Dong Hyun "Ethan" Kim

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Highlights

I study networks arising from various disciplines (biological, social, scale-free, etc.) using techniques from discrete mathematics. I have an extensive experience in designing graph-theoretic algorithms for various applications, and implementing the algorithms using C/C++ and Java both in research and production settings. My recent work involved computational analyses of Protein-Protein Interaction (PPI) network data. Prior to that, I worked on graph drawing problems and geometric graphs.

Academic Background

McGill University 2012
Ph.D. in Computer Science (Bioinformatics Option)
Thesis: Deconvolution of PPI Networks: Approximation Algorithms and Optimization Techniques
Advisors: Professor Mathieu Blanchette and Professor Adrian Vetta

McGill University 2007
M.Sc. in Computer Science, *Dean's Honour List*
Thesis: 3D Orthogonoal Graph Drawing with Direction-constrained Edges
Advisor: Professor Sue Whitesides

University of Lethbridge 2005
B.Sc. in Computer Science, *with Great Distinction*

Research & Work Experience

Software Engineer 2012-*present*
Google Inc.
Part of the Search team at Google, I develop various search features using social data. In particular, I work on delivering personalized search results via data mining from users' personal data including Gmail, Google+, Google Drive, and Google Calendar.

Consultant / Software Engineer 2011
Nexalogy Environics
Develop social media analytics tools and investigate effective methods to draw graphs for information visualization purposes. Research on machine learning techniques for co-word graph clustering and word lemmatization for several languages. Implement tools using C++/PHP.

Research Assistant 2007 – 2012
Supervisor: Profs M. Blanchette and A. Vetta **McGill University**
Research on computational methods for identification and characterization of protein–protein interaction network using graph theory and approximation algorithms. The designed methods can be applied in a wide variety of applications including telecommunication networks, social networks, etc. Implemented various algorithms using Java/Python/C++.

Graduate Intern 2007
Supervisor: Rasmus Tamstorf **Walt Disney Animation Studios**
Designed computational geometry algorithms for quadrilateral mesh matching for applications in computer graphics. Implementation of the devised algorithms in C++ as a plugin for Autodesk Maya, and currently in production code. This work resulted in 2 publications in computer graphics journals.

Research Assistant 2005-2007
Supervisor: Professor Sue Whitesides **McGill University**

Research on orthogonal graph drawing problems. Algorithms design for laying out combinatorial graphs in 2- or 3-dimensions. Construction of lower bounds on the computational complexity of the problems.

Research Assistant 2005
Supervisor: Professor Stephen Wismath **University of Lethbridge**
Research on graph drawing problems. Algorithms design for embedding planar graphs in 3-dimensional integer grid. Algorithms design for embedding planar graphs in 2-dimensional tracks.

Research Assistant 2004
Supervisor: Professor Howard Cheng **University of Lethbridge**
Research in Computational Algebra. Algorithms design for computing hypergeometric series with arbitrary precision. Theoretical and empirical analyses for the devised algorithm.

Honours and Awards

CIHR Systems Biology Training Program 2010 – 2011
Institutional, $30,000

Walter C. Sumner Memorial Fellowship 2010 – 2011
National, $12,000

Best PhD Presentation Award 2009
Robert Cedergren Bioinformatics Colloquium 2009, $1,000

Association of Korean-Canadian Scientists & Engineers Scholarship 2009
National, $1,000

School of Computer Science Fellowship 2009
Institutional, $5,000

NSERC Postgraduate Scholarship D 2007 – 2010
National, $63,000

Faculty of Science Dean's Excellence Award 2007 – 2009
Institutional, $40,000

Best Teaching Assistant Award 2007
Institutional (For excellence in teaching and leadership)

NSERC Canada Graduate Scholarship M 2006
National, $17,500

McGill Recruitment Award 2005
Institutional, $5,000

School of Computer Science Fellowship 2005
Institutional, $10,000

U. of Lethbridge Dean's Honour List 2003 – 2005
Fall 2003, Spring 2004, Fall 2004, Spring 2005

NSERC Undergraduate Research Award 2004
National, $6,500

U. of Lethbridge Chinook Research Award 2004
Institutional, $4,000 (Declined in favor of NSERC USRA)

Louise McKinney Scholarship 2004
Provincial, $2,500

Alberta Collegiate Programming Contest 2004
Provincial, $250 ($2^{nd}$ place)

U. of Lethbridge Academic Scholarship 2003
Institutional, $500

Teaching Experience

Teaching Assistant, Computers and Computing, McGill University, Fall 2010

Tomlinson Teaching Workshop, Faculty of Science, McGill University, Fall 2009

Teaching Assistant, Introduction to Computer Science, McGill University (2009, 2010)

Teaching Assistant, Data Structures and Algorithms, McGill University (2006, 2007, 2009)

Teaching Assistant, Planning Algorithms, McGill University, Fall 2007

Teaching Assistant, Data Structures and Algorithms, U. of Lethbridge, Winter 2005

Teaching Assistant, Combinatorial Mathematics, U. of Lethbridge, Fall 2004

Teaching Assistant, Advanced Programming Techniques, U. of Lethbridge, Winter 2004

Contributions

Journal Reviewer 2005–2010
McGill University
Served as a primary / secondary reviewer for various journals and conferences including: *ACM Journal of Experimental Algorithmics*, *Int'l Symp. on Graph Drawing*, *Theoretical Computer Science*.

Algorithms Seminar Series, Organizer 2005–2007
McGill University
Organized a group seminar and problem solving sessions for the theory group. Led discussions on recent literature and solving open problems in the community

McGill ACM Programming Contest teams, Coach 2006
McGill University
Served as the team coach for undergraduate programming contests (ACM Internationa Collegiate Programming Contest). Duties included teaching algorithms and problem solving skills for various real-world problems. Our best team won 2nd place among universities in Quebec, Massachusetts, and New York.

CS GAMES, Competition Designer 2006
McGill University
National competition designer for Algorithmics competitions in CS GAMES 2006. CS GAMES is a nation-wide competition for all computer science students in Canada. Devised algorithm problems for the contestants, and served as a judge for the competition.

Programming Constests, Participant 2003–2005
University of Lethbridge
Participated in various programming contests including ACM ICPC 2004, 2005, Alberta Collegiate Programming Contest 2004 (2nd place), Top Coder, Alberta-Waterloo joint programming contests.

Invited Talks / Meetings

Seminar on "Clique Cover on Sparse Networks", SIAM ALENEX, Kyoto (2012)

Seminar on "Constructing hypergraph model of PPI networks via clique covering algorithms", McGill-Toronto Computational Biology Meeting, Montreal, Canada (2011)

Seminar on "Direct protein interaction Network and Clique cover for protein interaction network", University of Victoria, Victoria, Canada (2010)

Seminar on "Predictiong Direct Protein Interactions from AP-MS Data", the Sixth Robert Cedergren Bioinformatics Colloquium, University of Montreal (2009) (*best PhD presentation award*)

Participant, the First Symposium of Montreal Bioinformatics User Group (MonBUG), Institute de recherches cliques de Montréal (2009)

Participant, Barbados Workshop on biological and computational analysis of protein-protein interaction networks, Bellairs Research Institute, McGill University, Barbados. (2009)

Seminar on "Topological Matching of Quadrilateral Meshes", Ottawa–Montreal Joint Symposium of Association of Korean–Canadian Scientists & Engineers, Montreal, Canada. (2008)

Participant, The 6th McGill-INRIA Workshop on Computational Geometry, Bellairs Research Institute, Barbados. (2007)

Poster Presentation, International Symposium on Graph Drawing, Karlsruhe, Germany. (2006)

Seminar on "On Bus Graph Realizability", McGill Algorithms Seminar, McGill University. (2006)

Participant, The 5th McGill-INRIA Workshop on Computational Geometry, Bellairs Research Institute, Barbados. (2006)

Seminar on "How fast can you compute π?", McGill Algorithms Seminar, McGill University. (2005)

Seminar on "Space-Efficient Evaluation of Hypergeometric Series", Department of Computer Science and Mathematics, University of Lethbridge, Lethbridge, Canada. (2004)

Publications

* Authors in theoretical computer science literature are conventionally listed in alphabetical order.

Working Papers

1. **Ethan Kim**, Adrian Vetta, Mathieu Blanchette, *Protein Quantification via Multi Cover*
2. **Ethan Kim**, Harley Cooper, *Fast Filtering for HMMs in Domain Discovery*

Journal Articles

1. Giuseppe Di Battista, **Ethan Kim***, Giuseppe Liotta, Anna Lubiw, and Sue Whitesides, Orthogonal Drawings of Cycles in 3D Space, *Discrete & Computational Geometry, Volume 47, Number 3, 2012*
2. **Ethan Kim**, Ashish Sabharwal, Adrian Vetta, Mathieu Blanchette, Predicting Direct Protein Interactions from Affinity Purification Mass Spectrometry Data, Algorithms for Molecular Biology 2010, 5:34
3. David Eppstein, Michael T. Goodrich, **Ethan Kim***, Rasmus Tamstorf, Approximate Topological Matching of Quad Meshes, The Visual Computer Vol. 25, Issue 8, 2008

4. David Eppstein, Michael T. Goodrich, **Ethan Kim***, Rasmus Tamstorf, Motorcycle Graphs: Canonical Quad Mesh Partitioning, Computer Graphics Forum Vol. 27, Issue 5, 2008
5. Cheng, H. and Gergel, B. and **Kim, E.*** and Zima, E. Space-Efficient Evaluation of Hypergeometric Series, ACM SIGSAM Communications in Computer Algebra, 2005, volume 39, No 2, 41–52

Refereed Conference Articles

1. Mathieu Blanchette, **Ethan Kim***, Adrian Vetta Clique Cover on Sparse Networks *SIAM Algorithm Engineering and Experiments, Kyoto, Japan, 2012*
2. David Eppstein, Michael T. Goodrich, **Ethan Kim***, Rasmus Tamstorf, Approximate Topological Matching of Quad Meshes, IEEE Shape Modeling International, Stony Brook, 2008
3. David Eppstein, Michael T. Goodrich, **Ethan Kim***, Rasmus Tamstorf, Motorcycle Graphs: Canonical Quad Mesh Partitioning, Symposium on Geometry Processing, Copenhagen, 2008
4. **Ethan Kim***, Giuseppe Liotta, and Sue Whitesides, A note on drawing direction-constrained paths, The 19th Canadian Conference on Computational Geometry, Ottawa 2007
5. A. Ada, M. Coggan, P. Di Marco, A. Doyon, L. Flookes, S. Heilala, **E. Kim***, J. Li On Wing, L-F Preville-Ratelle, S. Whitesides, and N. Yu, On Bus Graph Realizability, The 19th Canadian Conference on Computational Geometry, Ottawa, 2007
6. Cheng, H. and Gergel, B. and **Kim, E.*** and Zima, E. Space-Efficient Evaluation of Hypergeometric Series, The 11th International Conference on Applications of Computer Algebra (ACA), Nara, Japan, 2005

Refereed Conference Abstracts/Posters

1. A. Ada, M. Coggan, P. Di Marco, A. Doyon, L. Flookes, S. Heilala, **E. Kim***, J. Li On Wing, L-F Preville-Ratelle, S. Whitesides, and N. Yu, On Bus Graph Realizability, International Symposium on Graph Drawing 2006
2. Cheng, H. and Gergel, B. and **Kim, E.*** and Zima, E. Space-Efficient Evaluation of Hypergeometric Series, International Symposium on Symbolic and Algebraic Computation (ISSAC), Beijing, 2005

Theses

1. **Dong Hyun Kim**, Deconvolution of PPI Networks: Approximation Algorithms and Optimization Techniques, Ph.D. Thesis, School of Computer Science, McGill University, 2012
2. **Dong Hyun Kim**, 3D Orthogonal Graph Drawing with Direction-Constrained Edges, M.Sc. Thesis, School of Computer Science, McGill University, 2007