The First LANCS Workshop on Discrete and Non-Linear Optimisation

University of Southampton

February 2009

Overview

This workshop was the first of a planned series of workshops on discrete and non-linear optimisation, arranged in conjunction with the LANCS Initiative. It was aimed primarily at staff and doctoral students from the four LANCS universities (Lancaster, Cardiff, Nottingham and Southampton). Since it was the first workshop, and the participants came from a variety of backgrounds, the bulk of the programme was devoted to introductory surveys on various relevant topics.

Location and Date

The workshop took place on the Highfield Campus at the University of Southampton, on Thursday 19th and Friday 20th of February, 2009. The meetings were held in the Law Building on the Thursday, and in the Mathematics Building on the Friday.

Participants

There were 22 participants in all:

- From Lancaster: Professor Adam N. Letchford, Sebastian J. Miller, Thanh-Ha Nguyen.
- From Nottingham: Jakub Marecek, Dr Ender Ozcan, Dr Andrew Parkes.
- From Cardiff: Dr Iskander Aliev.
- From Southampton: Dr Tolga Bektas, Professor Joerg Fliege, Narges Haghi, Farhana Johar, Dr Konstantinos Kaparis, Banafsheh Khosravi, Qingna Li, Fotini Malliappi, Mohammed Mesgarpour, Dr Nik Pearson, Dr Brijesh Patel, Professor Chris Potts, Dr Houduo Qi, Dr Yue Wu, Dr Huifu Xu.

Organisers

The organiser of the academic programme was Adam Letchford, and the local organiser was Joerg Fliege. Thanks are also due to Ms Yvonne Richardson, secretary of the CORMSIS group in Southampton.

Programme

Thursday 19th February:

14:00-14:15: Adam Letchford gave an introduction and welcome. He introduced the LANCS Initiative, described its research clusters, and explained the motivation for having a cluster devoted to discrete and non-linear optimisation.

14:15-15:00: Iskander Aliev gave a survey on Convex Optimisation. This included an introduction to convexity, convex functions and convex optimisation problems, some practical applications of convex optimisation, and a description of some of the main solution methods.

15:00-15:45: Hou-Duo Qi gave a survey on Conic Optimisation, an important special case of convex optimisation. The talk focused on the three main special cases (Linear Programming, Second-Order Cone Programming and Semidefinite Programming), and some sample applications.

15:45-16:15: coffee break

16:15-17:00: Adam Letchford gave a survey on Mixed-Integer Non-Linear Programming. This included an explanation of why MINLPs are harder to solve than either NLPs or MILPs, a description of the main solution methods for the convex and non-convex cases, and examples of practical applications.

Friday 20th February:

09:30-11:00: A chance was given for participants to introduce themselves and describe their research interests. People expressed interest in a wide variety of topics, ranging from theoretical studies of various 'fundamental' optimisation problems, to various 'messy' real-life applications.

11:00-11:30: coffee break

11:30-12:45: Adam Letchford drew peoples' attention to various web sites related to optimisation — one of which was the LANCS web site itself. There was then an informal discussion. Two recurring themes emerged. First, it is not always clear which model or solution technique to use when facing a specific practical application. For this reason, it is good to have contact with people working in other areas from oneself. Second, existing software is not always ideal. In particular, there is still no cheap, user-friendly and robust software for Semidefinite Programming.