Bogdan Toader
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RESEARCH INTERESTS:

My research is focused on grid-free compressed sensing, or super-resolution. So far I have developed theory for the stability of the super-resolution problem with non-negative measures. Current and future work includes extending the theory to the recovery of curves in two dimensions and working on algorithms for super-resolution.

More generally, I have an interest in the broader fields of compressed sensing, mathematical signal processing, optimisation and machine learning.

EDUCATION

October 2018 - present
Alan Turing Institute, UK
Enrichment Student at the UK's national institute for data science and artificial intelligence until March 2019

2015 - present
University of Oxford, UK
PhD in Industrially Focused Mathematical Modelling (Centre for Doctoral Training)
Title: Source reconstruction from hydrophone data
Advisors: Prof Jared Tanner, Dr Andrew Thompson
Industrial supervisors: Dr Stephane Chretien (NPL), Dr Peter Harris (NPL)
Main research project on super-resolution, partly funded by the National Physical Laboratory (NPL).

2009 – 2013 University of Manchester, UK
BSc (Hons) Computer Science and Mathematics with Industrial Experience
Result: 1st class degree - with a grade above 80%

2005 – 2009 "Gheorghe Munteanu Murgoci" National College, Romania
Specialisation: Mathematics – Computer Science (Bilingual courses – English Language)
Romanian Baccalaureate: final grade of 9.91 (out of a maximum of 10).

PUBLICATIONS

1. **Non-negative super-resolution is stable**
   Armin Eftekhari, Jared Tanner, Andrew Thompson, Bogdan Toader and Hemant Tyagi
   2018 IEEE Data Science Workshop, DSW 2018 - Proceedings page 100-104

2. **Sparse non-negative super-resolution — simplified and stabilised**
   Armin Eftekhari, Jared Tanner, Andrew Thompson, Bogdan Toader and Hemant Tyagi
   Submitted, preprint on arXiv: https://arxiv.org/abs/1804.01490

3. **Perturbation analysis of the super-resolution problem and the level method**
   Stephane Chretien, Andrew Thompson, Bogdan Toader
   Work in progress

OTHER RESEARCH EXPERIENCE

July - September 2016 Deflating Magnetic Oscillations

A ten week project with Culham Centre for Fusion Energy on using deflation to find multiple periodic solutions to a system of ODEs that describes the behaviour of plasma.

May - July 2016 Improved Source Reconstruction from Hydrophone Data

A ten-week project where I analysed how compressed sensing techniques can be applied to a problem proposed by the National Physical Laboratory. An extension of this work to grid-free compressed sensing applied to the same problem has been the focus of my PhD project for the following three years.

2012 - 2013 Formal Verification of Dynamical Systems

For my undergraduate final year dissertation I have undertaken a research project that involved using the automatic theorem prover MetiTarski to analyse equilibrium and stability properties of dynamical systems.

PRESENTATIONS

2018 Curves and Surfaces Conference, Arcachon, France - Oral presentation
6th IMA Conference on Numerical Linear Algebra and Optimization, Birmingham, UK - Oral presentation
IEEE Data Science Workshop, Lausanne, Switzerland - Poster presentation
InFoMM Annual Meeting 2018, Oxford - Oral presentation
Numerical Analysis Seminar, Oxford - Oral presentation
Research Workshop on Optimization and Big Data, KAUST, Saudi Arabia - Poster presentation
SIAM UKIE Annual Meeting, Southampton, UK - Poster presentation

2017 InFoMM Group Meeting, Oxford - Oral presentation
InFoMM Annual Meeting 2017, Oxford - Poster presentation

OTHER ACTIVITIES

2019 Mathematics of imaging CIRM Winter School, Marseille, France (January)

2018 Data Study Group, Alan Turing Institute, London (December)
142nd European Study Group with Industry, Palanga, Lithuania
Worked on predicting the sustainable income of loan applicants according to rules from the central bank.

2017 Summer School on Structured Regularization for High-Dimensional Data Analysis, Henri Poincare Institute, Paris

2016 Data Study Group, Alan Turing Institute, London
Implemented network model to solve an air traffic prediction problem proposed by Airbus.
116th European Study Group With Industry, Durham, UK
Implemented mixed integer programming solution to problem on scheduling field trials proposed by Syngenta.
InFoMM Graduate Modelling Camp, Oxford - won IMA Best Team Performance prize

TEACHING EXPERIENCE

2016 - present Integer Programming - University of Oxford
Michaelmas term 2016, 2017 - teaching assistant for 3rd year undergraduate course
Lecturer: Prof Raphael Hauser

Continuous Optimization - University of Oxford
Hilary term 2017, 2018 - teaching assistant for 4th year undergraduate course
Lecturer: Prof Coralia Cartis

Computational Mathematics - University of Oxford
Michaelmas term 2016, Hilary term 2017 - demonstrator for 1st year undergraduate Matlab classes
Lecturer: Dr Andrew Thompson

2010 – 2011 PASS (Peer Assisted Study Sessions) leader - University of Manchester
Weekly sessions with first year undergraduate students, assisting them with basic mathematics and programming.

AWARDS

2010 Golden Anniversary Prize
University of Manchester – for excellence in first year studies. Awarded to the students with the first five highest grades in the first year.

2006 – 2009 Bronze medal at the National Mathematical Olympiad in Romania in 2007, 2008 and 2009
Won various prizes at other national and regional mathematics contests, including the national contest organised by the editors of the Romanian mathematical journal "Gazeta Matematica" for students who regularly send solutions to the problems published in the journal.

INDUSTRY EXPERIENCE

August 2013 – September 2015 Morgan Stanley – Technology Associate
I was part of the Pricing Technology team for the Interest Rate Derivatives business, where I used Scala and Perl on a daily basis to build and improve the pricing tools used by quantitative analysts and traders.

June – July 2012 Credit Suisse - Summer Internship in the Technology Department
I was part of the team that maintains the Unix servers in the EMEA region. On top of handling daily requests from users, I improved my shell scripting skills.

June 2011 – May 2012 Morgan Stanley - Industrial Placement in the Technology Department
Worked as part of the Institutional Securities Group Technology division in one of the teams developing and supporting the equities trading systems. Acquired experience of working with large sets of data.

OUTREACH

2017-2018 Lord Williams's School, Thame **-** Ran an outreach session every year aimed at pre-final year students about doing research in applied mathematics.

TECHNICAL KNOWLEDGE

Good knowledge of Matlab, Java, Scala, Python, Linux, intermediate skills of C++, Perl

LANGUAGES

Native: Romanian
Acquired: English (fluent, grade B in the *Cambridge English: Advanced CAE* examination)

OTHER INTERESTS

Gliding, running, hiking, climbing, skiing, guitar