universität wien
Fakultät für Mathematik

VORTRÄGE

Mittwoch, 11. Mai 2016 von 15:00 bis 15:45 Uhr, Sky Lounge, OMP 1
Junior Kolloquium: Hedy Attouch (Univ. Montepellier 2, France): "Grasient-based methods for Multiobjective Optimization. A dynamical approach to Pareto optima"

Our goal is to present gradient-based dynamics and algorithms for multiobjective optimization. The following model works in a general Hilbert space, which makes it applicable to a wide variety of problems in decision sciences, and inverse problems in engineering. For simplicity of presentation, consider a finite family of differentiable objective functions $\{f_i; i = 1,2,...q\}$, and the unconstrained case. The vector field which governs the dynamic is $s(x) := -(\mathrm{Conv}\{\nabla f_i(x)\})_0$ where $\mathrm{Conv}\{\nabla f_i(x)\}$ is the convex hull of the finite set of gradient vectors $\{\nabla f_i(x); i = 1,2,...q\}$ at x (a polyhedral convex set), and $(\mathrm{Conv}\{\nabla f_i(x)\})_0$ is its element of minimal norm. The associated dynamical system is called the Multi-Objective Gradient system ((MOG) for short) (MOG)x(t) + $(\mathrm{Conv}\{\nabla f_i(x)\})_0 = 0$. This dynamic system has been introduced by economists (Smale, Henry, Cornet) in the 80th for the optimal allocation of resources. It is only recently that its fundamental impor-tance in the optimization was highlighted, see [1] and references therein. We first present the properties of (MOG) that make it attractive in terms of modeling:

- It is a descent method, i.e., for each i = 1,...,q, t 7; $f_i(x(t))$ is nonincreasing.
- Its trajectories converge to weak Pareto optimal points when the f_i are convex, and critical Pareto points when the f_i are uasi-convex.
- At time t, the vector field which governs (MOG) is a convex combination of the gradients with scalars which are not fixed in advance. They are part of the process.

Then, we show how to extend the dynamical system to the constrained case, and nonsmooth objective functions. Discre-tization of the dynamical system provide algorithms which share the same properties, which makes the link with the multiobjective steepest descent algorithm by Fliege and Svaiter [2], and the associated splitting methods. Finally, we present recent results concerning the inertial version of (MOG) (secondorder differential equation), some open problems, and directions of research

15:45 Uhr Kaffeejause

Mittwoch, 11. Mai 2016 von 16:15 bis 17:00 Uhr, Sky Lounge, OMP 1
Mathematisches Kolloquium: Hedy Attouch (Univ. Montepellier 2, France):"Fast splitting algorithms for convex optimization. Beyond nesterov complexity bound $0(1/k^2)$"

Many scientifc and engineering problems can be naturally modeled as very large scale optimization problems, creating new challenges for the optimization discipline. In this perspective, in recent years, considerable effort has been devoted to the study of firstorder splitting algorithms. The forward-backward algorithm, which is one of the most important, is a powerful tool for solving optimization problems with a additively separable and smooth plus nonsmooth structure. In the convex setting, a simple but ingenious acceleration scheme developed by Nesterov improves the theoretical rate of convergence for the function values from the standard $O(k_{-1})$ down to $O(k_{-2})$. In this lecture, we show that the rate of convergence of a slight variant of Nesterov's accelerated forwardbackward method, which produces convergent sequences, is actually $o(k_{-2})$, rather than $O(k_{-2})$. Our arguments are based on the connection between this algorithm and a secondorder differential inclusion with vanishing damping, recently introduced by Su, Boyd and Candès. The key point is the introduction of energy-like Lyapunov functions, with adapted scaling. Linking algorithms with dynamical systems provide connections between different areas, and a valuable guide for the proofs. Finally, we consider the hierarchical multi-objective problem which consists in finding by rapid methods the solution with minimum norm of a convex minimization problem. To this end, we introduce into the dynamics and algorithms a Tikhonov regularization term with vanishing coefficient. Applications are given in sparse optimization for signal/imaging processing, and inverse problems. We conclude by showing some recent directions of research, in particular the developments of these methods to nonconvex nonsmooth semi-algebraic problems, based on Kurdyka-Lojasiewicz inequality.

im Anschluss vinum cum pane

Radu Bot, Harald Rindler

Mittwoch, 11. Mai 2016 von 9:00 bis 10:00 Uhr, SR 7, 2. OG., OMP 1
Habilitationsvortrag: Vera Fischer (KGRC, Univ. Wien): "Infinitary Combinatorics and Definability"

Abstract: The cardinal characteristics of the continuum describe various combinatorial, topological, or measure theoretic properties of the real line. They are usually defined as the minimum size of a family of reals satisfying a certain property and take cardinal values between the first uncountable cardinal and the size of the real line. For example, by the Baire Category Theorem, the minimal size of a family of meager sets that covers the real line is an uncountable cardinal,which does not exceed the size of the continuum. A major tool in the study of the cardinal characteristics of the real line is the method of forcing, which was introduced by Cohen to settle the Continuum Hypothesis. In this talk we will see how the study of some of the classical combinatorial cardinal characteristics of the real line, in particular the almost disjointness, bounding, dominating and splitting numbers, has prompted and influenced the development of some of our present day forcing techniques. Among those are the first appearance of creature forcing, a method of iteration known as matrix-iterations, as well as Shelah's template iteration technique. In addition, we will consider the existence of various nicely definable combinatorial objects on the real line in the presence of definable wellorders of the reals, which are low in the projective hierarchy, and large continuum, as well as various methods of forcing such wellorders. We will conclude with stating some open questions.

Mittwoch, 11. Mai 2016 von 10:00 bis 11:00 Uhr, SR 7, 2. OG., OMP 1
Habilitationsvortrag: Moritz Müller (KGRC, Univ. Wien): "Proof complexity"

Abstract: The talk offers a somewhat nonstandard introduction into proof complexity biased towards a selection of the results of my habilitation thesis. It intends to explain the interest in some of the central questions of proof complexity by tracing them back to the historical roots of mathematical logic.

Montag, 9. Mai 2016, von 09:50 Uhr bis Freitag, 13. Mai 2016 bis 12.40 Uhr, ESI, Boltzmann Lecutre Hall,
Programme on "Mixing Flows and Averaging Methods"
Workshop 2: "Statistical properties of dynamical sysstems"
org. by P. Bálint (TU, Budapest), H. Bruin (U Vienna), C. Liverani (U Rome, Tor Vergata), I. Melbourne (U Warwick), D. Terhesiu (U Vienna), (siehe Anhang)

Dienstag, 10. Mai 2016, 10:00 bis 11:00 Uhr, Sky Lounge, **OM P 1,**
Vortrag im Rahmen der Tenure Track Ausschreibung "Mathematics": Oleksiy Kostenko (Institut für Mathematik): "The string density problem and the Camassa-Holm equation".
(Details siehe Anhang)

Dienstag, 10. Mai 2016 von 13.15 bis 14:45, Seminarraum 9, 2. OG, OMP 1
Complexe Analysis SE: Michael Reiter (Univ. Wien): "Infinitesimal and local rigidity of holomorphic mappings (Part 1)
org. by B. Lamel, M. Reiter
http://complex.univie.ac.at/events/detail-of-talk/news/infinitesimal-and-local-rigidity-of-holomorphic-mappings-part-1/

Dienstag, 10. Mai 2016, von 15:00 bis 17:00 Uhr, SR 9, 2. OG., OMP 1
Geometry and Analysis on Groups, Research SE: John Mackay (Univ. Bristol):"Fixed point properties for groups acting on L^p spaces.""
org. by G. Arzhantseva, Ch. Cashen
http://www.mat.univie.ac.at/~gagt/abstracts/160510.html

Dienstag, 10. Mai 2016, 15:00 Uhr bis 16:00 Uhr, 09.142, 9 OG., OMP 1
AG Biomathematik : Konrad Grosser (Univ. Wien): "TBA"
org. by R. Bürger, J. Hermisson
http://homepage.univie.ac.at/Reinhard.Buerger/AGBio.html

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Dienstag, 10. Mai 2016, von 15:15 bis 16:45 Uhr, TU Dissertantenraum, Freihaus, Turm A, 8. Stock, Wiedner Hauptstraße 8-10, 1040 Wien
AG Diskrete Mathematik Seminar: **Olga Azenhas (Univ. de Coimbra): "The involutive nature of the Littlewood-Richardson (LR) commutativity bijection"**
org. by Ch. Krattenthaler
http://dmg.tuwien.ac.at/nfn/agdm.html

Mittwoch, 11. Mai 2016, ab 11.30 Uhr, Seminarraum 10, 2. OG, OMP 1,
NuHAG Seminar: **Xian Yin (Dept. of Electrial and Comp. Engin. Duke Univ.): "DCTNet and PCANet for Acoustic Signal Feature Extraction"**
http://www.univie.ac.at/nuhag-php/home/seminar.php?abstract=Y&id=3184

Donnerstag, 12. Mai 2016, von 16:30 Uhr bis 18:00 Uhr, TU Wien, Wiedner Hauptstr. 8, FH grün, SR 4, 4. OG.
Vienna SE Mathematical Finance and Probability: **Roberto Renò (Univ. of Verona):"The drift burst hypothesis"**
http://www.fam.tuwien.ac.at/events/vs-mfp/

Donnerstag, 12. Mai 2016, von 16.00 Uhr bis 18:00 Uhr, Josephinum, SR 8 (Zi. 02.101), Währinger Str. 25, 1090 Wien,
KGRC Research Seminar: **Anush Tserunyan (Univ. of Illinois): "Differentiation of subsets of semigroups, a Ramsey theorem, and a van der Corput lemma"**
org. by Kurt Gödel Research Center
http://www.logic.univie.ac.at/2016/Talk_05-12_a.html

Freitag, 13. Mai 2016, von 12.00 Uhr bis 15:00 Uhr, Josephinum, SR 8 (Zi. 02.101), Währinger Str. 25, 1090 Wien,
KGRC Research Seminar: **Paul Gartside (Univ. of Pittsburgh): "Neighborhoods, Compacta and the Tukey Order"**
org. by Kurt Gödel Research Center
http://www.logic.univie.ac.at/2016/Talk_05-13_a.html

Freitag, 13. Mai 2016, von 11.30 Uhr bis 13.00 Uhr, SR 11, 2. Stock, OMP 1
GAP Seminar: **Juan Margalef : " Misner space as a (toy) counterexample to almost anything"**
Org by M. Bauer, V. Branding (Fak. Math, TU), D. Fajman, J. Joudioux (Fak. Phys, UniVie), B. Schoerkhuber (Fak. Math, UniVie)
http://www.geometrie.tuwien.ac.at/branding/gap/index.html