Jakob Troidl

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About

I am a Ph.D. candidate in computer science at Harvard University, advised by Hanspeter Pfister. I am broadly interested in data visualization and applied machine learning, especially with applications in computational neuroscience. Specifically, my research focuses on building scalable interactive visual analysis tools and representation learning approaches to analyze the hidden architecture of the brain.

Education

Harvard University — Cambridge, MA
Ph.D. in Computer Science, Advisor: Prof. Hanspeter Pfister — 2021–2027

- Focus: Data Visualization, Applied ML, Computational Neuroscience

TU Wien — Vienna, Austria
M.Sc. & B.Sc (with Honors) in Computer Science, Advisor: Prof. Eduard Gröller — 2015–2021

- Focus: Data Visualization, Biomedical Imaging, Computer Vision
- GPA: 1.1/1.0

Experience

HHMI Janelia — Ashburn, VA
Visiting Researcher with Dr. Srinivas Turaga — 05/2024 - present

- Building Generative Models of Neuronal Morphology

Harvard University — Cambridge, MA
Research Assistant with Prof. Hanspeter Pfister — 09/2021 - present

- Visualization of Large-Scale Biomedical Data
- Towards Efficient and Scalable Analysis Tools for Connectomics

King Abdullah University of Science & Technology (KAUST) — Thuwal, Saudi Arabia
Research Intern with Prof. Markus Hadwiger — 02/2019 - 05/2019

- Observer Relative Flow Visualization in Curved Spaces
- Co-authored a publication which won the SciVis Best Paper Award at IEEE VIS 2020

Brainlab AG — Munich, Germany
Research Intern — 08/2018 - 01/2019

- Path Tracing for Realtime 3D Medical Visualization
- Mixed Reality for 3D Medical Visualization

Peer Reviewed Publications

[1] S. Dorkenwald, C. M. Schneider-Mizell, D. Brittain, A. Halageri, C. Jordan, N. Kemnitz, M. A. Castro, W. Silversmith, J. Maitin-Shephard, **J., Troidl**, *et al.*, "CAVE: Connectome Annotation Versioning Engine", *to appear in Nature Methods*, vol. 384, no. 6696, 2024.

[2] S. Prabhakaran, C. Yapp, G. J. Baker, J. Beyer, Y. H. Chang, A. L. Creason, R. Krueger, J. Muhlich, N. H. Patterson, K. Sidak, D. Sudar, A. J. Taylor, L. Ternes, **J., Troidl**, Y. Xie, A. Sokolov, D. R. Tyson, and the Cell Imaging Hackathon Participants, "Addressing persistent challenges in digital image analysis of cancer tissue: Resources developed from a hackathon", *to appear in Molecular Oncology*, pp. 2024–07, 2024.

[3] A. Shapson-Coe, M. Januszewski, D. R. Berger, A. Pope, Y. Wu, T. Blakely, R. L. Schalek, P. H. Li, S. Wang, J. Maitin-Shepard, N. Karlupia, S. Dorkenwald, E. Sjostedt, L. Leavitt, D. Lee, **J. Troidl**, F. Collman, L. Bailey, A. Fitzmaurice, R. Kar, B. Field, H. Wu, J. Wagner-Carena, D. Aley, J. Lau, Z. Lin, D. Wei, H. Pfister, A. Peleg, V. Jain, and J. W. Lichtman, "A petavoxel fragment of human cerebral cortex reconstructed at nanoscale resolution", *Science*, vol. 384, no. 6696, 2024.

[4] S. Warchol, **J. Troidl**, J. L. Muhlich, R. Krueger, J. Hoffer, T. Lin, J. Beyer, E. Glassman, P. K. Sorger, and H. Pfister, "psudo: Exploring Multi-Channel Biomedical Image Data with Spatially and Perceptually Optimized Pseudocoloring", *Computer Graphics Forum (Proceedings Eurographics/IEEE Symposium on Visualization, Eurovis 2024*, vol. 43, no. 3, 2024.

[5] Z. Chen, C. Zhang, Q. Wang, **J. Troidl**, S. Warchol, J. Beyer, N. Gehlenborg, and H. Pfister, "Beyond Generating Code: Evaluating GPT on a Data Visualization Course", *IEEE VIS Workshop on Visualization Education, Literacy, and Activities*, 2023.

[6] P. Harth, A. Bast, **J., Troidl**, B. Meulemeester, H. Pfister, J. Beyer, M. Oberlaender, H.-C. Hege, and D. Baum, "Rapid Prototyping for Coordinated Views of Multi-scale Spatial and Abstract Data: A Grammar-based Approach", in *Eurographics Workshop on Visual Computing for Biology and Medicine (VCBM)*, 2023.

[7] **J. Troidl**, S. Warchol, J. Choi, J. Matelsky, N. Dhanyasi, X. W. Wang, B. Wester, D. Wei, J. Lichtman, H. Pfister, and J. Beyer, "Vimo: Visual Analysis of Neuronal Connectivity Motifs", *IEEE Transactions on Visualization and Computer Graphics*, 2023.

[8] P. Velicky, E. Miguel, J. M. Michalska, J. Lyudchik, D. Wei, Z. Lin, J. F. Watson, **J., Troidl**, J. Beyer, Y. Ben-Simon, *et al.*, "Dense 4D nanoscale reconstruction of living brain tissue", *Nature Methods*, pp. 1–10, 2023.

[9] J. Beyer*, **J. Troidl***, S. Boorboor, M. Hadwiger, A. Kaufman, and H. Pfister, "A Survey of Visualization and Analysis in High-Resolution Connectomics", in *Computer Graphics Forum*, Wiley Online Library, vol. 41, 2022, **indicates equal contribution.*

[10] **J. Troidl**, C. Cali, E. Gröller, H. Pfister, M. Hadwiger, and J. Beyer, "Barrio: Customizable Spatial Neighborhood Analysis and Comparison for Nanoscale Brain Structures", *Computer Graphics Forum (Proceedings Eurographics/IEEE Symposium on Visualization, Eurovis 2022*, vol. 41, no. 3, 2022.

[11] P. Rautek, M. Mlejnek, J. Beyer, **J. Troidl**, H. Pfister, T. Theußl, and M. Hadwiger, "Objective Observer-Relative Flow Visualization in Curved Spaces for Unsteady 2D Geophysical Flows", *IEEE Transactions on Visualization and Computer Graphics*, 2020.

Preprints

[1] **J. Troidl**, J. Knittel, W. Li, F. Zhan, H. Pfister*, and S. Turaga*, "Global Neuron Shape Reasoning with Point Affinity Transformers", Preprint, 2024.

[2] **J. Troidl**, Y. Liang, J. Beyer, M. Tavakoli, J. Danzl, M. Hadwiger, H. Pfister, and J. Tompkin, "niiv: Fast Self-supervised Neural Implicit Isotropic Volume Reconstruction", Preprint, 2024, pp. 2024–09.

Teaching

- **(Head) Teaching Fellow** (for Extension School Students) at Harvard University — Fall 2022, 2023, 2024
  CS171 - Visualization
- **Teaching Fellow** for Professional & Executive Education at Harvard University — 2023, 2024
  Data Visualization: Communicating Data and Complex Ideas Visually
- **Teaching Fellow** at TU Wien — Fall 2020
  Selected Chapters from Medical Visualization
- **Teaching Fellow** at TU Wien — Spring 2017, 2018
  Introduction to Visual Computing
- **Teaching Fellow** at TU Wien — Fall 2017
  Introduction to Computer Engineering

Skills

- **Coding:** Python, PyTorch, Java-Script
- **Tools:** GCloud, Unity, QT, CMake, Latex

Scholarships and Awards

- ILW Best Master Thesis Award in informatics for life sciences, German Informatics Society and German Association for Medical Informatics, Biometry and Epidemiology. — 2022
- Best SciVis Paper, IEEE VIS 2020 (among the best 3 papers out of 211 accepted papers) — 2020
- Scholarship, Austrian Marshall Plan Foundation (9.100$) — 2020
- Bachelor with Honors, TU Wien (among the top 5% of CS students at TU Wien) — 2020
- Short-term grant for scientific work abroad, TU Wien (3.100$) — 2020
- Merit Based Scholarship, TU Wien (1.000$) — 2018

Talks

- **Analyzing Intelligence with Human-Centered Computing** at TU Wien, Austria — Summer 2024
  Seminar Talk
- **Neural Implicit Isotropic Volume Reconstruction** at IST Austria — Summer 2024
  Seminar Talk
- **Motif Analysis in Connectomes** at KAUST, Saudi Arabia — Spring 2023
  Seminar Talk
- **The State of the Art in Neural Rendering** at Harvard University — Spring 2023
  Seminar Talk
- **The State of the Art in Connectome Visualization** in Rome, Italy — Summer 2022
  Conference Presentation at EuroVis
- **Visual Neuronal Motif Analysis in Connectomes** in Berlin, Germany — Summer 2022
  Poster Presentation at the International Connectomics Conference

References

- **Hanspeter Pfister**, An Wang Professor of Computer Science, Harvard University
  pfister@g.harvard.edu
- **James Tompkin**, Associate Professor, Brown University
  james_tompkin@brown.edu
- **Srinivas Turaga**, Group Leader, HHMI Janelia
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