

BENESCO Lecture Series on
Sleep, Epilepsy, Consciousness
and Cognition
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Matrix calculus – an introduction using Matlab



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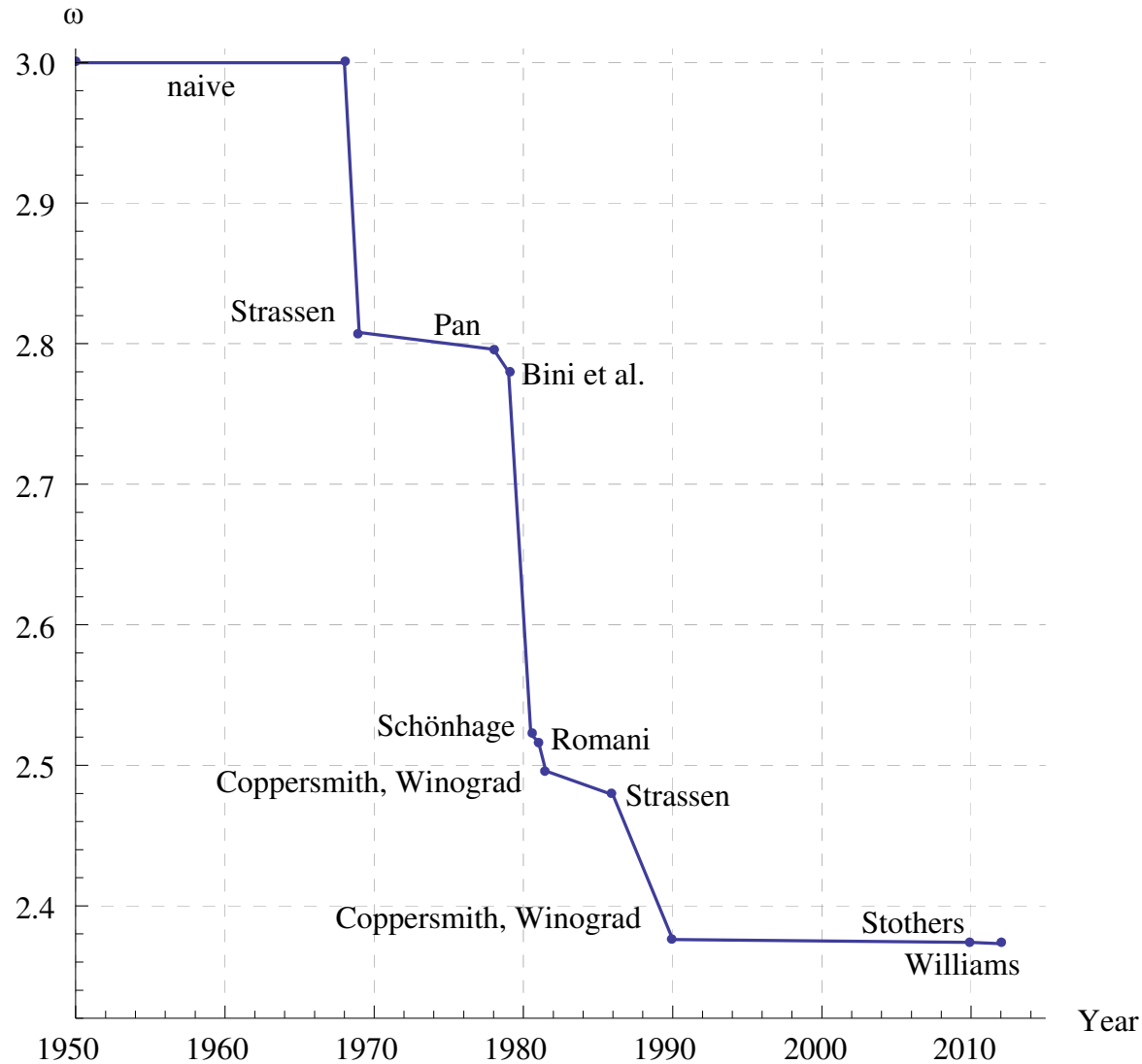
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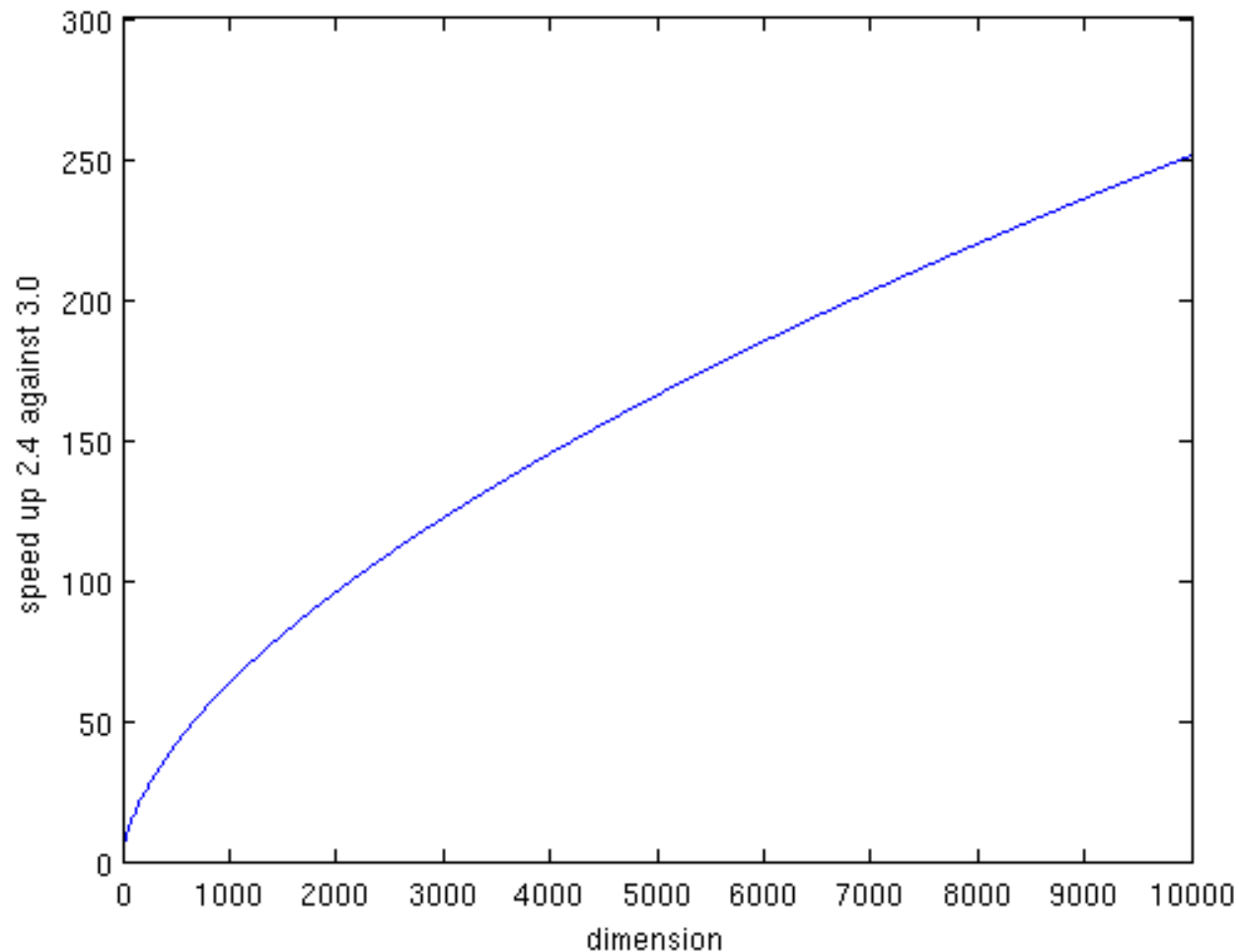
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Algorithms for Matrix Multiplication



Algorithms for Matrix Multiplication



Literature

K. Meyberg & P. Vachenauer, Höhere Mathematik 1, Springer

I. Markov, Introduction to matrix calculus

http://w3.uacg.bg/UACEG_site/acadstaff/userfiles/study_bg_162_Matrix_PDF_Engl.pdf

Homework

A) Write a short Matlab script to solve the following tasks:

- 1) generate a random matrix of dimensions 50×20 with elements drawn from a normal distribution
- 2) use *loops* to set all elements with $|a| \leq 1$ to zero, check the required time
- 3) do the same task *without* using loops, check the required time
- 4) display the original matrix together with the results of 2) and 3) to check that they are really equal
- 5) rerun the same script for dimension 5000×2000

Homework

B) Write a short Matlab script to rerun the following instructions 20 times:

- 1) generate a random matrix of dimensions 5000*2000 with elements drawn from a normal distribution
- 2) use *loops* to set all elements with $|a| \leq 1$ to zero, check the required time
- 3) do the same task *without* using loops, check the required time
- 4) repeat steps 2) and 3) for the *transposed* matrix

Answer the following questions:

- a) Is the vectorized version significantly faster than the loops?
- b) Do vectorized and looped variants differ between the original and the transposed matrix?