

Sourabh Palande

Address: East Lansing, MI | **Email:** sourabh.palande@gmail.com | **Phone:** +1(801)898-2083
LinkedIn: <https://linkedin.com/in/sourabhpalande> | **GitHub:** <https://github.com/sourabhpalande>
Homepage: sourabhpalande.github.io

Summary

Data scientist; applied mathematician; theoretical, algorithmic, and applied machine learning researcher. Developed, implemented novel methods leveraging topology and geometry in machine learning and data analysis. Published research articles in leading journals and conferences, spanning a range of topics and applications. Experience working with MRI, fMRI, 3D X-Ray CT scans, RGB images, brain networks, RNA-Seq data sets. Eager to make real-world impact by solving complex problems, advancing scientific and technological capabilities.

Skills

- **Programming:** Python, C, C++. Familiar with Matlab, R, Julia. Well versed with Git, LaTeX, HTML/CSS/JS/D3.
- **Python ML/CV:** NumPy, SciPy, NetworkX, Scikit-Learn, PyTorch, OpenCV, Scikit-Image, Matplotlib, Seaborn.
- **Technical:** Complex Data Analysis, Mathematical Modeling, Research, Collaboration, Science Communication.

Research Experience

Postdoctoral Research Associate | CMSE, Michigan State University | East Lansing, MI | Oct 2020 - Present.

- Lead interdisciplinary collaborative projects consisting of mathematicians, computer scientists and biologists.
- Developed image analysis techniques for 3D X-Ray scans and 2D RGB images for applications in plant biology.
- Developed exploratory visual analytics tools to study gene expression data across plant evolution.
- Mentored undergraduate and graduate students in computational biology.
- Helped design and publish a novel interactive book introducing python programming to biology students: [Plants & Python](https://plantsandpython.github.io/PlantsAndPython) (<https://plantsandpython.github.io/PlantsAndPython>).

Graduate Research Assistant | SCI Institute, University of Utah | Salt Lake City, UT | May 2016 - Jul 2020.

- Collaborated with neuroscientists, applying advanced data science techniques in autism research.
- Developed and implemented novel machine learning and data analysis methods for brain networks.
- Developed and implemented spectral algorithms for simplicial complexes and hypergraphs.
- Helped design a visualization tool for DNN interpretability: [TopoAct](https://tdavislab.github.io/TopoAct) (<https://tdavislab.github.io/TopoAct>)

Awards and Honors

American Mathematical Society (AMS) | 2022-2023 | Models and Methods for (Hyper) Network Science.

- Invited to participate in Mathematical Research Communities (MRC): <https://www.ams.org/programs/research-communities/2022MRC-HyperNet>
- Established continued research collaborations to identify and solve open problems in hyper network science.

Simons Institute for Theory of Computing | Fall 2018 | Foundations of Data Science.

- Invited to participate as a visiting graduate researcher in the Fall semester program on mathematical foundations of data science: <https://simons.berkeley.edu/programs/datascience2018>

XRadia (Zeiss) and University of Manchester | Summer 2014 | Dissertation Award.

- Awarded GBP 3000 in funding to carry out dissertation research with industrial collaborators.

Education

PhD in Computing (Image Analysis) | University of Utah | Salt Lake City, UT | Aug 2015 - Jul 2020.

- Thesis: "Utilizing Topological Structures of Data for Machine Learning." Advisor: Dr. Bei Wang-Phillips.

MSc in Applied Mathematics | University of Manchester | Manchester, UK | Sep 2013 - Oct 2014.

- Dissertation: "Analysis of the Source Trajectory in Cone Beam Micro CT." Advisor: Prof. Bill Lionheart.

BSc in Mathematics | University of Pune | Pune, India | Jul 2004 - Oct 2007.

- Specialization in Computational Mathematics, minored in Physics and Statistics.

Selected Publications

Preprints

- Robert VanBuren, Alejandra Rougon-Cardoso, Erik J. Amézquita, Evelia L. Coss-Navarrete, Aarón Espinosa-Jaime, Omar Andres Gonzalez-Iturbe, Alicia C. Luckie-Duque, Eddy Mendoza-Galindo, Jeremy Pardo, Guillermo Rodríguez-Guerrero, Pablo Y. Rosiles-Loeza, Marilyn Vásquez-Cruz, Selene L. Fernandez-Valverde, Tania Hernández-Hernández, **Sourabh Palande**, and Daniel H. Chitwood, "[Plants & Python: A series of lessons in coding, plant biology, computation, and bioinformatics](#)," The Plant Cell, vol. 34, no. 7, e1–e1, Jul. 2022
- **Sourabh Palande**, Joshua Kaste, Miles Roberts, Kenia Segura Aba, Carly Claucherty et al. "[The topological shape of gene expression across the evolution of flowering plants](#)." *bioRxiv* (2022).
- Li, Mingzhe, **Sourabh Palande**, Lin Yan, and Bei Wang. "[Sketching merge trees for scientific data visualization](#)." *arXiv preprint arXiv:2101.03196* (2021).

Journal Articles

- Archit Rathore, Nithin Chalapathi, Sourabh Palande, and Bei Wang, "[Topoact: Visually exploring the shape of activations in deep learning](#)," Computer Graphics Forum, vol. 40, no. 1, pp. 382–397, 2021.
- Braxton Osting, Sourabh Palande, and Bei Wang, "[Spectral sparsification of simplicial complexes for clustering and label propagation](#)," *Journal of Computational Geometry (JoCG)*, vol. 11, no. 1, pp. 176–211, 2020, *Authors listed alphabetically.
- Sourabh Palande, Vipin Jose, Brandon Zielinski, Jeffrey Anderson, P. Thomas Fletcher, and Bei Wang, "[Revisiting Abnormalities In Brain Network Architecture Underlying Autism Using Topology-Inspired Statistical Inference](#)," *Brain Connectivity*, vol. 9, no. 1, pp. 13–21, 2019, PMID: 30543119. Eprint: <https://doi.org/10.1089/brain.2018.0604>

Conference Proceedings

- Sarah Percival, Erik J. Amézquita, **Sourabh Palande**, Aman Husbands, Arjun Krishnan, Beronda Montgomery, Elizabeth Munch, and Daniel Chitwood. "[Using Mapper to Reveal Morphological Relationships in Passiflora Leaves](#)." In *2022 Spring Central Sectional Meeting*. AMS, 2022.
- Archit Rathore, Sourabh Palande, Jeffrey Anderson, Brandon Zielinski, P. Thomas Fletcher, and Bei Wang, "[Autism Classification Using Topological Features And Deep Learning: A Cautionary Tale](#)," in *Medical Image Computing and Computer Assisted Intervention – MICCAI 2019*, Springer International Publishing, Oct. 2019.
- Keri Anderson, Jeffrey Anderson, **Sourabh Palande**, and Bei Wang, "[Topological Data Analysis Of Functional MRI Connectivity In Time And Space Domains](#)," in *Connectomics in NeuroImaging (CNI) at Medical Image Computing and Computed Assisted Intervention (MICCAI)*, Springer International Publishing, Sep. 2018. * Best Paper Award.
- Eleanor Wong, Sourabh Palande, Bei Wang, Brandon Zielinski, Jeffrey Anderson, and P. Thomas Fletcher, "[Kernel Partial Least Squares Regression For Relating Functional Brain Network Topology To Clinical Measures Of Behavior](#)," in *2016 IEEE 13th International Symposium on Biomedical Imaging (ISBI)*, Apr. 2016.

Teaching

Guest Instructor | HRT 841: Plants & Python | Michigan State University | Fall 2020.

- Developed price prediction models for securities, commodities using machine learning and time series analysis.
- Designed and implemented automated, high frequency trading strategies.

Teaching Assistant | CS 6170: Computational Topology | University of Utah | Spring 2017.

- Analyzed financial statements and historical market trends to identify trading and investing opportunities.
- Managed a diversified portfolio of securities, delivering 3X returns in 30 months.

Teaching Assistant | CS 6210: Advanced Scientific Computing | University of Utah | Fall 2016.

- Analyzed financial statements and historical market trends to identify trading and investing opportunities.
- Managed a diversified portfolio of securities, delivering 3X returns in 30 months.

Other Work Experience

Quantitative Analyst | Algoanalytics Financial Consultancy | Pune, India | Jun 2011 - Jun 2013.

- Developed price prediction models for securities, commodities using machine learning and time series analysis.
- Designed and implemented automated, high frequency trading strategies.

Equity Trader and Portfolio Manager | Self Employed | Pune, India | Jan 2009 - Jun 2011.

- Analyzed financial statements and historical market trends to identify trading and investing opportunities.
- Managed a diversified portfolio of securities, delivering 3X returns in 30 months.

Courses and Certifications

Deep Learning Specialization | Coursera and deeplearning.ai | May 2019.

C++ Programming for Financial Engineering | QuantNet LLC and Baruch College | Oct 2012.

Graduate Coursework in Computer Applications | University of Pune | Aug 2008 - May 2009.

- Algorithms, Data Structures, Introduction to (Functional) Programming, Database Systems

References

Dr. Elizabeth Munch | Associate Professor | Departments of CMSE and Mathematics | Michigan State University.

- Postdoc Advisor
- **Email:** muncheli@msu.edu | **Phone:** +1(517)432-0619 | **Website:** <http://elizabethmunch.com/>

Dr. Daniel Chitwood | Assistant Professor | Departments of Horticulture and CMSE | Michigan State University.

- Postdoc Advisor
- **Email:** chitwoo9@msu.edu | **Phone:** +1(517)353-0462

Dr. Bei Wang | Associate Professor | SCI Institute and School of Computing | University of Utah.

- PhD Advisor
- **Email:** beiwang@sci.utah.edu | **Phone:** +1(517)432-0619 | **Website:** <https://sci.utah.edu/~beiwang/>