- Read the paper to understand the PageRank algorithm.
- Solve two exercises of your choice.
- Write a code to implement it.
- Test the code on the two graphs in the paper (Fig. 2.1 and 2.2).
- Test the code on the given dataset.
- Write a report containing:
  - A mathematically sound description of the algorithm.
  - The results.
  - The solution to the two exercises.

How to get a good grade

- Implement the algorithms yourselves, using basic data structures. Using libraries correctly will still get you a nice grade.
- Know and be able to explain the mathematics in PageRank.

Additional (non-mandatory) homework

You can:

- Solve at least 10 more exercises from the PageRank paper. The report shall then contain the solutions and you will be asked to justify them.

- Choose a topic of your choice involving the implementation of the algorithms seen during the semester (listen to our advices during lessons!). The report shall contain a mathematical description of the problem you want to solve, the results you obtained and the code that you produced. You will be questioned about the mathematics.