

Dong Hyun “Ethan” Kim

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Highlights

I study networks arising from various disciplines (biological, social, scale-free, etc.), and computational geometry. 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) networks and protein quantification from mass spectrometry. Prior to that, I worked on graph drawing problems and geometric graphs.

Academic Background

McGill University 2007 – present
Ph.D. Candidate in Computer Science (Systems Biology, Bioinformatics Programme)
Advisors: Professor Mathieu Blanchette and Professor Adrian Vetta

McGill University 2007
M.Sc. in Computer Science, *Dean's Honour List* (GPA: 3.82/4.0)
Thesis: 3D Orthogonal Graph Drawing with Direction-constrained Edges
Advisor: Professor Sue Whitesides

University of Lethbridge 2005
B.Sc. in Computer Science, *with Great Distinction* (GPA: 3.98/4.0)

Research & Work Experience

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 – present
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 Institutional, \$30,000	2010 – 2011
Walter C. Sumner Memorial Fellowship National, \$12,000	2010 – 2011
Best PhD Presentation Award Robert Cedergren Bioinformatics Colloquium 2009, \$1,000	2009
Association of Korean-Canadian Scientists & Engineers Scholarship National, \$1,000	2009
School of Computer Science Fellowship Institutional, \$5,000	2009
NSERC Postgraduate Scholarship D National, \$63,000	2007 – 2010
Faculty of Science Dean’s Excellence Award Institutional, \$40,000	2007 – 2009
Best Teaching Assistant Award Institutional (For excellence in teaching and leadership)	2007
NSERC Canada Graduate Scholarship M National, \$17,500	2006
McGill Recruitment Award Institutional, \$5,000	2005
School of Computer Science Fellowship Institutional, \$10,000	2005
U. of Lethbridge Dean’s Honour List Fall 2003, Spring 2004, Fall 2004, Spring 2005	2003 – 2005
NSERC Undergraduate Research Award National, \$6,500	2004
U. of Lethbridge Chinook Research Award Institutional, \$4,000 (Declined in favor of NSERC USRA)	2004
Louise McKinney Scholarship Provincial, \$2,500	2004
Alberta Collegiate Programming Contest Provincial, \$250 (2 nd place)	2004
U. of Lethbridge Academic Scholarship Institutional, \$500	2003

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

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 graduate students and Post-docs in discrete mathematics. 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 International 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.

McGill KGSA, President 2006
McGill University
Served as the president of McGill Korean Graduate Student Association(KGSA). Implemented the club website, worked in conjunction with external organizations including AKCSE, McGill PGSS, and Samsung Recruiting.

Programming Contests, 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 “Predicting 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