

Dan Zeng

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Personal Summary

PhD candidate with research interests in geometry, topology, and computer graphics with applications in geometry modeling and biomedical and plant imaging.

Education

Washington University in St. Louis

PhD Candidate (4th year), Computer Science
(expected graduation: 2022)

BS in Computer Science Class of 2017

Courses: Computer Graphics, Geometric Computing for Biomedicine, Computational Geometry, Advanced Algorithms and Data Structures, Analysis of Imaging Data, Information Visualization, Machine Learning

Experience

PhD Candidate WUSTL Dept. of Computer Sci. and Engineering (advisor: Tao Ju) 2017-present

- Developed a novel algorithm for maximally simplifying the topology of a 3D shape while minimizing the change to its geometry. Our algorithm demonstrates significantly improved topological and geometric results compared to prior methods on real 3D biomedical images and graphical models
Paper accepted to SIGGRAPH ASIA 2020: <https://www.cse.wustl.edu/~taoju/research/cutfill.pdf>
- Developed a skeleton-based method to capture the architectures of sorghum panicles as part of a study which revealed continuous morphological variation across genetically diverse sorghum inflorescences (Published in and on the cover of New Phytologist journal, May 2020).
 - Wash U Press Release:
<https://engineering.wustl.edu/news/2020/3D-images-allow-detailed-insight-into-grasses.html>
 - Danforth Center Press Release:
<https://www.danforthcenter.org/news/looking-inside-grass-flowers/>

Summer Research Internship: Computer Graphics in AR / VR

Summer 2020

- Details of work performed are confidential.

PhD Intern: Donald Danforth Plant Science Center (Christopher Topp's Lab)

Summer 2018

- Developed a skeleton-based method to capture the architectures of sorghum panicles as part of a study which revealed continuous morphological variation across genetically diverse sorghum inflorescences (accepted for publication by New Phytologist journal, February 2020)
- Applied geometric computing techniques to create an image-to-architecture analysis pipeline for capturing plant root shape, branching hierarchy, and other traits for phenotyping. The pipeline, composed of a software suite, is now used by members of the Topp Lab.
- Generated virtual reality data sets of plant roots using Drishti, which are being presented in educational outreach programs at the Saint Louis Science Center and at other exhibitions.

Undergraduate Research Assistant: WUSTL Dept. of Computer Science and Engineering 2016-2017

- Implemented an interface for pathwalking (algorithm for determining protein backbones in Cryo-EM density maps) in Gorgon, an open-source interactive molecular modeling software suite.
- Developed extremal curve skeletonization (method that uses local maxima to identify α -helices and β -sheets in high-resolution density maps) in Gorgon.
- Presented discoveries at Washington University's Fall Undergraduate Research Symposium.

Research Intern: Washington University in St. Louis Psychiatry Department

2015-2016

Performed a research study regarding the effects of residency restrictions on sex offenders in Missouri.

- Used Perl, Python, and JavaScript to extract demographic and address data from online sources.
- Cleaned address data for geocoding using AWK and Sed. Visualized it using GIS software.
- Performed regressions and statistical analyses to measure the effectiveness of the restrictions.

Graduate Teaching Assistant: CSE 554 Geometric Computing for Biomedicine Fall 2018

- Instructed students on geometric computing algorithms and image analysis techniques as applied to biomedical and plant images.

Head Teaching Assistant: CSE 530 Database Management Systems Fall 2016 and Spring 2017

- Instructed students on database design, optimization, applications, and query languages.
- Held office hours to help students on homeworks and projects.

Teaching Assistant: CSE 132 Intro to Computer Science II Spring 2015

- Instructed students in object-oriented programming, concurrency, and TCP/IP protocol.
- Held office hours and lab sessions.

Co-Founder: Washington University Phone Services 2013-2015

- Designed, developed, and maintained an application hosted on App Engine using Django and jQuery for managing repair requests.
- Repaired screens, backs, cameras, digitizers, and batteries of iPhone and Samsung phones.

Honors / Awards

- Imaging Sciences Pathway Fellowship (2019-2021), awarded by the Division of Biology and Biomedical Sciences at Washington University
- Dean's Select PhD Fellowship at Washington University (2017)
- Thomas H. Eliot Scholarship Award at Washington University (2013)

Extracurriculars

Outreach Coordinator, WUSTL Spectra 2020-present

- Coordinating with local organizations to setup outreach events and workshops to connect graduate students with the local community, schools, and industry.

Career Development Officer, Association of Graduate Engineering Students 2018-2019

- Organized networking receptions and other events to connect graduate students with industry. Responsible for inviting industry guests, scheduling the events, coordinating with student groups, and event promotion. The AGES Spring Networking events of 2018 and 2019 were attended by nearly 100 students and representatives. Over 120 students and 34 representatives from 24 companies went to our September 26 event.

Organizer, Dragon Dance Team 2018-2019

- Organized a volunteer dragon dance team which performed at cultural events such as the Chinese Culture Days at the MO Botanical Gardens, the Gateway Dragon Boat Festival, and the Independence Day and Thanksgiving Day parades in downtown St. Louis.

Publications

Dan Zeng, Erin Chambers, David Letscher, Tao Ju. 2020. To cut or to fill: A global optimization approach to topological simplification. ACM Transactions on Graphics (Proc. ACM Siggraph Asia 2020), 39(6): No. 201

Mao Li, Mon-Ray Shao, Dan Zeng, Tao Ju, Elizabeth A. Kellogg, Christopher N. Topp. 2020. Comprehensive 3D Phenotyping reveals Continuous Morphological Variation across Genetically Diverse Sorghum Inflorescences. New Phytologist Journal.