Alex Raichev

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2014.04

introduction

For the past eight years, Alex has worked as a professional researcher and developer on a variety of technical projects, both theoretical and applied. Most recently, he has collaborated with the consultancy MRCagney to analyze and visualize civic data. Alex enjoys designing mathematical and algorithmic solutions to complex problems, learning new things, working on teams, and using his skills to benefit society.

key skills

Mathematics and algorithmics: 8 years experience developing mathematical and algorithmic solutions to complex problems in both academe and industry
Python: 6 years experience programming in the Python ecosystem (Python, Sage, SciPy, Django, etc.)
Technical communication: 10 years experience scientific publishing and university teaching
Learning new things: 8 years experience making original contributions to disparate fields such as algorithmic randomness, analytic combinatorics, and geographic analysis

education

Ph.D. Mathematics, University of Wisconsin-Madison, USA, 2006.05
Subject: Computability Theory
Minor: Computer Science
M.A. Mathematics, University of Wisconsin-Madison, USA, 2002.05
B.A. Mathematics with honors, Cornell University, USA, 2000.05

experience

Researcher and Developer, MRCagney, New Zealand, 2013.05–present
Developed software to analyze and visualize civic data, such as General Transit Feed Specification (GTFS); crafted with open-source tools, such as Python, GeoDjango, PostGIS, RapydScript, Highcharts, and Leaflet; founded the dev team; worked in a team of four; see GTFS Explorer and Affordability in New Zealand

Honorary Research Fellow, University of Auckland, New Zealand, 2009.05–present
Conducted research in the field of graph dynamics and analytic combinatorics both solely and collaboratively; published in mathematical journals and conference proceedings; developed algorithms to compute asymptotics of coefficients of multivariate generating functions and submitted them as Python/Sage patches; consulted on various scientific projects; see graph_dynamics and amgf on Github

Researcher and Developer, Publons, New Zealand, 2013.04–2013.05
Developed a review process to evaluate scientific research; developed the Publons website with Django; created interactive data visualizations with D3; worked in a team of six; see the Publons site

Researcher and Developer, Landcare Research, New Zealand, 2011.07–2013.03
Developed a discrete global grid system (DGGS) based on NASA's HEALPix projection to underlie Landcare's open-source geographic analysis system for worldwide scientific collaboration; derived the formulas, designed the algorithms, and implemented the DGGS in Python; tested early, often, and automatically; prepared visualizations with Sage; documented and auto-documented with Sphinx; contributed the HEALPix and rHEALPix map projections to the PROJ.4 library; documented the DGGS in a scientific article; worked in a team of four; see Landcare's Git repo

Researcher and Developer, University of Auckland, New Zealand, 2012.07
Developed Python/Sage software to compute asymptotics of coefficients of multivariate generating functions
Lecturer, Auckland University of Technology, New Zealand, 2012.05
Taught theory of computation to a class of 10 students
Lecturer, Auckland University of Technology, New Zealand, 2009.07–2011.01
Taught algebra, analysis, cryptology, statistics, and theory of computation to small and medimum sized classes (5–25 students); wrote and graded homework, quizzes, and exams; mentored mathematics students
Postdoctoral Research Fellow, University of Auckland, New Zealand, 2006.05–2009.04
Conducted research in the field of analytic combinatorics both solely and collaboratively; published in mathematical journals and conference proceedings; presented at domestic and international workshops and conferences; developed and implemented algorithms for computing asymptotics of coefficients of multivariate generating functions and submitted them as Python/Sage patches; mentored mathematics students
Doctoral Candidate, University of Wisconsin-Madison, USA, 2000.08–2006.02
Conducted research in the field of computability theory both solely and collaboratively; published in mathematical journals and conference proceedings; presented at domestic and international seminars, workshops, and conferences

publications

- The rHEALPix discrete global grid system, Robert Gibb, Alexander Raichev, and Michael Speth, in preparation
- New software for computing asymptotics of multivariate generating functions, Alexander Raichev, ACM Communications in Computer Algebra, Volume 45 Issue 3/4, September/December 2011, pages 183–185
- Asymptotics of coefficients of multivariate generating functions: improvements for multiple points, Alexander Raichev and Mark C. Wilson, Online Journal of Analytic Combinatorics, Issue 6, 2011.
- Asymptotics of coefficients of multivariate generating functions: improvements for smooth points, Alexander Raichev and Mark C. Wilson, Electronic Journal of Combinatorics, Vol. 15 (2008), R89
- A new method for computing asymptotics of diagonal coefficients of multivariate generating functions, Alexander Raichev and Mark C. Wilson, Discrete Mathematics & Theoretical Computer Science Proceedings, Conference on Analysis of Algorithms 2007
- A minimal rK-degree, Alexander Raichev and Frank Stephan, Lecture Notes Series, Institute for Mathematical Sciences, National University of Singapore, Vol. 15 (2008), 261–269.
- Model completeness for trivial, uncountably categorical theories of Morley rank 1, Alfred Dolich, Michael C. Laskowski, and Alexander Raichev, Archive for Mathematical Logic, Jul 2006, 1–15
- Relative randomness and real closed fields, Alexander Raichev, Journal of Symbolic Logic, 70 (2005), no. 1, 319–330
- Relative randomness and real closed fields (extended abstract), Alexander Raichev, Proceedings of the 6th Workshop on Computability and Complexity in Analysis (CCA 2004), 135–143, Electron. Notes Theor. Comput. Sci., 120, Elsevier, Amsterdam, 2005

service

- Contributor to the PROJ.4 cartographic projections library, 2011–2013
- Contributor to the Sage open-source mathematics software project , 2010.12–present
- Co-founder and volunteer mechanic for Tumeke Cycle Space, Auckland's community bicycle workshop, 2010.05–present