

Oliver Downs, PhD

Chief Scientist

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QUALIFICATIONS

Oliver Downs is Chief Scientist at Analytical Insights, Inc. He brings eight years of experience in advanced data modeling, machine learning algorithm design and is a pioneer in the field of quantum-inspired optimization algorithms.

A graduate of Princeton University, and the University of Cambridge, UK, Oliver specializes in applying abstract analytical ideas from mathematical, physical and statistical science to problems in the real world, in particular using client data to help optimize their business processes; including customer behavior prediction, time-series forecasting, and cross-sell/up-sell maximization.

Oliver has consulted for various customers, including MSN and Novantas LLC, as the Chief Scientist of Analytical Insights, Inc. As a Microsoft Research Graduate Fellow he was afforded the freedom to explore blue-skies thesis work on developing a novel quantum-inspired approach to global optimization. Prior to Microsoft Research, while a PhD student in the Program in Applied & Computational Mathematics at Princeton University, Oliver consulted extensively in the Biological Computation group at the world-renowned Bell Laboratories.

His Erdős number is 3.

EMPLOYMENT HISTORY

CHIEF SCIENTIST

Analytical Insights, Inc., Redmond, WA

- *Data Mining & Machine Learning:*

Clients include MSN, Microsoft Research, Hamlet, Inc., Barnes & Noble, Novantas, Seattle Times and Apollo Data Technologies.

Developed and deployed state-of-the-art predictive models of customer behavior for MSN, facilitating the development of advanced, data-driven, customer acquisition and retention strategy, using Microsoft SQL Server 2005

Performed basic data-driven research to discover the underlying structure of contract-free monthly subscription behavior - the Standardized Lifecycle[®] view of subscription-based customer relationships provides unique insight for customer behavior prediction

- *Quantum Computation:*

Actively developing the world's first quantum computing offering in partnership with D-Wave Systems, Inc.

- Directed customer acquisition and business development
- Built partner relationships to strengthen strategic positioning of business in marketplace

RESEARCH INTERN

Microsoft Research, Redmond, WA

- Theorized and implemented Quantum Tunneling Optimization, an efficient novel approach to Global Optimization, exploiting the theory of Quantum Physics.

(Patent Pending)

- Researched the consistency of Gibbs Sampling for Dependency Networks, allowing their inclusion in SQL Server 2005 Analysis Services.

CONSULTANT

Biological Computation Group, Bell Laboratories (Lucent Technologies), Murray Hill, NJ

- Developed attractor neural network models of the oculomotor integrator in Goldfish.
- Developed novel Bayesian probabilistic modeling algorithm for Nonnegative Data, the Nonnegative Boltzmann Machine.

EDUCATION

Princeton University, Princeton, NJ

- Ph.D., Applied and Computational Mathematics.
 - Thesis Title: Learning, Adaptation & Optimization: The Nonnegative Boltzmann Machine and the Tunneling Salesman Algorithm.
- M.A., Applied and Computational Mathematics.

University of Cambridge, Cambridge, UK

- M.Sci., Experimental and Theoretical Physics.
- M.A., Honorary.
- B.A., Experimental and Theoretical Physics.

PUBLICATIONS

The Nonnegative Boltzmann Machine,
O.B. Downs, D.J.C. MacKay and D.D. Lee,
Advances in Neural Information Processing Systems 12, pp428-434
S.A. Solla, T.K. Leen, K.-R. Mueller, eds., MIT Press, 2000.

High-temperature expansions for learning models of nonnegative data,
O.B. Downs
Advances in Neural Information Processing Systems 13, pp465-471
T.K. Leen, T.G. Dietterich, V. Tresp, eds., MIT Press, 2001.

Analytical Reflective Slice Sampling: The Nonnegative Boltzmann Machine,
O.B. Downs
Invited illustration of Neal's *Slice Sampling*, Annals of Statistics 31:3, June 2003.

The Tunnelling Salesman: Truncated Variational Approximations for Quantum Mechanical
Global Optimization, *Patent Pending*
O.B. Downs, H. Attias C.J.C. Burges & R. Rounthwaite
Microsoft Research Technical Report MSR-TR-2002-100, October 2002.

AWARDS

2000-2002 Microsoft Research Graduate Fellowship
1999 & 2000 NIPS Foundation Travel Award.
1998-1999 Procter Fellowship, Princeton University, USA.
1998 Mary Lucking Prize

*"For student of Fitzwilliam College with the most exceptional record
of academic achievement in his Cambridge Career."*

1998-1999 Senior Scholar of Fitzwilliam College, Cambridge University
Highest Classed Physicist, Fitzwilliam College, in Natural Sciences Parts IA, IB, II and III.
Elected to the Rawlins, Donald-Walker and Clough Scholarships of
Fitzwilliam College consecutively.
1995, 1996, 1997, 1998 - Fitzwilliam College Prizes for academic achievement
1994-1995 Degree Sponsorship from Roke Manor Research.
1994 Sir Peter Emery Cup

"For outstanding academic achievement at Exmouth Community College."

1994 British Physics Olympiad Competition - Silver Award
Within top one hundred UK physicists in age group.

PROFESSIONAL ACTIVITIES

Associate Member of the Institute of Physics (AMInstP)
Reviewer: Data Mining and Knowledge Discovery
Reviewer: International Conference on Cognitive Modeling (ICCM)

HOBBIES & INTERESTS

Waterpolo - Fitzwilliam College Team. (1994 to 1998).

Motor Racing, Sailing (ASA Level II Certified, June 2001), Swimming (particularly open water),

Violin - since the age of three years old.