

Matthew Kitching

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Programming Expertise

Operating Systems: Microsoft and Unix.

Programming Experience: Nine years of experience in C, C++, and Java, including four years of industrial experience, and five years of experience while working towards a Ph.D. degree focused on developing high performance mathematical programs. Expert in Microsoft Visual Studio and Eclipse. Familiarity with C#, CPLEX and Perl.

Algorithms: Expert knowledge of constraint programming, data structures, backtracking search, local search, planning and scheduling, and discrete optimization algorithms.

Education: B.Sc. (1994-1999) and M.Sc. (2000-2003) in Computer Science, McGill University. Ph.D. (2004-2010) in Computer Science, University of Toronto.

Work Experience

Mitacs Post-Doctoral Research Fellow May, 2011 - present
University of Waterloo Waterloo, Canada
The MITACS post-doctoral fellowship is designed to facilitate collaborations between industry and academia. The fellowship involves applying constraint programming techniques to problems posed by industrial partners. In addition, I also teach an introductory computer science course at the University of Waterloo.

Internal Research Fellow May, 2010 - May, 2011
European Space Agency Darmstadt, Germany
I worked on planning and scheduling solutions for use in space missions. I liaised with end users of the scheduling system in order to determine the specifications and requirements of the planning and scheduling platform. Once I identified the needs of end users, I designed algorithms and prototype solutions using techniques such as local search and an in-house planning and scheduling platform called APSI. A second component of my position involved large scale projects with industrial partners. My duties included evaluating project feasibility, analyzing bids from industrial partners, and as a technical consultant for the projects.

Research Intern April 2008 - August 2008
Microsoft Research Cambridge, UK
The internship focused on the development of a prototype local search solver in C#. I adapted and improved upon existing local search techniques to produce a competitive local search solver that has since been expanded into a commercially released product.

Researcher September 2002-September 2004
Montreal Neurological Institute Montreal, Canada
I developed data analysis tools for an MRI pediatric study involving children from across the United States. The study involved over 500 subjects, and 8700 MRI scans. I programmed a processing pipeline that automatically performed image processing and segmentation on MRI data using C and Perl on Linux machines.

Software Engineer September 1999-September 2000

Milinx Business Services Vancouver, Canada
 I designed and programmed Linux-based voice-recognition system using entropic voice recognition software. I also developed a java based client program that allowed users to navigate the Milinx web site by using a microphone, as well as a C based server program that performed the voice-recognition.

Software Engineer May 1997-August 1998
 Matrox Electronics Montreal, Canada
 I was part of a team that programmed an imaging software program named Inspector, for use with Matrox graphics cards. The program was developed in Visual C++ using MFC, on Windows 95/NT platforms.

Education

Ph.D. University of Toronto September 2004 - May 2010
 Knowledge Representation Group. Adviser: Professor Fahiem Bacchus. Project: Decomposing Constraint Satisfaction Problems.

M.Sc. Computer Science McGill September 2000 - April 2003
 Graph Theory Group. Adviser: Professor Sue Whitesides. Project: On the Geometric Layout of Graphs: Complexity and Approximation Results.

B.Sc. Computer Science McGill September 1994 - April 1999
 Major in Computer Science.

Refereed Conference Proceedings

M. Kitching and N. Policella: "A Local Search Solution for the INTEGRAL Long Term Planning", International Workshop on Planning and Scheduling for Space 2011 (IWPSS-2011).

M. Kitching and F. Bacchus: "Exploiting Decomposition on Constraint Problems with High Tree-Width", Twenty-first International Joint Conference on Artificial Intelligence (IJCAI-2009), 525-531.

M. Kitching and F. Bacchus: "Set Branching in Constraint Optimization", Twenty-first International Joint Conference on Artificial Intelligence (IJCAI-09), 532-537.

M. Kitching and F. Bacchus: "Exploiting Decomposition in Constraint Optimization Problems", Fourteenth International Conference on the Principles and Practice of Constraint Programming (CP-2008), 478-492.

E. Hsu, M. Kitching, F. Bacchus, and S. McIlraith: "Using EM to Find Likely Assignments for Solving CSPs", Twenty-Second Conference on Artificial Intelligence (AAAI-2007), 224-230.

M. Kitching and F. Bacchus: "Symmetric Component Caching", Twentieth International Joint Conference on Artificial Intelligence (IJCAI-2007), 118-124.

M. Kitching and S. Whitesides: "The Three Dimensional Logic Engine", 12th International Symposium on Graph Drawing (GD-2004), 329-339.

V. Dujmovic, M. Fellows, M. Hallett, M. Kitching, G. Liotta, C. McCartin, N. Nishimura, P. Ragde, F. Rosamond, M. Suderman, S. Whitesides and D.R. Wood: "A Fixed-parameter Approach to Two Layer Planarization", 9th International Symposium on Graph Drawing (GD-2001), 1-15.

V. Dujmovic, M. Fellows, M. Hallett, M. Kitching, G. Liotta, C. McCartin, N. Nishimura, P. Ragde, F. Rosamond, M. Suderman, S. Whitesides and D.R. Wood: "On the Parameterized Complexity of Layered Graph Drawing", 9th Annual European Symposium on Algorithms (ESA 2001), 488-499.

Journal Publications

V. Dujmovic, M. Fellows, M. Hallett, M. Kitching, G. Liotta, C. McCartin, N. Nishimura, P. Ragde, F. Rosamond, M. Suderman, S. Whitesides and D.R. Wood: “On the Parameterized Complexity of Layered Graph Drawing”, *Algorithmica*, Volume 52(2):267-292, 2008.

V. Dujmovic, M. Fellows, M. Hallett, M. Kitching, G. Liotta, C. McCartin, N. Nishimura, P. Ragde, F. Rosamond, M. Suderman, S. Whitesides and D.R. Wood: “A Fixed-parameter Approach to Two Layer Planarization”, *Algorithmica*, Volume 45(2):159-182, 2006.