Kenneth Weiss

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Education

Ph.D., Computer Science, University of Maryland, College Park, Spring 2011.

Thesis title: Diamond-based models for scientific visualization.

Committee: Leila De Floriani (advisor), Larry Davis, Samuel Goward, David Mount, Hanan Samet and Amitabh Varshney.

M.S., Computer Science, University of Maryland, College Park, 2006.

Overall GPA: 3.875.

B.S./B.A., Dual degree in Computer Science and Mathematics, Binghamton University, 2004

Overall GPA: 3.941, *GPA in Major (CS):* 4.0, *GPA in Major (Math):* 4.0.

Honors: Summa Cum Laude

Research Experience

Lawrence Livermore National Laboratory – Livermore, CA

Postdoctoral researcher, Center for Applied Scientific Computing, January 2012 – PRESENT.

Project: Distributed and multiresolution streaming analysis of petascale data.

Mentor: Dr. Peter Lindstrom

Developed a multiresolution representation for mesh-based scientific data to support distributed stream processing for visualization and data analysis.

Implemented efficient data structures and algorithms that support extracting and encoding adaptive wavelet-based meshes.

Investigated several interpolation schemes for rendering and contouring these adaptive meshes.

University of Maryland, College Park – College Park, MD

Faculty Research Associate, Summer 2011 – December 2011.

Graduate Research Assistant, Fall 2006 – Spring 2011.

Project: A multiresolution approach to modeling and visualizing multidimensional scalar fields.

Advisor: Prof. Leila De Floriani

Developed dimension-independent multiresolution models and adaptive extraction algorithms for representing and visualizing discrete scalar fields including terrain and volumetric datasets.

Evaluated the efficiency of these models through a template-based implementation in C++.

Communicated results through peer-reviewed conference presentations and journal publications.

Università di Genova – Genova, Italy

Visiting Scholar, Geometry and Graphics Group, Summers 2007, 2009, 2011 and 2013.

Collaborated with researchers in Italy and France on discrete notions of curvature (distortion), efficient representations for simplicial complexes and topology-based shape analysis, leading to several publications.

Binghamton University – Vestal, NY

Research Assistant, Graphics And Image Computing Laboratory, Summer 2003 – Spring 2004.

Project: Automating tumor detection in CT images.

Undergraduate advisor: Prof. Lijun Yin.

Implemented a multithreaded *active contour* algorithm (energy-based deformable splines) in C++ to find contours of tumors in medical datasets.

Modeled user faces from video sequences through an analysis of topographic features.

Employment

Lawrence Livermore National Laboratory – Livermore, CA

Summer Scholar, Institute for Scientific Computing Research (ISCR), Summer 2006.

Project: Progressive techniques for efficient processing of massive geospatial datasets.

Mentor: Dr. Valerio Pascucci.

Created an efficient model for representing and progressively visualizing time-varying geospatial vector data overlaid on raster image data.

Implemented a KML parser in C++ for importing/exporting geospatial data and for associating metadata with the dataset.

Integrated vector data into existing multiresolution raster-based geospatial browser.

Sandia National Laboratories – Albuquerque, NM

Technical Intern, Center for Cyber Defenders Program (CCD), Summer 2005 – Spring 2006.

Project: Visualization for kernel-level security "firewall" in Microsoft Windows.

Manager: Robert Hutchinson.

Developed techniques to visualize events between the kernel and shell of an OS.

Designed an interactive user interface in C# to aid in discovery of interesting security events.

Microsoft Corporation – Redmond, WA

Lead Student Ambassador, Mid-Atlantic Region, Fall 2004 – Spring 2006.

Oversaw the progress of eleven Student Ambassadors on college campuses in the region.

Student Ambassador, University of Maryland, College Park, Fall 2004 – Spring 2006.

Student Ambassador, Binghamton University, Spring 2003 – Spring 2004.

Campus liaison between Microsoft, faculty and students for the .NET platform.

Developed and presented workshops on Microsoft .NET and related technologies.

Softsight Inc. – Vestal, NY

Programmer, Spring 2002.

Project: Embroidery simulation via texture mapping.

Supervisors: Dr. Richard Eckert and Dr. David Goldman.

Implemented low-level texture mapping algorithms in C++ to simulate embroidered logos.

Publications

Refereed Journal Articles

1. K. Weiss, F. Iuricich, R. Fellegara, and L. De Floriani. A primal/dual representation for discrete Morse complexes on tetrahedral meshes. *Computer Graphics Forum (Proceedings Eurovis 2013)*, 32(3):361–370, 2013.
2. K. Weiss and L. De Floriani. Modeling multiresolution 3D scalar fields through Regular Simplex Bisection. In H. Hagen, editor, *Scientific Visualization: Interactions, Features, Metaphors*, volume 2 of *Dagstuhl Follow-Ups*, pages 360–377. Schloss Dagstuhl–Leibniz-Zentrum für Informatik, Dagstuhl, Germany, 2011.
3. D. Canino, L. De Floriani, and K. Weiss. IA*: An adjacency-based representation for non-manifold simplicial shapes in arbitrary dimensions. *Computers & Graphics (Proceedings Shape Modeling International 2011)*, 35(3):747–753, June 2011.
4. K. Weiss and L. De Floriani. Simplex and diamond hierarchies: Models and applications. *Computer Graphics Forum*, 30(8):2127–2155, 2011.
5. K. Weiss and L. De Floriani. Isodiamond hierarchies: An efficient multiresolution representation for isosurfaces and interval volumes. *IEEE Transactions on Visualization and Computer Graphics*, 16(4):583 – 598, July-August 2010.
6. K. Weiss and L. De Floriani. Diamond hierarchies of arbitrary dimension. *Computer Graphics Forum (Proceedings Symposium on Geometry Processing 2009)*, 28(5):1289–1300, July 2009.
7. K. Weiss and L. De Floriani. Supercubes: A high-level primitive for diamond hierarchies. *IEEE Transactions on Visualization and Computer Graphics (Proceedings IEEE Visualization 2009)*, 15(6):1603–1610, November-December 2009.

Refereed Conference Publications

8. L. De Floriani, F. Iuricich, R. Fellegara, and K. Weiss. A spatial approach to morphological feature extraction from irregularly sampled scalar fields. In *Proceedings of the Third ACM SIGSPATIAL International Workshop on GeoStreaming*, IWGS '12, pages 40–47, New York, NY, 2012. ACM.
9. K. Weiss, R. Fellegara, L. De Floriani, and M. Velloso. The PR-star Octree: A spatio-topological data structure for tetrahedral meshes. In *Proceedings ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, ACM GIS '11, pages 92–101, Chicago, IL, November 1–4 2011. ACM.
10. M. A. Yalçın, K. Weiss, and L. De Floriani. GPU algorithms for diamond-based multiresolution terrain processing. In *Eurographics Symposium on Parallel Graphics and Visualization*, EGPVG '11, pages 121–130, Bangor, Wales, April 10–11 2011.
11. K. Weiss and L. De Floriani. Bisection-based triangulations of nested hypercubic meshes. In S. Shontz, editor, *Proceedings 19th International Meshing Roundtable*, IMR '10, pages 315–333, Chattanooga, Tennessee, October 3–6 2010.
12. K. Weiss, L. De Floriani, and M. Mesmoudi. Multiresolution analysis of 3D images based on discrete distortion. In *International Conference on Pattern Recognition*, ICPR '10, pages 4093–4096, Istanbul, Turkey, August 2010. IEEE Computer Society.
13. K. Weiss and L. De Floriani. Simplex and diamond hierarchies: Models and applications. In H. Hauser and E. Reinhard, editors, *Eurographics 2010 - State of the Art Reports*, EG STAR '10, pages 113–136, Norrköping, Sweden, 2010. Eurographics Association. (*Refereed proposal*).
14. K. Weiss and L. De Floriani. Sparse terrain pyramids (BEST PAPER AWARD). In *Proceedings ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, ACM GIS '11, pages 115–124, Irvine, CA, 2008. ACM.
15. K. Weiss and L. De Floriani. Multiresolution interval volume meshes. In H.-C. Hege, D. Laidlaw, R. Pajarola, and O. Staadt, editors, *IEEE/ EG Symposium on Volume and Point-Based Graphics*, EG PBGVG '08, pages 65–72, Los Angeles, California, USA, 2008. Eurographics Association.

16. K. Weiss and L. De Floriani. Modeling and visualization approaches for time-varying volumetric data. In G. Bebis, R. Boyle, B. Parvin, D. Koracin, P. Remagnino, F. Porikli, J. Peters, J. Klosowski, L. Arns, Y. Chun, T. Rhyne, and L. Monroe, editors, *Advances in Visual Computing (ISVC '08)*, volume 5359 of *Lecture Notes in Computer Science*, pages 1000–1010. Springer, 2008.
17. L. Yin and K. Weiss. Generating 3D views of facial expressions from frontal face video based on topographic analysis. In *Proceedings ACM international conference on Multimedia*, ACM SIGMM '04, pages 360–363, New York, NY, USA, 2004. ACM.

Refereed Book Chapters

18. L. De Floriani, F. Iuricich, P. Magillo, M. Mesmoudi, and K. Weiss. Discrete distortion for 3D data analysis. In L. Linsen, H. Hagen, B. Hamann, and H.-C. Hege, editors, *Visualization in Medicine and Life Sciences II*, Mathematics and Visualization, pages 3–25. Springer Verlag, Berlin Heidelberg, 2011.

Refereed Posters and Extended Abstracts

19. K. Weiss and P. Lindstrom. Adaptive Regular Simplex Bisection (RSB) wavelets. In *NSF Workshop on Barycentric Coordinates in Geometry Processing and Finite/Boundary Element Methods*, New York, NY, July 25–27 2012.
20. K. Weiss and L. De Floriani. Nested refinement domains for tetrahedral and diamond hierarchies. In *IEEE Visualization 2010 Poster Compendium*, IEEE VIS '10, Salt Lake City, Utah, October 24–29 2010.
21. L. Yin, K. Weiss, and X. Wei. Face modeling from frontal face image based on topographic analysis. In *ACM SIGGRAPH Posters*, page 86, New York, NY, USA, 2004. ACM.

Articles Under Review

- K. Weiss and P. Lindstrom. Adaptive refinement for tensor product wavelets.

Articles In Preparation

- K. Weiss and P. Lindstrom. Adaptive Regular Simplex Bisection wavelets.
- K. Weiss, L. De Floriani, and F. Iuricich. Implicit topological navigation on diamond meshes.
- K. Weiss and L. De Floriani. On balanced hierarchies of hypercubes and their triangulations.
- R. Fellegara, K. Weiss, P. Magillo, and L. De Floriani. Tetrahedral trees: A family of hierarchical spatial indexes for tetrahedral meshes.
- R. Fellegara, K. Weiss, and L. De Floriani. Topology through space: A lightweight connectivity data structure for spatial meshes.

Invited Talks, Conference Presentations and Tutorials *(selected)*

- K. Weiss. Fine-grained multiresolution hierarchies for scientific visualization. In *SLAC Early Career Scientist Associate Forum*. Stanford University, October 4 2013.
- K. Weiss. Efficient and effective mesh representations for shape modeling and analysis. In *Symposium for Geometry Processing (SGP) Graduate School*. Eurographics Association, July 1 2013.
- A primal/dual representation for discrete Morse complexes on tetrahedral meshes. In *Eurovis 2013*. Eurographics, Leipzig, Germany, June 20 2013.
- The PR-star Octree: A spatio-topological data structure for tetrahedral meshes. In *ACM SIGSPATIAL GIS 2011*. ACM, Chicago, IL, November 2 2011.
- Diamond based models for scientific visualization. In *The Technion Pixel Club*. Technion – Israel Institue of Technology, Haifa, Israel, June 27 2011.
- IA*: An adjacency-based representation for non-manifold simplicial shapes in arbitrary dimensions. In *Shape Modeling International (SMI) 2011*. Herzliya, Israel, June 24 2011.

- GPU algorithms for diamond-based multiresolution terrain processing. In *Eurographics Symposium on Parallel Graphics and Visualization (EGPGV) '11*. Llandudno, Wales, April 11 2011.
- Bisection-based triangulations of nested hypercubic meshes. In *19th International Meshing Roundtable (IMR)*. Chattanooga, TN, October 6 2010.
- Simplex and diamond hierarchies: Models and applications. In *Eurographics State of the Art Reports '10*. Norrköping, Sweden, May 6 2010.
- Supercubes: A high-level primitive for diamond hierarchies. In *IEEE Visualization '09*. Atlantic City, NJ, October 16 2009.
- Diamond hierarchies of arbitrary dimension. In *Symposium on Geometry Processing (SGP) '09*. Berlin, Germany, July 16 2009.
- Sparse terrain pyramids. In *ACM SIGSPATIAL GIS '08*. Irvine, CA, November 6 2008.
- Multiresolution interval volume meshes. In *IEEE/EG Symposium on Volume and Point-Based Graphics (EGPGV) '08*. Los Angeles, CA, August 10 2008.
- Sound technology in games. In *Graphics Seminar Series*. University of Maryland, College Park, College Park, MD, April 16 2007.
- Decomposition and compression of regularly sampled geometry. In *Graphics Seminar Series*. University of Maryland, College Park, College Park, MD, May 1 2006.

Teaching Experience

Guest Lecturer – University of Maryland, College Park

Geometric and Solid Modeling (CMSC 741), Fall 2010.

Instructor: Hanan Samet.

Collaborated on organization of course, lectured three sessions and closely supervised research projects of seven graduate students in collaboration with Leila De Floriani.

Teaching Assistant – University of Maryland, College Park

Introduction to Computer Graphics (CMSC 427), Spring 2006.

Instructor: David Mount.

Introduction to Computer Graphics (CMSC 427), Fall 2005.

Instructor: Amitabh Varshney.

Object-Oriented Programming II (CMSC 132), Spring 2005.

Instructors: Fawzi Emad, Chau-Wen Tseng.

Object-Oriented Programming II (CMSC 132), Fall 2004.

Instructors: Bill Pugh, Fawzi Emad.

Course Assistant – Binghamton University

Data Structures in C++ (CS 240), Fall 2003.

Instructor: Steaphan Greene.

Activities and Service

Advising

Riccardo Fellegara (co-advising with Leila De Floriani)

DIBRIS department, University of Genova – Ph.D. expected 2014.

Journal Editorial Boards

ACM Transactions on Spatial Algorithms and Systems (TSAS) – Information director, 2012 – PRESENT.

Conference Program Committees

Eurographics Conference (Short Papers) – 2012.

Eurographics Italian Chapter Conference – 2011, 2010.

Peer Reviewing

Journals

ACM Transactions on Graphics (ToG)

IEEE Transactions on Visualization and Computer Graphics (TVCG)

Computer Graphics Forum

Graphical Models (GMOD)

Computers & Graphics

Computers & Geosciences

The Visual Computer

Computer Aided Design (CAD) Journal

Conferences

ACM SIGGRAPH

ACM SIGGRAPH Asia

IEEE Visualization

Eurographics

Symposium on Geometry Processing (SGP)

Shape Modeling International (SMI)

ACM SIGSPATIAL GIS

Computer Graphics International (CGI) –

Eurographics Symposium on Parallel Graphics and Visualization (EGPGV)

CAD/Graphics

Eurographics Italian Chapter Conference

International Meshing Roundtable (IMR)

Eurographics/IEEE Symposium on Visualization (EuroVis)

IEEE/EG International Symposium on Volume Graphics

Mathematics of Surfaces

Solid and Physical Modeling (SPM)

International Symposium on Visual Computing (ISVC)

Pacific Graphics

International Conference on Computer Graphics Theory and Applications (GRAPP)

SIBGRAPI

Memberships

IEEE Computer Society.

ACM, ACM SIGGRAPH.

Eurographics.

Upsilon Pi Epsilon, the Computer Science Honor Society.

President, Iota Chapter, Fall 2002 – Spring 2004.

Golden Key International Honour Society.

Phi Eta Sigma, Freshman Honor Society.

Student Volunteer

IEEE Visualization – 2007, 2006.

ACM SIGGRAPH – 2007.

Competitions

Imagine Cup, May 2005

Project: Design-by-contract annotations and runtime verification for .NET.

Teammate: Mike Kobyakov

Finalist in U.S. National competition in Redmond, WA.

Developed source code annotation framework within C# using .NET native attributes and runtime reflection.

Imagine Cup, May 2004

Project: Mobile Robotic Services.

Teammates: Mike Howell, Shane Liu and David Sersen

Participant in East Coast Regional Round after winning local round at Binghamton University.

Designed and implemented Pocket PC Application to remotely compile and execute programs for a custom built micro-controlled robot.

Developed web service to send application-generated code to server for compilation and to receive compiled bytecode.

Windows ChallengE, March 2004.

Project: Virtual NetBorhood

Teammates: Shane Liu and David Sersen

Participant in U.S. National competition in Redmond, WA.

Developed web services and mobile app using .NET Compact Framework to provide a forum for members of a physical community to interact and attend to local safety concerns.

Honors and Awards

Best Paper Award, ACM SIGSPATIAL GIS, 2008.

Recipient, International Meshing Roundtable Graduate Student Travel Grant, 2010.

Recipient, Stony Brook Modeling Week Graduate Student Travel Grant, 2008.

Recipient, University Award for Student Excellence, Binghamton University, 2004.

Recipient, Department of Computer Science Award for Service, Binghamton University, 2004.

Recipient, Upsilon Pi Epsilon–Microsoft Scholarship, 2003.

Finalist, Binghamton University Exemplary Student Award, 2003.

Student Marshall, Watson School of Engineering Commencement Ceremony, May 2004.

National Dean's List, 2003.

Dean's List, Binghamton University, 2000–2004.

References

Peter Lindstrom

Postdoctoral mentor at Lawrence Livermore National Laboratory

Research scientist in the Center for Applied Scientific Computing (CASC)

(925) 423-5925 | pl@llnl.gov

Leila De Floriani

Research advisor for my dissertation.

Professor of computer science at University of Maryland, College Park.

(301) 405-4391 | deflo@umiacs.umd.edu

Hanan Samet

Professor of computer science at University of Maryland, College Park.

(301) 405-1755 | hjs@umiacs.umd.edu

Valerio Pascucci

Mentor during internship at Lawrence Livermore National Laboratories.

(801) 587-9885 | pascucci@sci.utah.edu

Robert Hutchinson

Project manager at Sandia National Laboratories.

(925) 294-4531 | rlhutch@sandia.gov

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