Università della Svizzera italiana

Institute of Computational Science ICS

Numerical Computing **2020**

Student: Claudio Maggioni Discussed with: –

Solution for Project 1

Due date: Thursday, 8 October 2020, 12:00 AM

Numerical Computing 2020 — Submission Instructions
(Please, notice that following instructions are mandatory: submissions that don't comply with, won't be considered)

- Assignments must be submitted to iCorsi (i.e. in electronic format).
- Provide both executable package and sources (e.g. C/C++ files, Matlab). If you are using libraries, please add them in the file. Sources must be organized in directories called:
  Project_number_lastname_firstname
  and the file must be called:
  project_number_lastname_firstname.zip
  project_number_lastname_firstname.pdf
- The TAs will grade your project by reviewing your project write-up, and looking at the implementation you attempted, and benchmarking your code's performance.
- You are allowed to discuss all questions with anyone you like; however: (i) your submission must list anyone you discussed problems with and (ii) you must write up your submission independently.

The purpose of this assignment[1] is to learn the importance of numerical linear algebra algorithms to solve fundamental linear algebra problems that occur in search engines.

1. Page-Rank Algorithm

1.1. Theory [20 points]

1.2. Other webgraphs [10 points]

1.3. Connectivity matrix and subcliques [10 points]

1.4. Connectivity matrix and disjoint subgraphs [10 points]

1.5. PageRanks by solving a sparse linear system [50 points]

[1] This document is originally based on a SIAM book chapter from *Numerical Computing with Matlab* from Clever B. Moler.