

Roman Holenstein

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HIGHLIGHTS OF QUALIFICATION

- Programming experience in C++ , Matlab/Octave, and R
- Applied knowledge in Monte Carlo sampling, Bayesian statistics, and machine learning
- Publication record in scientific modeling & computer simulations
- Academic & research excellence demonstrated through numerous merit-based scholarships
- Fast learner with strong technical and analytical skills

RELEVANT PROJECTS

Monte Carlo Methods (Ph.D. Thesis, Computer Science, 2009)

Developed a novel Monte Carlo framework based on Markov chain Monte Carlo (MCMC) and sequential Monte Carlo (SMC) for efficient sampling from high-dimensional distributions, which appear in many important statistical problems. The new algorithms have been successfully applied to a variety of models in finance, signal processing, biology, and other applications (nonlinear state space models, Lévy-driven Stochastic Volatility models, Dirichlet mixture models, protein folding, etc.). The framework is flexible and allows the design of effective Monte Carlo algorithms in complex scenarios where standard strategies fail.

Machine Learning and Game Theory (Graduate Course Project, 2005)

Developed a new algorithm to find a Bayes-Nash equilibrium (BNE) bidding strategy in first-price auction games where each bidding agent only has approximate knowledge about the other agents' valuation of the good for sale. For this game there are in general no closed-form solutions except for some simple cases; as a contribution, this new algorithm finds a solution using MCMC sampling with simulated annealing and requires very few assumptions.

Time-Sensitive Distributed Applications (Graduate Course Project, 2005)

Enabled QStream, an experimental media streaming system, to be used for video conferencing and live broadcasting by having implemented live-audio support using the ALSA library for capture and play, and the Speex library for compression of the voice audio. [<http://qstream.org>]

Numerical Modeling of Physical Systems (M.Sc. Thesis, Electrical Eng., 2004)

Developed molecular dynamics and heat diffusion simulations to study the process of ultrafast laser ablation of silicon. The code was written in C++ and parallelized using MPI. 3D visualizations were done with OpenDX. The results showed agreement with experiments and provided insight into the ablation process.

EMPLOYMENT

Graduate Fellow Statistical & Applied Math. Sciences Institute
Research Triangle Park, North Carolina 2008

- Explored, investigated, and developed new Sequential Monte Carlo (SMC) methodology for use in complex statistical analyses as part of the program on SMC methods.

Software Development Engineer (Intern) Microsoft, MSN/Live Search
Redmond, Washington 2006

- Improved relevance of search results by applying my machine learning skills to dynamic ranking and having designed and implemented analysis software.

Teaching Assistant University of British Columbia
Vancouver, British Columbia 2006/2007

- Improved students' programming skills and computer science knowledge by effectively leading labs, communicating, and giving suggestive feedback to students.
- Received annual Teaching Assistant Award.

TECHNICAL SKILLS

- **Programming:** C/C++ , Java, Matlab/Octave, R, Python, BASH
- **Platforms:** Linux, Unix, Windows

EDUCATION

- Ph.D. Computer Science** University of British Columbia
Vancouver, British Columbia 2004-2009
- *Thesis title:* “Particle Markov Chain Monte Carlo”
 - *Research:* Markov chain Monte Carlo, sequential Monte Carlo (particle filters), Machine learning, Bayesian statistics
 - *Supervisor:* Dr. Arnaud Doucet (Canada Research Chair for Stochastic Computation)
- M.Sc. Electrical Engineering** University of Alberta
Edmonton, Alberta 2002-2004
- *Thesis title:* “Molecular Dynamics Simulations of Femtosecond Laser Ablation of Silicon”
 - *Supervisor:* Dr. Robert Fedosejevs and Dr. Ying Y. Tsui
- B.Sc. Joint Physics & Computer Science** University of Northern British Columbia
Prince George, British Columbia 1998-2001

HONOURS AND AWARDS

- University Graduate Fellowship (2008)
- Pacific Century Graduate Scholarship (2007/2008)
- Graduate TA Award (2007)
- NSERC PGSD2, University of British Columbia (2004-2006)
- Graduate Entrance Scholarship, University of British Columbia (2004/2005)
- NSERC PGS-A, University of Alberta (2002-2004)
- iCore Graduate Student Award, University of Alberta (2002-2004)
- Walter H Johns Graduate Fellowship, University of Alberta (2002, 2003)
- NSERC USRA, University of Northern British Columbia (2000, 2001)
- UNBC In-Course Scholarship, University of Northern British Columbia (1999/2000, 2000/01)
- RDC KITE Student Recognition Award, Red Deer College (1998)
- Dean’s List, Red Deer College (1998)

SELECTED PUBLICATIONS

Book Chapter

- C. Andrieu, A. Doucet, and R. Holenstein. Particle Markov Chain Monte Carlo for efficient Numerical Simulation. Lecture Notes in Statistics, Springer-Verlag, to appear. [alphabetical authorship]

Journals

- C. Andrieu, A. Doucet, and R. Holenstein. Particle Markov Chain Monte Carlo. Journal of the Royal Statistical Society B, to appear as a read paper (a select few papers per year receive the honour of being read to the Society). [alphabetical authorship]
- R. Holenstein, T.A. Rothwell, and M.R.A. Shegelski (2003) Reconstruction of composite in-line electron holograms using a small emission cone. Ultramicroscopy. 94: 99-107
- M.R.A. Shegelski, M. Reid, and R. Holenstein (2001) Exact vs. quasi-classical tunneling times for idealized potentials. Canadian Journal of Physics. 79: 1105-1116

Conference Proceedings

- R. Fedosejevs, S.E. Kirkwood, R. Holenstein, N. Young, and Y.Y. Tsui (2007). Femtosecond interaction processes near threshold: damage and ablation, SPIE Proc., vol. 6403, 640302 (10 Pages), 2007.
- R. Holenstein, S.E. Kirkwood, Y.Y. Tsui, and R. Fedosejevs (2004) Simulation of femtosecond laser ablation of silicon. SPIE Proc. of Photonics-North 2004. 5579: 688-695

Conference Presentations

- Christophe Andrieu, Arnaud Doucet, and R. Holenstein (Sept. 2008) Particle Markov Chain Monte Carlo. Opening Workshop for the SAMSI program on SMC Methods, Research Triangle Park (North Carolina). Poster and oral presentation.
- Roman Holenstein, Arnaud Doucet (June 2007) Particle Markov Chain Monte Carlo. AdapMC Workshop: New directions in Monte-Carlo methods (Fleurance, France). Presentation.
- R. Holenstein, R. Fedosejevs, and Y.Y. Tsui (2004) Molecular Dynamics Simulation of Femtosecond Laser Ablation of Silicon. Canadian Association of Physicists (CAP) Congress (Winnipeg). Presentation.