

Joseph Scott

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EDUCATION

- MAR 2016 | Doctorate in COMPUTER SCIENCE, **Uppsala University**, Sweden
THESIS: *Other Things Besides Number: Abstraction, Constraint Propagation, and String Variables*
Advisors: Prof. Pierre FLENER, Prof. Parosh ABDULLA, Dr. Justin PEARSON
We develop a framework describing propagation of constraints for combinatorial problems in terms of Galois connections between the set of candidate solutions and their over-approximations. This framework enables us to precisely define complicated propagation strengths, and to derive corresponding propagator functions. We use this framework to design and implement a practical string decision variable type for a constraint solver, and to derive efficient propagators for string constraints.
- SEP 2010 | Master of Science in COMPUTER SCIENCE, **Uppsala University**, Sweden
THESIS: *Filtering Algorithms for Discrete Cumulative Resources*
Advisor: Dr. Mats CARLSSON | Reviewer: Dr. Justin PEARSON
We implement a state-of-the-art algorithm in constraint-based scheduling, the edge-finding propagator for the cumulative resource constraint, which detects precedences among tasks that must exist in any feasible schedule. The thesis supplies several important details omitted from the published algorithm, and uncovers a significant and previously unreported error in the original description.
- JUN 2006 | Bachelor of Science in COMPUTER SCIENCE, **Eastern Michigan University**, USA
summa cum laude
MINOR: Mathematics, History
GPA: 3.85/4

WORK EXPERIENCE

- 2010–present | DOCTORAL CANDIDATE, **Uppsala University**, Sweden
Constraint Programming for Software Verification
RESEARCH TOPIC: constraint programming techniques for software verification problems.
- 2007 | TEXTBOOK MANAGER, **Shaman Drum Books**, Ann Arbor, Michigan, USA
Physical setup, staff training, sales floor management.
- 2002–2005 | SOFTWARE TESTER, **Borders Group, Inc.**, Ann Arbor, Michigan, USA
Independent testing of Point of Sale systems for Borders and Waldenbooks retail locations.
- 2000–2002 | MANAGER, **Borders Books and Music**, Ann Arbor, Michigan, USA
Managed operations of music and café departments (\$3M in annual sales); supervised 20+ employees.
- 1997–2000 | TRAINER, **Borders Books and Music**, Ann Arbor, Michigan, USA
Developed and ran week-long training program for managers throughout the midwest.
Physical setup and staff training for new stores, domestic and international.
- 1995–96 | BOOKSELLER, **Borders Books and Music**, Ann Arbor, Michigan, USA

AWARDS

- 2011 | SWEDISH AI SOCIETY: **Best Masters Thesis Award**.
Invited presentation at the SCANDINAVIAN CONFERENCE ON ARTIFICIAL INTELLIGENCE (SCAI 2011), Norwegian University of Science and Technology, Trondheim, Norway; 5000 SEK travel grant.
- 2006 | COMPUTER SCIENCE DEPT., EASTERN MICHIGAN UNIVERSITY: **Outstanding Senior Award**
Conferred annually by faculty on one graduating student, for academic excellence in computer science.
- 2005–2006 | EASTERN MICHIGAN UNIVERSITY: **Regent's Scholar**
\$3000 annual scholarship, for students demonstrating outstanding academic performance.

PEDAGOGICAL EXPERIENCE

- 2011–2014 | INVITED LECTURER, Uppsala University
constraint-based scheduling, string matching algorithms
- 2011–2016 | TEACHING ASSISTANT, Uppsala University
Machine Learning, Program Design and Data Structures, Algorithms and Data Structures II and III
- 2011 | ACADEMIC TEACHER TRAINING, 5 week course, Uppsala University
Theory and practice of teaching and learning in higher education.
- 1998–2002 | MANAGEMENT TRAINER, Midwest Regional Learning Center, Borders Group, Inc.
Developed and ran 3–5 day management training courses.
- 1998 | ACTIVE TRAINING, 2 day seminar, Borders Group, Inc.

OTHER EDUCATION

- 2014–2015 | SWEDISH FOR ACADEMICS II & III
Uppsala University
- SEP 2012 | ASSOCIATION FOR CONSTRAINT PROGRAMMING SUMMER SCHOOL: THEORY AND PRACTICE
University of Wrocław, Institute of Computer Science, Wrocław, Poland
- JUN 2012 | CP MEETS CAV invitational seminar
Institute of Theoretical and Applied Physics, Turunç, Turkey
- JUN 2011 | ASSOCIATION FOR CONSTRAINT PROGRAMMING SUMMER SCHOOL: HYBRID METHODS
Institute of Theoretical and Applied Physics, Turunç, Turkey
- JUN 2011 | 1ST INTERNATIONAL SAT/SMT SUMMER SCHOOL
Massachusetts Institute of Technology, Boston, Massachusetts, USA
- MAY 2010 | ASSOCIATION FOR CONSTRAINT PROGRAMMING SUMMER SCHOOL
Centre Paul Langevin, Aussois, France
- 2009 | BASIC SWEDISH I
Uppsala University
- 2008 | SVENSKA FÖR INVANDRARE

MEMBERSHIP AND SERVICE

- 2015 | DESIGN CHAIR and CONFERENCE WEBMASTER
ACM WOMENCOURAGE 2015, Uppsala, Sweden
- MAR 2015 | INVITED PANELIST: “Gender and Computing” Panel Discussion
Gender Equity Group, Dept. of Information Technology, UPPSALA UNIVERSITY
- 2014–2015 | WEBMASTER and EXECUTIVE COUNCIL MEMBER
Uppsala student chapter, Association for Computing Machinery’s Women in Computing (ACM-W).
- 2011–2013 | PHD STUDENT COORDINATOR, Computing Science Division, Dept. of IT, UPPSALA UNIVERSITY
organizer of departmental PhD seminar series, and annual PhD student retreat
- Conference Referee: CP, CPAIOR, AAAI
 - Member: Association for Constraint Programming (ACP); Swedish AI Society (SAIS); IEEE; ACM

INTERESTS AND ACTIVITIES

history of science; knitting; cross country skiing; ukulele

SKILLS

- Experience with global and local optimisation techniques, primarily: constraint programming, local search, genetic algorithms, particle swarms, SMT, multi-objective optimisation methods, linear programming.
- Programming experience: C++, PYTHON, HASKELL, JAVA, PERL, JAVASCRIPT, \LaTeX .
- Knowledge of software verification and formal methods
- Native ENGLISH speaker, with excellent command of the written and spoken language.

PUBLICATIONS

- [1] **2016**. “Other Things Besides Number: Abstraction, Constraint Propagation, and String Variable Types”. PhD thesis, Uppsala University. *Uppsala Dissertations from the Faculty of Science and Technology* 120. Uppsala: Acta Universitatis Upsaliensis. 210 pp. URL: <http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-273311>. Supervisors: Pierre Flener, Justin Pearson, Parosh Abdulla.
- [2] **2015**. “Constraint Solving on Bounded String Variables”, with Pierre Flener and Justin Pearson. In: *Integration of AI and OR Techniques in Constraint Programming (CPAIOR 2015)*. Proceedings of the 12th International Conference. (Barcelona, Spain, May 18–22, 2015). Ed. by Laurent Michel. LNCS 9075. Springer, pp. 375–392. DOI: [10.1007/978-3-319-18008-3_26](https://doi.org/10.1007/978-3-319-18008-3_26).
- [3] **2014**. “A Quadratic Edge-Finding Filtering Algorithm for Cumulative Resource Constraints”, with Roger Kameugne, Laure Pauline Fotso, and Youcheu Ngo-Kateu. *Constraints* 19.3: 243–269. DOI: [10.1007/s10601-013-9157-z](https://doi.org/10.1007/s10601-013-9157-z). Extended version of [7].
- [4] **2013**. “A Quadratic Extended Edge-Finding Filtering Algorithm for Cumulative Resource Constraints”, with Roger Kameugne and Laure Pauline Fotso. *International Journal of Planning and Scheduling* 1.4: 264–284. DOI: [10.1504/IJPS.2013.059678](https://doi.org/10.1504/IJPS.2013.059678).
- [5] **2013**. “Rapid Prototyping of a Structured Domain through Indexical Compilation”. In: *COSpeL: The 1st Workshop on Domain Specific Languages in Combinatorial Optimization*. Satellite workshop of CP 2013. (Uppsala, Sweden, Sept. 16, 2013). Available from: cp2013.a4cp.org/workshops/cospe1.
- [6] **2013**. “Bounded Strings for Constraint Programming”, with Pierre Flener and Justin Pearson. In: *Tools with Artificial Intelligence (ICTAI 2013)*. Special Track on SAT and CSP technologies. (Washington, D.C., U.S.A. Nov. 4–6, 2013). IEEE Computer Society, pp. 1036–1043. DOI: [10.1109/ICTAI.2013.155](https://doi.org/10.1109/ICTAI.2013.155).
- [7] **2011**. “A Quadratic Edge-Finding Filtering Algorithm for Cumulative Resource Constraints”, with Roger Kameugne, Laure Pauline Fotso, and Youcheu Ngo-Kateu. In: *Principles and Practice of Constraint Programming (CP 2011)*. Proceedings of the 17th International Conference. (Perugia, Italy, Sept. 12–16, 2011). Ed. by Jimmy Ho-Man Lee. LNCS 6876. Springer, pp. 478–492. DOI: [10.1007/978-3-642-23786-7_37](https://doi.org/10.1007/978-3-642-23786-7_37).
- [8] **2010**. “Filtering Algorithms for Discrete Cumulative Resources”. MSc Thesis, Uppsala University, Department of Information Technology. IT 10 048. URL: <http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-132172>. Supervisor: Mats Carlsson.

TALKS

- [1] **May 2015**. *Constraint Solving on Bounded String Variables*. Integration of AI and OR Techniques in Constraint Programming (CPAIOR 2015). Barcelona, Spain.
- [2] **May 2015**. *Constraint Solving on Bounded String Variables*. SweConsNet Workshop 2015. Göteborg, Sweden.
- [3] **Sept. 2014**. *Bounded Strings for Constraint Programming*. CP meets Verification. Satellite workshop of CP 2014. Lyon, France.
- [4] **Nov. 2013**. *Bounded Strings for Constraint Programming*. IEEE 25th International Conference on Tools with Artificial Intelligence (ICTAI 2013). Washington, D.C., U.S.A.
- [5] **Sept. 2013**. *Rapid Prototyping of a Structured Domain through Indexical Compilation*. COSpeL: The 1st Workshop on Domain Specific Languages in Combinatorial Optimization. Satellite workshop of CP 2013. Uppsala, Sweden.
- [6] **Sept. 2011**. *A Quadratic Edge-Finding Algorithm for Cumulative Resources*. Principles and Practice of Constraint Programming (CP 2011), Doctoral Program. Perugia, Italy.
- [7] **May 2011**. *Filtering Algorithms for Discrete Cumulative Resources*. 11th Scandinavian Conference on Artificial Intelligence (SCAI 2011). **Invited Presentation**. Trondheim, Norway.
- [8] **May 2011**. *Quadratic Edge-Finding for Cumulative Resources*. SweConsNet Workshop 2011. Örebro, Sweden.