ERIK AMÉZQUITA

Topological Data Analysis (TDA) and shape quantification meet plant biology

CAREER AND EDUCATION Preparing Future Faculty for Inclusive Excellence Postdoctoral Fellow present • Columbia. MO University of Missouri 2023 · Division of Plant Science & Technology (80%) · Department of Mathematics (20%) PhD, Computational Mathematics, Science & Engineering 2023 🗣 East Lansing, MI Michigan State University 2018 Advisors: Elizabeth Munch and Dan Chitwood Defended: March 2023 · Dissertation: Exploring the Mathematical Shape of Plants Lic. Mathematics (B.S.) 2018 🕈 Guanajuato, Gto. Universidad de Guanajuato 2013 · Advisor: Antonio Rieser (CONACYT-CIMAT) • Defended: May 2018 Thesis: Efficient Object Classification using the Euler Characteristic PEER-REVIEWED WORK Decoding the coiling patterns of *Cuscuta campestris* with automated image 2024 processing M. Bentelspacher, E.J. Amézquita, S. Adhikari, J. Barros, S.Y. Park · Plant Cell Reports 24(282). DOI: 10.1007/s00299-024-03337-1 Allometry and volumes in a nutshell: Analyzing walnut morphology using 2024 three-dimensional X-ray computed tomography E.J. Amézquita, M.Y. Quigley, P.J. Brown, E. Munch, D.H. Chitwood • The Plant Phenome Journal 7: e20095. DOI: 10.1002/ppj2.20095 Genomics data analysis via spectral shape and topology 2023 E.J. Amézquita, F. Nasrin, K.M. Storey, M. Yoshizawa · PLoS ONE 18(4): 30284820. DOI: 10.1371/journal.pone.0284820 A critical analysis of plant science literature reveals ongoing inequities 2023 R.A. Marks, E.J. Amézquita, S. Percival, A. Rougon-Cardoso, C. Chibici-Revneanu, S.M. Tebele, J.M. Farrant, R. VanBuren, D.H. Chitwood · PNAS 120(10): e2217564120. DOI: 10.1073/pnas.2217564120 The shape of aroma: measuring and modeling citrus oil gland distribution 2023 E.J. Amézquita, M.Y. Quigley, T. Ophelders, D. Seymour, E. Munch, D. H. Chitwood · Plants, People, Planet 5(5): 698-711. DOI: 10.1002/ppp3.10333



View this CV online at ejamezquita.github.io/cv

CONTACT

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SKILLS

Programming: Python, R, C/C++, bash/unix

Technologies: $L\!\!AT_E\!X$, RMarkdown, jupyter, vim, html/css

Languages: Spanish (native), English (fluent), French (elementary)

Made with the R package pagedown.

Last updated on 2025-04-20.

2022	•	Teaching Tools in Plant Biology. Plants and Python, Coding from Scratch in the Plant Sciences R. VanBuren, A. Rougon-Cardoso, E.J. Amézquita, E. Coss-Navarrete, A. Espinosa-Jaime, O. Gonzalez- Iturbe, A. Luckie-Duque, E. Mendoza-Galindo, J. Pardo, G. Rodríguez-Guerrero, P. Rosiles-Loeza, M. Vásquez-Cruz, S. Fernandez-Valverde, T. Hernandez-Hernandez, S. Palande, and D.H. Chitwood • <i>The Plant Cell</i> 34(7): el. DOI: 10.1093/plcell/koac187
2021	•	Measuring hidden phenotype: Quantifying the shape of barley seeds using the Euler Characteristic Transform E.J. Amézquita, M.Y. Quigley, T. Ophelders, J.B. Landis, D. Koenig, E. Munch, D. H. Chitwood • <i>in Silico Plants</i> 4(1): diab033. DOI: 10.1093/insilicoplants/diab033
2020	•	The shape of things to come: Topological data analysis and biology, from molecules to organisms E.J. Amézquita, M.Y. Quigley, T. Ophelders, E. Munch, D.H. Chitwood • Developmental Dynamics 249(7): 816-833. DOI: 10.1002/dvdy.175
	₿	WORK SUBMITTED FOR PEER-REVIEW
2024	•	Tabula Glycine: The whole-soybean single-cell resolution transcriptome atlas S.A. Cervantes-Pérez, S. Thibivilliers, S. Amini, J.M. Pelletier, I. Meyer, H. Xu, S. Tennant, P. Ma, C. Sprueil, A.D. Farmer, J.E. Coate, H. Nelissen, Q. Yao, O. Martin, E.J. Amézquita, R.B. Goldberg, J.J. Harada, M. Libault
2024	•	From hand measurements to high throughput phenotyping: understanding maize canopy structure and predicting yield Z. Ji, E.J. Amézquita, L. Newton, D.H. Chitwood, A.M. Thompson
	69	STUDENTS MENTORED
present 2025	•	Sophia Knehans and Roberto Herrera Martin (Undergraduate) Mathematical network analysis of academic collaboration. Dept. of Mathematics. Univ. of Missouri.
2024	•	Searcy Thomas and Jake Parmentier (Undergraduate) TDA to model spatial cell distributions. Dept. of Mathematics. Univ. of Missouri
2024	•	Ethan Lenhardt (Undergraduate) Mathematical network analysis of academic collaboration. Dept. of Mathematics. Univ. of Missouri.
		TEACHING EXPERIENCE
present 2025	•	At University of Missouri (as Instructor) PLNT_SCI 2500: Data Science for Life Sciences I. Spring 2025
2021	•	At other institutions (as TA) Code In Place. Stanford University. Remote. Summer 2021
2019	•	At Michigan State University (as TA) CMSE 201: Computational Modelling and Data Analysis I. Fall 2019
2016	•	At CIMAT/Universidad de Guanajuato (as TA)
 2018		Topology I (Intro to point-set topology). Fall 2018 14th Calculus Problem-solving Workshop. Summer 2017 Introduction to C/C++ and data structures (Online). Summer 2017 Introduction to probability. Fall 2016

P INVITED TALKS

2025	•	The mathematical shape of plants AATRN. Applied Algebraic Topology Research Network. Virtual
2025	•	Mathematically phenotyping shapes and patterns, from molecules to organisms TDA Seminar. Dept. of Comp. Math, Science, and Eng. Michigan State University, East Lansing, MI
2025	•	Mathematically phenotyping shapes and patterns, from molecules to organisms Plant Science Seminar. Division of Plant Science and Technology. University of Missouri, Columbia
2025	•	The topology of sub-cellular RNA distribution Math & Data Seminar. Department of Mathematics. University of Missouri. Columbia, MO
2024	•	Characterizing spatial patterns and distributions with Topological Data Analysis (TDA) NAPPN AI/ML Affinity Group. North American Plant Phenotyping Network. Virtual
2023	•	Mapper and the topological shape of genomic analysis MU-GNU International Symposium in Plant Biotechnology. Bond LSC. Columbia, MO
2023	•	A primer on Topological Data Analysis Geometry and Topology Seminar. Department of Mathematics. University of Missouri. Columbia, MO
2023	•	Exploring the mathematical shape of plants CS Colloquium. Department of Computer Science. Saint Louis University. St. Louis, MO
2023	•	When topology meets plant morphology USTARS 2023. Underrepresented Students in Topology and Algebra Research Symposium, Seattle
2023	•	The mathematical shape of plants Plant Sciences Seminar. Department of Botany and Plant Sciences. University of California, Riverside
2023	•	Directional statistics to describe the distribution of citrus oil glands JMM 2023. Joint Mathematics Meeting. American Mathematical Society. Boston, MA.
2022	•	The mathematical shape of plants Plant Science Seminar. Division of Plant Science and Technology. University of Missouri, Columbia
2022	•	Using applied topology in plant science Stochastic Topology seminar. Max Planck Institute for Mathematics in the Sciences (MiS). Virtual.
2022	•	TDA to harness plant morphology Multicellular dynamics seminar. Max Planck Institute for Plant Breeding Research (MPIPZ). Virtual
2022	•	Using the Euler characteristic to quantify the shape of barley seeds OU Topology and Data Science Seminar. Department of Math. University of Oklahoma. Virtual
2022	•	Bridging applied topology and plant biology JMM 2022. Joint Mathematics Meeting. American Mathematical Society
2022	•	Measuring the shape of plants with the Euler Characteristic Transform UFTDA 2022. University of Florida Topological Data Analysis Conference. Gainesville, FL



2020	•	Using Euler Characteristic Curves to model barley shape YRF@SoCG. Young Researcher Forum @ CG Week, Symposium on Computational Geometry. Virtual
	•	SELECT WORKSHOPS AND HACKATHONS ATTENDED
2023	•	Graduate Wellness and Mental Health Ambassador Program. The Graduate School. Michigan State University, East Lansing, MI
2022	•	NatSci Cultural Competency. Workshop Semester Series DEI Office. College of Natural Science. Michigan State University. East Lansing, MI
2022	•	Beyond Abstract Measures: geometry and computation Organized by the Lorentz Center, Leiden, The Netherlands
2021	•	Datathon4Justice D4J@QSIDE. Institute for Quantitative Study of Inclusion, Diversity, and Equity. Virtual
2021	•	Immersive Visualization Institute IVI2021. Abrams Planetarium, MSU Libraries, and MSU Museum. East Lansing. MI
2021	•	MSU Dialogues: Race. Semester I Office for Institutional Diversity and Inclusion. Michigan State University. Virtual
2019	•	Applied Mathematical Modeling with Topological Techniques. ICERM. Institute for Computational and Experimental Research in Mathematics. Providence, RI
	+ +	OUTREACH
2023	•	If life gives you lemons, analyze the shape of their aroma Science on Tap. International Tap House. Columbia, MO
2023	•	Un matemático y un botánico van por una limonada ¡Science on Wheels en Español! SACNAS Mizzou. Columbia, MO
2023	•	Mental Health in Mathematics and Computer Science Panel organizer and moderator. SGI23. Massachussets Institute of Technology. Virtual
2022	•	Webinar de Solicitudes al Doctorado en Estados Unidos Panelist. Organized by the Coloquio de Exestudiantes CIMAT/DEMAT. Virtual
2022	•	Mental Health in Mathematics and Computer Science Panel organizer and moderator. SGI22. Massachussets Institute of Technology. Virtual
2021	•	A topologist and a plant biologist go for a newly shaped beer Hispanics in STEM celebration. WaMPS. Michigan State University. East Lansing, MI
2021	•	Demeter y Euler van por una cerveza Seminario Junior de Estudiantes. Departamento de Matemáticas. Universidad de Guanajuato. Virtual.
2020	•	Cuantificando la forma de la cebada con ATD Seminario de Matemáticas y Estadística. Instituto Politécnico Nacional. Virtual



2016 	•	High School Mathematics Seminar Co-Organizer Escuela de Nivel Medio Superior, Guanajuato. Guanajuato.
2015		\cdot Organized lectures on college-level math topics, such as combinatorics or group theory.
	<u>Q</u>	SELECT AND RECENT AWARDS
2025	•	Travel Grant (US\$600) BEDE Network Annual Meeting. Biological and Environmental Data Education. Santa Barbara, CA
2025	•	Travel Grant (US\$575) Plant Biology 2025. American Society of Plant Biologists. Milwaukee, WI
2024	•	Travel Grant (US\$250) SIAM-CSS24. SIAM Central States Section. Kansas City, MO.
2024	•	Travel Grant (US\$650) SIAM-MDS24. Early Career Award. SIAM-Mathematics of Data Science. Atlanta, GA
2024	•	Travel Grant (US\$350) MW-ASPB 2024. ASPB Midwest Section. West Lafayette, IN
2024	•	Best Flash Talk (1st place out of 52 talks) 2024 NAPPN. North American Plant Phenotyping Network. West Lafayette, IN
2023	•	Distinguished Graduate Student. Travel Grant (US\$700) USTARS 2023. Underrepresented Students in Topology and Algebra Research Symposium.
2022	•	Best Poster Award. 3rd place out of 173 posters. IPPS2022. International Plant Phenotyping Symposium. Wageningen, The Netherlands
2022	•	Travel Grant (EUR 2000) IPPS2022. International Plant Phenotyping Symposium. Wageningen, The Netherlands
2022	•	Fitch H. Beach Award (2nd place) College of Engineering. Michigan State University. Most outstanding graduate research.
2022	•	Travel Grant (US\$800) 2022 NAPPN. North American Plant Phenotyping Network. Athens, GA
2019	•	Travel Grant (US\$800) Applied Mathematical Modeling with Topological Techniques. ICERM. Providence, RI
2019	•	IMPACTS Fellowship Awarded jointly by Michigan State University and the NRT-NSF program (NSF DGE-1828149).
2018	•	<mark>Sotero Prieto Medal</mark> Sociedad Mexicana de Matemáticas. Best undergrad math thesis produced in Mexico
2018	•	Francisco Aranda Ordaz Award (3rd place) Asociación Mexicana de Estadística. Best undergrad statistics thesis produced in Mexico.
2018	•	Raymond P. and Marie M. Ginther Graduate Fellowship Awarded by CMSE to outstanding incoming graduate students.

