Phd seminar on classic papers in mathematics and mathematical statistics

David Cohen

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Goal. The original idea for such a seminar comes from Prof. Nick Trefethen, University of Oxford (see the webpage https://people.maths.ox.ac.uk/trefethen/classics.html for details). Furthermore, together with Prof. Marcus Grote, I organised a seminar series in classic papers in numerical analysis at the University of Basel (see http://snovit.math.umu.se/Personal/cohen_david/Teach/Klass09/KlassFS09.html for further details in German).

The goal of this seminar series is to present classic papers in the general field of mathematics and mathematical statistics.

Content. The idea behind this course is that each Phd student, that register to the course, presents one classic paper from his/her field of research. It is important to carefully select the paper in order for every participants to understand as much as possible the content of the paper. The presentations should thus also be adapted to a large audience.

Depending on the field, I'll discuss the choice of the paper with the Phd student, else the Phd student should carefully select the paper with his/her supervisor.

Examples of classic papers in numerical analysis.

- J. W. Cooley, J. W. Tukey, *An algorithm for the machine calculation of complex Fourier series*. This paper presents the idea of the fast Fourier transform (FFT). From wikipedia: "Fast Fourier transforms have been described as the most important numerical algorithm[s] of our lifetime" It is a short and relatively easy to read paper.

- J. Crank, P. Nicolson, *A practical method for the numerical evaluation of solutions of partial differential equations of the heat-conduction type*. This paper introduces and analyses one of the first finite difference method for parabolic PDEs.

- N. Metropolis, S. Ulam, *The Monte Carlo method*. This is the first time that one uses a probabilistic approach to solve deterministic problems. Applications are in all sciences (computational biology, engineering, finance, physical sciences, etc.).

- E. Hairer, C. Lubich, G. Wanner, *Geometric numerical integration illustrated by the Störmer/Verlet method*. This paper is closely related to my research field and give a very nice summary of the state of the art numerical methods for ODEs.

- C. De Boor, *On calculating with B-splines*. This is the first paper on splines and its uses in car design.

- Y Saad, M. H. Schultz, *GMRES: A generalized minimal residual algorithm for solving nonsymmetric linear systems*. This paper presents an iterative method for the numerical solution of nonsymmetric systems of linear equations.

Organisation. Each participant present one paper and assist to all other presentations in order to get 4 credit points. Furthermore, each participant could prepare a short report ($1-2$ pages) for the other participants, where they present the authors, the results and the main ideas of the paper. Depending on the number of participants, one could imagine having this seminar series once a week or every two weeks.

Target students. Phd and master students from our department, the department of computing science, UMIT and IceLab. No requirements.

Period for the course. I can give this seminar in HT-2014 (but not in October).

Further information. http://snovit.math.umu.se/Personal/cohen_david