Jennifer Chang

CONTACT INFORMATION

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RESEARCH INTERESTS

Network analysis, systems biology, heterogeneous data integration, visualization, bioinformatics, and software engineering.

EDUCATION

Ph.D. in **Bioinformatics and Computational Biology** *Aug 2011 – June 2017*
minor in **Statistics**

Dissertation: "Designing an integrated system for biological network exploration"

Iowa State University, Ames, Iowa 50010, USA

GPA: 3.71/4.00

B.A. in **Computer Science** and **Biochemistry** *Aug 2007 – May 2011*

Cornell College, Mount Vernon, Iowa 52314, USA

PROFESSIONAL EXPERIENCE

Computational Biologist Post-Doc, ORISE Fellow USDA-ARS *Aug 2017 – present*
Using R, Bash, and Perl in computational and statistical analysis of influenza A viruses (IAV) in swine. Collaborate with lab mates to develop scientific study designs for specific scientific objectives either in pig or computational models. Prepare the quarterly surveillance report every 3 months and present the information to scientists across multiple locations over conference calls. Select 21 virus for whole genome sequences each month which are later deposited and shared on NCBI GenBank.
Average of 40 hrs/wk. Supervisor: Amy Vincent

Co-Founder Complex Computation, LLC; Ames, Iowa, USA *Jul 2015 – Aug 2017*
Co-founder to market Mango Graph Studio where the company provides software solutions and workshops on network analysis. Served as PI for DARPA SBIR Contract W911NF-15-P-0040 in 2015 and for DARPA SBIR Contract W911NF-17-P-0014 in 2016 and prepared monthly progress reports on findings. Part of 1st Cohort of the Iowa State University StartUp Factory in 2016. Led a team of 3 software and electrical engineers to design and develop methods on signal analysis. Presented the findings in-person to DARPA at a conference in Durham, NC. Collaborated with scientists and researchers at Iowa State University and other locations to develop network analysis pipelines to answer a variety of biological questions.
Varied from 20 to 40 hrs/wk.
Supervisor: Hui-Hsien Chou

Research Assistant Complex Computational Laboratory; Iowa State Univ. *Feb 2012 – Aug 2017*
Lucy2: updated the wxWidgets GUI, http://www.complex.iastate.edu/download/Lucy2/index.html Since the update in 2013, Lucy2 has been downloaded over 700 times on all platforms (Mac, Windows, Linux)
Mango: designed and developed a network visualization software with a new graph exploration language (Gel). Won Plant Sciences Institute Scholar Grant in 2015. Presented and won awards at several conferences, see Conferences section. Mango has been licensed to Complex Computation, LLC.
Average of 20 hrs/wk.
Supervisor: Hui-Hsien Chou

Teaching Assistant GEN 409 Molecular Genetics; Iowa State University *Fall 2016*
The principles of molecular genetics: gene structure and function at the molecular level. Graded exams and homework and provided detailed feedback.
Average of 20 hrs/wk. Supervisor: Yanhai Yin

Teaching Assistant BCB 444 Introduction to Bioinformatics; Iowa State Univ. *Fall 2013, Fall 2014, Fall 2015*
Ran weekly 2-hour lab sections teaching bioinformatic command-line tools, perl, genome assembly, and genome annotation to a mixture of undergraduate and graduate students. Provided mentoring and remedial help outside of lab and class times. Graded weekly assignments and exams. Authored and presented the systems biology lecture. Occasionally answered questions on study design for graduate students depending on time available.
Average of 20 hrs/wk.
Supervisor: Hui-Hsien Chou

Research Assistant Lab of Dr. Eve Wurtele; Iowa State Univ. *Nov 2011 – Feb 2012*
Reprogrammed the Fuzzies game in the Unity3D environment. The game provides an interactive interface to learn basic genetics concepts.
Average of 20 hrs/wk. Supervisor: Eve Wurtele

Research Assistant Lab of Dr. Di Cook; Iowa State Univ. *Sept 2011 – Nov 2011*
Proof-read biovizbase, a Bioconductor package. Developed an exon splicing visualization function for ggbio, written in R. Presented the results to peers in a statistical graphics group and a bioinformatics graduate student group.(https://github.com/j23414/Exon-Junction-Arches.git)
Average of 20 hrs/wk. Supervisor: Di Cook

Webteam Student Worker; Cornell College *Aug 2007 – May 2011*
Update college website, provide website development training to students and faculty.

Research Assistant Lab of Dr. Craig Tepper; Cornell College *Mar 2011*
Performed Sanger sequencing of fire coral samples collected from the Bahamas for a conference publication. Wrote a protocol for using 4Sale, a tool for synchronous RNA sequence and secondary structure alignment and editing.

Programmer The Squirt Project: Building a Holonomic Turtle-Bot; Cornell College *Aug 2008 – Apr 2009*

Worked in a team of four to design and build "Squirt," a holonomic tri-wheeled turtle-bot. A robot is holonomic if the number of degrees of freedom is greater than or equal to the total degrees of freedom. Squirt is holonomic because the drivetrain is composed of three omni-wheels mounted on the sides of an equilateral triangle. Programmed Squirt to be autonomously and right-wall following and presented at the Cornell College Student Symposium.
Average of 40 hr/wk. Supervisor: Andy Wildenberg

Honours and Awards

Collegian Innovation and Leadership Winner, Iowa Women of Innovation	*2016*
Teaching Excellence Award, Iowa State University	*2015*
Dale W. Young and W.E. Loomis Award	*2015*
James Cornette Fellowship	*2014*
NSF IGERT Fellowship	*2011*
Outstanding Junior Award, Cornell College	*2010*
First Year Computer Science Student Achievement Award, Cornell College	*2008*
State 2nd Place in Java Programming, Future Business Leaders of America,	*2007*

Selected Publications

Duwell, M., Feldman, K., Blythe, D., Radebaugh, M., Kough, E., Bachaus, B., Crum, D., Perkins, K., Blanton, L., Davis, C., Jang, Y., Vincent, A., **Chang, J.**, Abney, D., Gudmundson, L., Brewster, M., Polsky, L., Rose, D., "Influenza A(H3N2) Variant Virus Outbreak at Three Fairs – Maryland, 2017", *MMWR Morb Mortal Wkly Rep* 2018;67:1167-1173. DOI: http://dx.doi.org/10.15585/mmwr.mm6742a1

Chang, J. and Chou, J., "Cavatica: A pipeline for identifying author adoption trends among software or methods," 2017 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), Kansas City, MO, USA, 2017, pp. 2145-2150. doi:10.1109/BIBM.2017.8217990

Chang, J., Cho, H., and Chou, H., "Mango: combining and analyzing heterogeneous biological networks", *BioData Mining*, August 2016

Tepper, C., Gaynor, S. and **Chang, J.**, "Cryptic Speciation or Intragenomic Variation: Implications for the Millepores (Fire Coral)", *14th Symposium on the Natural History of the Bahamas.*, pp.20, 2011.

Extra Curricular Activities

Bioinformatics & Computational Biology Graduate Student Organization *2011 – 2017*
Provide bioinformatics related consultant work on Iowa State University Campus. Mentored two students in a project converting R code to C code. In 2014 and 2015, helped design and run the Unix and Python Workshops, each workshop lasting 4 hours. Taught Advanced Unix in Spring 2016.

GDCB Technology Committee *2013 – 2016*
For the Genetics, Development and Cellular Biology (GDCB) department, attended monthly meetings and provided website design feedback and outreach. Authored and distributed a form for student feedback.

Cornell College Computer Club *Aug 2010 – May 2011*
Led one of three teams in an all-campus autonomous robot competition. Trained team members on

programming VEX Robots.

Sustained Dialogue Campus Network

Head Moderator *Aug 2010 – May 2011*
Provided training to student moderators. Led weekly moderator meetings to provide feedback and keep track of dialogue groups. Served as liason between e-board and moderators.

Vice-President *Aug 2009 – May 2010*
Compiled and authored over 10 documents and workshops to train student moderators. Updated and interpreted internal files. Raised over $4000 to send 20 students to the National Conference at Princeton University. Held monthly phone conference calls with national headquarters located in Washington, DC. As a result of revitalizing the organization and increasing campus impact, received the 2010 Outstanding Junior Award.

PROGRAMMING R, Bash, Perl, C++, wxWidgets, OpenGL, Doxygen, GitHub, LaTeX, Python, Java, Emacs, Vim

CONFERENCES & WORKSHOPS

ACM SIGCHI Conference on Human Factors in Computing Systems *May 5-10, 2012*

International Symposium on Bioinformatics Research and Applications *May 21-23, 2012*

Danforth Center Fall Symposium *Sept 26-28, 2012*
Poster: "Bioinformatics Laboratory (BCBLab)"

CRA-W Graduate Cohort Workshop *Apr 5-6, 2013*

PSI Phenomics Workshop *Nov 14,2014*
Talk: "Large biological graph data analysis using Mango"

Statistical Graphics Group Meeting *Mar 5, 2015*
Talk: "Mango: an integrated environment for network visualization and exploration"

Bioinformatics and Computational Biology Retreat & Symposium *Mar 27, 2015*
Poster: "Mango: an environment for analyzing and exploring multiple networks"

PAG Plant and Animal Genome Conference *Jan 9-13 2016*
Poster: "Mango: an environment for combining heterogeneous networks"
Computer Demo: "Mango: an environment for combining heterogeneous networks"

BCBGSO Unix and Python Workshop Series *Jan 28-30, 2016*
Talk: "Advanced Unix Workshop: working with grep, sed, and awk"

Statistical Graphics Group Meeting *Feb 25, 2016*
Discussion Leader: "Michael Friendly paper 'The Golden Age of Statistical Graphics'"

Bioinformatics and Computational Biology Retreat & Symposium *Mar 25, 2016*
Poster: "Mango: an environment for analyzing and exploring multiple networks"
Voted 1st place for Best Poster

3rd Annual Graduate & Professional Students' Research Conference *April 12, 2016*
Innovative Inventions: "Mango: an environment for combining massive heterogeneous networks"
Outstanding Innovative Invention Award

Digital Agriculture Spoke All-Hands Meetings *May 16-17, 2016*
Poster: "Mango: an environment for combining massive heterogeneous networks"

StartUp Factory Iowa State University Research Park *Jun - Dec 2016*
http://www.isupark.org/news-events/news/startup-factory-provides-new-o
StartUp: Complex Computation, LLC

DARPA/MTO M3IC Kick-Off Meeting Durham, NC *Mar 29 - 30, 2017*
Magnetic Miniaturized and Monolithically Integrated Components (M3IC) meeting for the DARPA SBIR Phase I Contract W911NF-17-P-0014
Talk: Complex Computation, LLC Phase I Progress Report

IEEE BIBM 2017 Kansas City, MO *Nov 13 - 16, 2017*
IEEE International Conference on Bioinformatics and Biomedicine
Workshop: The 8th Integrative Data Analysis in Systems Biology
Workshop Paper: "Cavatica: a pipeline for identifying author adoption trends among software or methods"

NSF Cyber Carpentry Workshop Chapel Hill, NC *Jul 16 - 27, 2018*
Data Lifecycle Training
Project Proposal: Cavatica. Led 2 teams to containerize Cavatica as Docker and Singularity images over the course of a week. Each team composed of 5 graduate students or post doctorates from different universities and fields ranging from biology, statistics to social science. Answered coding questions as needed.

CRWAD: Conference of Research Workers in Animal Disease Chicago, IL *Dec 1 - 4, 2018*
Poster: "Spatial and temporal patterns of swine IAV gene constellations in the USA from 2010 to 2018"

Referees

Hui-Hsien Chou, Ph.D.
Co-Founder, Owner
Complex Computation, LLC
Ames, Iowa, USA
e-mail: *available on request*

Di Cook, Ph.D.
Professor
Monash University
Clayton, VIC, Australia
e-mail: *available on request*

Andy Wildenberg, Ph.D.
Associate Professor
Rocky Mountain College
Billings, Montana, USA
e-mail: *available on request*

Heike Hofmann, Ph.D.
Full Professor
Iowa State University
Ames, Iowa, USA
e-mail: *available on request*

Amy Vincent, Ph.D.
Research Veterinary Medical Officer
USDA-ARS Virus and Prion Unit
Ames, Iowa, USA
e-mail: *available on request*