Joyce A. Chew

Mathematics Ph.D. candidate

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Research Interests

Learning on manifolds, low-rank matrix and tensor approximations, bias in machine learning

Education

2025 (expected) **Ph.D in Mathematics**, *University of California, Los Angeles*
Advisor: Deanna Needell
Selected coursework: Bias and Fairness in Machine Learning, Topics in Network Science, High Dimensional Statistics, Monte Carlo Methods for Optimization

2023 **C.Phil. in Mathematics**, *University of California, Los Angeles*

2022 **M.A. in Mathematics**, *University of California, Los Angeles*

2020 **B.S. in Mathematics, Honors**, *Calvin University*, Grand Rapids, MI

2020 **B.A. in Chemistry**, *Calvin University*, Grand Rapids, MI

Honors and Awards

2022 UCLA Raymond Redheffer Prize (awarded for excellence in teaching calculus)

2020 NSF Graduate Research Fellowship

2019 National Center for Women and Information Technology Collegiate Award Finalist

2018 Goldwater Scholarship Honorable Mention

2016 Calvin University Student Research Fellowship

Publications

* denotes undergraduate author.

Preprints

[A1] E. George, **J. A. Chew**, and D. Needell. Detecting and mitigating indirect stereotypes in word embeddings. *arXiv preprint*, 2023. doi:10.48550/arXiv.2305.14574.

[A2] **J. A. Chew**, E. De Brouwer, S. Krishnaswamy, D. Needell, and M. Perlmutter. Manifold filter-combine networks. *arXiv preprint*, 2023. doi:10.48550/arXiv.2307.04056.

[A3] W. Diepeveen, **J. A. Chew**, and D. Needell. Curvature corrected tangent

space-based approximation of manifold-valued data. *arXiv preprint*, 2023. doi:10.48550/arXiv.2306.00507.

Conference/Workshop Papers

[B1] A. Venkat, **J. A. Chew**, F. C. Rodriguez, C. J. Tape, M. Perlmutter, and S. Krishnaswamy. Directed scattering for knowledge graph-based cellular signaling analysis. 2023. doi:10.48550/arXiv.2309.07813. Accepted to ICASSP 2024.

[B2] **J. A. Chew**, D. Needell, and M. Perlmutter. A convergence rate for manifold neural networks. In *2023 International Conference on Sampling Theory and Applications (SampTA)*, pages 1–5. IEEE, 2023. doi:10.1109/SampTA59647.2023.10301407.

[B3] **J. A. Chew**, H. Steach, S. Viswanath, H.-T. Wu, M. Hirn, D. Needell, M. D. Vesely, S. Krishnaswamy, and M. Perlmutter. The manifold scattering transform for high-dimensional point cloud data. In *Topological, Algebraic and Geometric Learning Workshops 2022*, volume 196, pages 67–78. PMLR, 2022. URL `https://proceedings.mlr.press/v196/chew22a.html`.

Journal Papers

[C1] **J. A. Chew**, M. Hirn, S. Krishnaswamy, D. Needell, M. Perlmutter, H. Steach, S. Viswanath, and H.-T. Wu. Geometric scattering on measure spaces. *Applied and Computational Harmonic Analysis*, page 101635, 2024. doi:10.1016/j.acha.2024.101635.

[C2] K. Cheng*, S. Inzer*, A. Leung*, X. Shen*, M. Perlmutter, M. Lindstrom, **J. A. Chew**, T. Presner, and D. Needell. Multi-scale hybridized topic modeling: A pipeline for analyzing unstructured text datasets via topic modeling. *SIAM Undergraduate Research Online*, 16, April 2023. doi:10.1137/22S1536832.

[C3] N. P. Kazmierczak, **J. A. Chew**, and D. A. Vander Griend. Bootstrap methods for quantifying the uncertainty of binding constants in the hard modeling of spectrophotometric titration data. *Analytica Chimica Acta*, 1227:339834, September 2022. doi:10.1016/j.aca.2022.339834.

[C4] N. P. Kazmierczak, **J. A. Chew**, and D. A. Vander Griend. A reliable algorithm for calculating stoichiometry parameters in the hard modeling of spectrophotometric titration data. *Journal of Chemometrics*, 36(6):e3409, May 2022. doi:10.1002/cem.3409.

[C5] P. Li*, C. Tseng*, Y. Zheng*, **J. A. Chew**, L. Huang, B. Jarman, and D. Needell. Guided semi-supervised non-negative matrix factorization. *Algorithms*, 15(5):136, April 2022. doi:10.3390/a15050136.

[C6] N. P. Kazmierczak, **J. A. Chew**, A. R. Michmerhuizen, S. E. Kim, Z. D. Drees, A. Rylaarsdam, T. Thong, L. Van Laar, and D. A. Vander Griend. Sensitivity limits for determining 1: 1 binding constants from spectrophotometric titrations via global analysis. *Journal of Chemometrics*, 33(5):e3119, 2019. doi:10.1002/cem.3119.

Talks

2023 **A Convergence Rate for Manifold Neural Networks**, *SampTA 2023*

2023 **Uncovering Structure in High-Dimensional Data**, *Calvin University Mathematics and Statistics Colloquium*

2022 **Geometric Scattering on Non-Euclidean Data**, *SIAM MDS 22*

2019 **Slinkies, Gorges, and Ice Cream: What I Did on My Summer Vacation**, *Calvin University Mathematics and Statistics Colloquium*

2019 **Tension induced instabilities of twisted springs**, *Cornell University Undergraduate Research Forum*

2015 **Cake and what I learned from cutting it**, *TEDxValencia High School*

Teaching

Calculus I, *UCLA*

Calculus II, *UCLA*

Applied Numerical Methods, *UCLA*

Mentoring

2023-2024 UCLA/Los Angeles Pierce College Collaborative Undergraduate Research Experience (NSF Award)

2022 UCLA CAM REU: AI for Holocaust Studies (paper: [C2])

2021–2023 UCLA Women in Mathematics Undergraduate Mentoring

2021–2022 UCLA Mathematics Directed Reading Program

2021 UCLA CAM REU: California Innocence Project (paper: [C5])

Professional Memberships

SIAM, AWM

Programming Languages

Python, C, C++, MATLAB, Julia, R, LaTeX