Notes on the software for the multi-shift algorithm

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1 Tests available

Various tests are started by running a Test_xy.m file.

The parameters like the number of simultaneous shifts, problem sizes, the number of experiments can be changed easily in the Test_xy.m files.

Each of the testfiles saves its results in a particular directory and file – be careful not to overwrite your datafile by accidently running the Test_xy.m again. Inside every directory a file plotresults.m is located. Running this file displays briefly in the command window some information on the experiments and generates a whole lot of figures. All figures are automatically saved as .fig, .eps and .pdf files.[1]

For some of the random tests, several matrices are generated and the average outcome (connected with a line), as well as each individual test (just markers) are printed in the figs.

- Test_ns.m : complex arbitrarily generated non structured matrices. Various reduction types, followed by various multishift algorithms. Eigs to compare with are computed after the similarity to condensed form.
  Directory: nonsym.
- Test_s.m: complex arbitrarily generated Hermitian matrices. Various reduction types, followed by various multishift algorithms. Eigs to compare with are computed after the similarity to condensed form.
  Directory: sym.
- Test_u.m: complex arbitrarily generated unitary matrices. Various reduction types, followed by various multishift algorithms. Eigs to compare with are computed after the similarity to condensed form.
  Directory: unitary. Note that the unitary implementation is not optimized as the passing through the upper triangular matrix is still executed.

[1] An annoying error in matlab disables the possibility of saving the pdf-files to a format smaller than a page, See Section 3 for a simple solution.

2 Parameters

For the tests, the following parameters, hardcoded inside the EigCRMS.m routine, are used:

- Blocksize admitted to be deflated. I took $4 * m$, where m stands for the number of shifts. Initially I experienced some difficulties because I was running, e.g., 5 shifts on a 6×6 matrix, which does not make much sense. These matrix blocks are then piped to matlab's eig.
- A rotation is regarded to be the identity if the absolute value of its sine is below $10^{(-17)}$. This value is also passed to the shift-through function, in case two rotations are close to the identity some choices are made to overcome the stalling.

3 Eps to pdf transformation

By running the following linux commands in the correct directory all epsfiles are transformed to correctly sized pdf files, enabling inclusion in latex.

```
for i in *.eps
do
 epstopdf $i
done
```

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