Computational Challenges in Image Processing

The Turing Gateway to Mathematics

Isaac Newton Institute, Cambridge, 5 Sept. 2017

Part of the programme

Variational methods and effective algorithms for imaging and vision[1]

(Ke Chen (Liverpool), Andrew Fitzgibbon (Microsoft), Michael Hintermüller (Berlin), Carola-Bibiane Schönlieb (Cambridge), Xue-Cheng Tai (Hong Kong))
Goal: gather (mostly academic) experts in applied math (imaging), optimization, computer science, inverse problems, to discuss / work together / improve techniques for image processing.

- more than 20 long-term participants;
- about 70 participants to the current workshop;

[1] "VMV"

Overview of the VMV programme

Three workshops at INI, one in CMS, one in Warwick...

- this week: *Variational methods, new optimisation techniques and new fast numerical algorithms*;
- *IMA Conference on Inverse Problems from Theory to Application* in CMS, 19th–21st Sept., 2017;
- *Generative models, parameter learning and sparsity*, 29th Oct.–3rd Nov., 2017;
- *Flows, mappings and shapes*, 11th–15th Dec., 2017.

["satellite" workshop in Warwick, *Image analysis and processing in the life sciences*]
And this afternoon: *Computational Challenges in Image Processing*

Current workshop

- Focuses on optimisation and algorithms.
- For inverse problems, reconstruction, clustering, etc...
- mostly academic research (more or less "*pure applied math*" depending on the presentations). Useful for experimenting and finding new techniques.
- Gathers researchers in applied math, computer science, signal processing...

Computational Challenges in Image Processing

This afternoon event is part of the "**Turing Gateway to Mathematics**", a programme of the INI and CMS (University of Cambridge). The "TGM" aims at developing interactions between mathematicians and the industry, or other disciplines.

This particular event aims therefore at presenting applied research, both academic and industrial. The focus is in particular on computationally intensive problems (such as involving complex physical systems or big data/learning).
It fits perfectly well the current academic workshop but is obviously closer to applications.

Computational Challenges in Image Processing

Talks:

- *Statistical Machine Learning and Optimisation Challenges for Brain Imaging at a Millisecond Timescale*, Alexandre Gramfort (Université Paris-Saclay, France);
- *Nonlinear Tomography*, Andrew Curtis (University of Edinburgh);
- *Validating Machine Learning Models Visually with Zegami*, Roger Noble (Zegami);
- *Computational Challenges for Long Range Imaging*, Mark Bray (BAE Systems);
- *Imaging Whales from Space*, Peter Fretwell (British Antarctic Survey).

Upcoming

Next event in this series is "**Mathematics of Imaging and Vision**" on **6th December**, 2017.
It will focus on image reconstruction, image and shape analysis with end-user applications, and consists of talks and a poster exhibition.
More info on
https://www.turing-gateway.cam.ac.uk/event/ofbw33.