David Tolpin

Contact info

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Research Interests

Artificial Intelligence, probabilistic reasoning, bayesian statistics, decision-making under uncertainty, problem-solving search, information retrieval.

Education

Ben-Gurion University of the Negev (2009 – 2013)

Ph.D. Thesis title: "Rational Metareasoning in Problem-Solving Search". Awarded 19.03.2014

2012 - Friedman research excellence award.

Ben Gurion University of the Negev (2007 – 2009)

Master of Science in Computer Science. Thesis title: "Application of Limited Rationality Approach to Optimization under Uncertainty Problems".

Moscow State Technical University

Master of Science in Applied Mechanics. Thesis title: "A Model for Chaotic Behavior in Deep Drilling".

Employment

2014 – current

[**University of Oxford**](#) – Post-Doctoral Researcher.

- Probabilistic Programming — developed [Anglican](#), a probabilistic programming system capable of solving real-world inference problems.
- Approximate Inference — introduced and implemented a new adaptive Metropolis-Hastings algorithm for probabilistic programming, publication under review.
- Bayesian Statistics — working on [applications](#) of probabilistic programming to reinforcement learning.

2007 – 2014

[Ben Gurion University of the Negev](#) – Lecturer.

- Principles of Programming Languages, lecturer.
- System Programming, lecturer.
- Extended System Programming Laboratory, lecturer.
- Computer Architecture and System Programming Laboratory, laboratory instructor.
- Compiler Construction, teaching assistant.

2013 - Excellence in teaching award.

January, 2005 – February, 2006

[Polimetrix](#) – Consultant.

Designed and developed an online survey system. The system is capable of conducting extremely high volume online surveys and offers survey designers flexible and powerful tools.

April, 1999 – December, 2004

[RenderX](#) – Developer, CTO.

April, 1996 – June, 1998

[International Research and Exchanges Board](#) – Coordinator for US–Armenia Internet Access and Training Program.

Publications and Patents

Journals

1. David Tolpin, Solomon Eyal Shimony. Semimyopic Measurement Selection for Optimization Under Uncertainty. IEEE Transactions on Systems, Man, and Cybernetics, Part B, Part B, 42(2):565–579, 2012

2. David Tolpin, Solomon Eyal Shimony. Rational Value of Information Estimation for Measurement Selection. Intelligent Decision Technologies, 6(4):297--304, 2012.

3. David Tolpin, 2007. Probabilistic Networks for Knowledge Description. A Survey. Information Processes, Russian Academy of Sciences. 2007, Vol 1.

Conferences

1. David Tolpin, Frank Wood. Maximum a Posteriori Estimation by Search in Probabilistic Programs. SOCS-15.

2. David Tolpin, Oded Betzalel, Ariel Felner, Solomon Eyal Shimony. Rational Deployment of Multiple Heuristics in IDA*. ECAI-2014

3. David Tolpin, Tal Beja, Solomon Eyal Shimony, Erez Karpas, Ariel Felner. Towards Rational Deployment of Multiple Heuristics in A*. IJCAI-2013

4. Nicholas Hay, Stuart Russell, David Tolpin, Solomon Eyal Shimony. Selecting Computations: Theory and Applications. UAI-2012

5. David Tolpin, Solomon Eyal Shimony. VOI-aware MCTS. ECAI-2012. pp. 929-930.

6. David Tolpin, Solomon Eyal Shimony. MCTS Based on Simple Regret. AAAI-2012. pp. 570-576

7. David Tolpin, Solomon Eyal Shimony. Rational Deployment of CSP Heuristics. IJCAI-2011. pp. 680-686

8. David Tolpin, Solomon Eyal Shimony. Rational Value of Information Estimation for Measurement Selection. 25th Mini-EURO Conference: URPDM-2010.

Patents

1. David Tolpin, 2006. US Patent 7024621: Methods and systems for rendering electronic data.

2. David Tolpin, 2005. US Patent 6971062: Methods for rendering footnotes.

Representative Projects

Probabilistic Programming System Anglican
November, 2014 – current

Anglican is a open source, just-in-time-compiled probabilistic programming language embedded in Clojure. Anglican is higher-order, Turing-complete, and supports accurate inference in models that make use of complex control flow, including stochastic recursion. It also includes primitives from Bayesian nonparametric statistics.

Implemented Anglican, as a language embedded in Clojure. Community-maintained examples of probabilistic programs written in Anglican cover a wide range of inference settings.

SYRENE
December, 2003 – March, 2007

SYRENE is SYndrome REasoning NEtwork. Syrene is a set of tools for experiments in syndrome analysis and explanation generation.

Implemented the system in Haskell as a by-product of research in Institute for Information Transmission Problems.

RNV — Relax NG validator
October, 2003 – March, 2004

RNV is an implementation of Relax NG Compact Syntax validator in ANSI C.

Implemented the validator from scratch. The validator is widely used and is known to be conformant and the fastest implementation of Relax NG. Wrote two implementations of W3C XML Schema Datatypes, in ANSI C and R5RS Scheme, for the validator.

[*XEP* — XSL Formatting Objects Rendering Engine](#)
April, 1999 – July, 2003

Designed and led a team of engineers to implement the first commercially available and still one of the best implementations of [XSL Formatting Objects](#). Wrote core modules of the formatting engine.

rwww — **WWW Search Engine with Support for Russian Morphology**
1994 – 1996

Designed and implemented a non-dictionary stemming algorithm for the Russian language (Rustem). Wrote the stemming module in Scheme and ANSI C. Modified and improved *freeWAIS* to support 8-bit encodings and calls to external wordform normalizers. Wrote a WWW scanning robot in Perl.

Miscellanea

Languages: Hebrew, English, Yiddish, Armenian, Russian.