NAOMI K. FOX

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RESEARCH INTERESTS

Computational Structural Biology, Algorithms, Biological Research Databases, Software Engineering

EDUCATION

University of Massachusetts Amherst   Amherst, MA
Ph.D., Computer Science, September 2012
Dissertation: Accurate and robust mechanical modeling of proteins
Committee: Ileana Streinu (chair), Lori Clarke, Jeanne Hardy, Ion Mandoiu, Jack Wileden

University of Massachusetts Amherst   Amherst, MA
M.S., Computer Science, 2008

Thayer School, Dartmouth College   Hanover, NH
B.E., Computer Engineering, 2003

Smith College   Northampton, MA
B.A., Computer Science, 2002

SKILLS

Programming languages: Java, C++, Python, PHP, SQL, JavaScript, Bash, Awk
Operating systems: Mac OS X, Linux, Windows
Libraries: Bioconductor, Bioruby, MMTK, OpenBabel, Matplotlib, CGAL, Boost, STL, jQuery, D3, SCOP/ASTRAL codebase
Frameworks: Junit, CMake cross-platform build, CxxTest C++ unit testing framework, WEKA
Molecular visualizers: Jmol, Jsmol, Pymol

EXPERIENCE

Postdoctoral Fellow   October 2012 - Present
Lawrence Berkeley National Laboratory   Berkeley, CA
Supervisor: Dr. John-Marc Chandonia
Website: http://scop.berkeley.edu

Design and implementation of the next generation of the Structural Classification of Proteins (SCOP) database. Extended automatic classification module within the SCOP build pipeline to predict and classify domains from newly deposited Protein Data Bank (PDB) files. Benchmarked method against manually curated data. Implemented in Java and MySQL. This work was published in December 2013. Performed an extensive literature review (over 300 papers) to study how the SCOP site is used. Also examined Apache web logs to study how broadly the website is searched, with Python and MySQL. Integrated in tools for previewing protein domains in 3D. Namely, added the Jsmol visualizer to the website and added Jquery-based javascript for displaying images.

Research Assistant   September 2005–September 2012
University of Massachusetts Amherst   Amherst, MA

Adviser: Dr. Ileana Streinu
Website: `http://kinari.cs.umass.edu`

Thesis work, developing methods and software for modeling protein mechanics using PDB data and graph-based algorithms. Also focused on developing methods for benchmarking rigidity analysis methods. Ran large scale computational experiments on Sun grid engine cluster. Developed a publicly available web front-end and visualization tool. Programmed in `C++`, Python, and PHP. Co-developed and presented two tutorials on the work (see Publications section).

Research Associate   March 2003–July 2005
Institute for Security Technology Studies, Dartmouth College   Hanover, NH
Supervisor: Dr. George Cybenko

Research and development of Java software and network infrastructure for network attack detection.

Summer Intern   May–August 2002
IBM Research   Austin, TX
Supervisor: Dr. Sani Nassif

Summer internship in circuit simulation. Implemented geometric algorithms to speed up `C++`, circuit validation tools.

Summer Intern   May–August 2001
Alpha Development Group, Compaq   Shrewsbury, MA
Supervisor: Dr. Nevine Nassif

Summer internship in circuit simulation and verification. Made improvements to the build system of `C++`, codebase for circuit verification.

PUBLICATIONS

Naomi K. Fox, Steven E. Brenner, John-Marc Chandonia *The value of protein structure classification information in the scientific literature.* in preparation

Gabrielle Ho, Naomi K. Fox, Steven E. Brenner, John-Marc Chandonia *Inference of superfamily phlogenies in the Structural Classification of Proteins Database through Exploitation of Alternative Databases.* in preparation

Naomi K. Fox, Steven E. Brenner, John-Marc Chandonia *SCOPe: Structural Classification of Proteins extended, integrating SCOP and ASTRAL data and classification of new structures.* Nucleic Acids Research, doi: 10.1093/nar/gkt1240, 2013

Naomi Fox, Ileana Streinu. *Towards Accuracy in Modeling for Protein Rigidity Analysis*, BMC Bioinformatics, 14(Suppl 18):S3, 2013

Naomi Fox, Ileana Streinu. *Redundant and Critical Noncovalent Interactions in Protein Rigid Cluster Analysis*, Discrete and Topological Models in Molecular Biology, Natural Computing book series, Springer, 2013

Naomi Fox, Filip Jagodzinski, Ileana Streinu *KINARI-Lib: a C++, library for pebble game rigidity analysis of mechanical models*, Minisymposium on Publicly Available Geometric/Topological Software, Chapel Hill, NC, USA, Jun 17-19, 2012 (tutorial)

Ileana Streinu, Filip Jagodzinski, Naomi Fox, *Analyzing protein flexibility: an introduction to combinatorial rigidity methods and applications*, IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2011), Atlanta, GA, Nov 12-15, 2011 (tutorial)

Naomi Fox, Filip Jagodzinski, Yang Li, Ileana Streinu. *KINARI-Web: A Web Server for Protein Rigidity and Flexibility Analysis*, Nucleic Acids Research, 39 (Web Server Issue), 2011

Naomi Fox, Ileana Streinu. *Redundant Interactions in Protein Rigid Cluster Analysis.* in 1st IEEE International Conference on Computational Advances in Bio and medical Sciences (ICCABS), Orlando, FL, Feb 3-5, 2011

Christopher Carella, Jeff Dike, Naomi Fox, Mark Ryan. *UML Extensions for Honeypots in the ISTS Distributed Honeypot Project*, Fifth Annual IEEE Information Assurance Workshop, Jun 2004

Vincent Berk, Naomi Fox. *Process query systems for network security monitoring*, Proceedings of the SPIE, May 20, 2005

Conference presentations and posters

Naomi K. Fox, Steven E. Brenner, John-Marc Chandonia. *Recent updates to SCOP and ASTRAL*, 3DSIG2013 and ISMB/ECCB 2013, Berlin, Jul 19-23, 2013 (poster)

Ileana Streinu, Filip Jagodzinski, Naomi Fox, *Analyzing protein flexibility: an introduction to combinatorial rigidity methods and applications*, IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2011), Atlanta, GA, Nov 12-15, 2011 (tutorial)

Naomi Fox, Ileana Streinu, *Towards Accurate Modeling of Hydrogen Bonds for Protein Rigidity Analysis*, Computational Structural Biology Workshop (CSBW), Atlanta, GA, Nov 12, 2011 (poster)

Naomi Fox, *Modeling Techniques for Protein Rigidity Analysis*, Richard Tapia Celebration of Diversity in Computing Doctoral Consortium, San Francisco, CA, Apr 3, 2011 (presentation)

Naomi Fox, Ileana Streinu, *Redundant Interactions in Protein Rigid Cluster Analysis*, Richard Tapia Celebration of Diversity in Computing, San Francisco, CA, Apr 3-5, 2011 (poster)

Naomi Fox, Ileana Streinu, *Redundant Interactions in Protein Rigid Cluster Analysis*, New England Science Symposium, Harvard Medical School, Boston, MA, Apr 1, 2011 (poster)

Naomi Fox, Filip Jagodzinski, Yang Li, and Ileana Streinu, *A Web-Based Tool for Rigidity Analysis of Proteins*, Biotechnology and Bioinformatics Symposium (BIOT 2009). Lincoln, NE, Oct 9-10, 2009 (poster)

Naomi Fox, Filip Jagodzinski, Jeanne Hardy, and Ileana Streinu, *How Hydrogen Bonds Affect Protein Rigidity*, 23rd Symposium of the Protein Society, Boston, MA, Jul 25–29, 2009 (poster)

Naomi Fox and Filip Jagodzinski (joint work with Audrey Lee St John and Ileana Streinu), *Rig-Dyn: A modular, extensible and user-friendly software platform with tools for rigidity analysis and visualization*, Workshop on Geometrical Simulation Techniques, Tempe, AZ, 2008, May 11-15, 2008 (presentation)

Naomi Fox (joint work with Filip Jagodzinski, Audrey Lee St John, and Ileana Streinu) *Design of RigDyn* CRA-W Grad Cohort 2006 Workshop, San Francisco, CA, Mar 31-Apr 1, 2006 (poster)

CONFERENCES AND MEETINGS ATTENDED

Cancer Genomics Symposium, University of California, Berkeley, CA, Jan 17, 2014

Intelligent Systems in Molecular Biology/European Conference on Computational Biology, Berlin, Jul 21-23, 2013

3DSIG Meeting (Structural Bioinformatics and Computational Biophysics), Berlin, Jul 19-20, 2013

Critical Assessment of Genome Interpretation Conference (CAGI), Berlin, Jul 17-18, 2013

Brenner Lab Annual Research Conference, Bodega Bay, CA, Mar 8-10, 2013

Center for Computational Biology, UC Berkeley, Computational and Genomic Biology Retreat, Marshall, CA, Nov 17-18, 2013

IEEE International Conference on Computational Advances in Bio and medical Sciences (ICCABS), Las Vegas, NV. Feb 23-25, 2012

Richard Tapia Celebration of Diversity in Computing San Francisco, CA. Apr 3-5, 2011

New England Science Symposium Harvard Medical School, Boston, MA. Apr 1, 2011

IEEE International Conference on Computational Advances in Bio and medical Sciences (ICCABS) Feb 3-5, 2011. Orlando, FL. 2011

Rigidity Theory and Applications Bellairs Institute of McGill University, Barbados, Jan 2-7 2010

CRA-W/CDC Workshop on Computational Geometry Tufts University, Medford, MA, Nov 15, 2009

19th Fall Workshop on Computational Geometry, Tufts University, Medford, MA, Nov 13-14, 2009

23rd Symposium of the Protein Society, Proteins in Motion, Boston Marriott Copley Place, Boston, MA, Jul 25-29, 2009

Biotechnology and Bioinformatics Symposium (BIOT 20009), University of Nebraska, Lincoln, NE, Oct 9-10, 2009

Geometric constraints with applications in CAD and biology Bellairs Institute of McGill University, Barbados. Jan 3-8, 2009

18th Fall Workshop on Computational Geometry, Rensselaer Polytechnic Institute, Troy, NY, Oct 31-Nov 1, 2008

17th Fall Workshop on Computational Geometry, IBM T.J. Watson Research Center, Hawthorne, New York, Nov 9-10, 2007

19th Canadian Conference on Computational Geometry, Carleton University, Ottawa, Canada, Aug 20-22, 2007

Dynamics under Constraints II, Bellairs Institute of McGill University, Barbados., Feb 2007

16th Fall Workshop on Computational Geometry, Smith College, Northampton, MA, Nov 10-11, 2006

Workshop on Dynamics under Constraints, Bellairs Institute of McGill University, Barbados, Jan

2006

15th Fall Workshop on Computational Geometry, University of Pennsylvania, Nov 18-19, 2005

SPIE Defense + Security, Orlando, FL, Mar 2005

SPIE Defense + Security, Orlando, FL, Mar 2004

SEMINAR PRESENTATIONS

Increasing coverage of the Structural Classification of Proteins (SCOP) Database, QB3 Postdoc Seminar Seminar, University of California, Berkeley, CA, Apr 11, 2014

Algorithms and Software for Identifying Hydrogen Bonds, BioMath Seminar, Smith College, Northampton, MA, Sep 8, 2010

Applications of Delaunay Tesselations in Proteins, Seminar in Advanced Computational Geometry and Applications, Department of Computer Science, UMass, Amherst, MA, Nov 20, 2009

Protein Rigidity, Seminar in Computational Biology, Smith College, Northampton, MA, Dec 2, 2008

Bar-and-Joint Rigidity of Proteins, Theory Seminar. Department of Computer Science, UMass, Amherst, MA, Apr 8, 2008

Theory and Practice of Molecular Dynamics, Seminar in Computational Biology. Department of Electrical and Computer Engineering, UMass, Amherst, MA, Mar 13 and 15, 2006

TEACHING

Teaching Assistant, CMPSCI 121: Introduction to Problem Solving with Computers, Using Java. Spring 2007. Led a weekly discussion section. Responsible for holding office hours, grading programming assignments and exams.

Teaching Assistant, CMPSCI 250: Introduction to Computation. Fall 2005. Responsible for holding office hours, grading problem sets and exams, and preparing sample solutions.

MASTERS PROJECT

Title: Software Modeling and Analysis of Data Structures for Geometric Computing
Advisers: Lori Clarke, Ileana Streinu

COURSE PROJECTS

Tags in Web 2.0 work with Louis Theran. Dec 2006 for the Information Retrieval course. Explored if Web 2.0 tags can help improve search.

Prototypes and Inheritance in Javascript work with Scott Myers. May 2007 for the Programming Languages course. Formal study of the static and dynamic semantics of prototypes and inheritance in the Javascript language.

Comparison of Graph Indexing Techniques work with Huong Phan. May 2008 for the Databases course. Compared three different graph indexing systems.

GRADUATE COURSEWORK

Systems: Databases, Principles Of Programming Language, Intro to Computer Graphics
Theory: Theory of Computation, Algorithms
Artificial Intelligence: Artificial Intelligence, Information Retrieval, Applied Information Theory
Seminars: Research Methods, Seminar in Computational Biology, Seminar in Rigidity Theory, Seminar in Advanced Topics in Computational Geometry, UMass Theory Seminar

AWARDS AND HONORS

Best Poster Award, 2013 Berkeley Lab Physical Biosciences Division TechFest
ISMB Travel Award, 2013
ICCABS Travel Award, 2012
ICCABS Travel Award, 2011

SERVICE

Presenter for Berkeley Lab at USA Science and Engineering Festival, Washington, DC, April 26-27, 2014

Volunteer for BLAZES program (Berkeley Lab Adventure Zone in Elementary Science), Berkeley, CA. Oct. 2013 to present

Presenter to Scratch Club, Peck Middle School, Holyoke, MA. Apr 28, 2011

Presenter for Girls Inc visit to UMass computer science department. Feb 19, 2009

Invited to speak at the Fifth CRA-W Graduate Cohort Workshop, Seattle, WA, Mar 13-14, 2008
Gave talk with Prof Tiffany Williams, Texas A&M University. "Finding Academic Year Funding"

Speaker at the "Mind the Gap" Career Summit, University of Massachusetts, Amherst, MA. Sep 27, 2007

Co-chair of women's group in the UMass computer science department, Jan 2007 - Dec 2007