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High Performance Computing 2

SoSe 2017

Sheet 5

Introduction

Todays exercise will deal with storage formats. We want to specifically consider the conversion from one format to another.

Exercise

1) Describe in short words the triplet, crs, crc, jds (jagged diagonal format).

2) Download the material from the homepage.

3) What does the demo do? Try to understand the functions `cs_load`, `gem_compress(T)` and `cs_compress`. What is the difference between `cs_compress(T,1)` and `cs_compress(T,2)`?

4) Complete the function `jds_compress(T)` (empty file in directory Source), which should convert a given matrix T in triplet format to matrix jds matrix J.

5) Extend the function `jds_compress(A)`, such that any matrix A given in triplet, crs or crc format can be converted to a jds format.

6) Test your function with at least two more matrices.

7) What does the function `sed_compress(T)` do?

8) Wirte the functions, which converts

   a) crs to triplet and crs to crc
   b) crc to triplet and crc to crs
   c) jds to triplet and jds to crc and jds to crc

9) Theoretically, how would you implement the matrix vector multiplication for each storage format crc, crs, jds and sed?

Extra cookies and for those who want more

If the matrix A is symmetric, only the lower (or upper) triangular part has to be stored. How does the functions now change? How can be this now realized and implemented?

Hints

1) `http://netlib.org/linalg/html_templates/node90.html`

2) `http://aleteya.cs.buap.mx/~jlavalle/papers/books_on_line/Addison.Wesley.Donald.E.Knuth.The.Art.of.Computer.Programming.Volume.1.pdf`

3) `http://aleteya.cs.buap.mx/~jlavalle/papers/books_on_line/Addison.Wesley.Donald.E.Knuth.The.Art.of.Computer.Programming.Volume.2.pdf`

4) `http://aleteya.cs.buap.mx/~jlavalle/papers/books_on_line/Addison.Wesley.Donald.E.Knuth.The.Art.of.Computer.Programming.Volume.3.pdf`