

# Hossein Fathollahian

## Data visualization/Scientist/AI Engineer

Computer Science PhD Student  
Electronic Visualization Laboratory  
University of Illinois Chicago, IL  
hfatho2@uic.edu

github.com/Hosseinfatho  
linkedin.com/in/hossein-fathollahian  
Portfolio: hosseinfatho.github.io  
+1 (312) 498-3674

My research focuses on visual analytics for high-dimensional biological and biomedical imaging data, leveraging AI, computer vision, machine learning, and human-centered design to transform complex data into actionable insights. I seek to bridge AI and biomedical discovery through intelligent visualization platforms that help biologists and clinicians explore disease processes, support diagnosis and treatment decisions, and advance drug discovery and delivery.

### SKILLS

|                              |                                                                                                  |
|------------------------------|--------------------------------------------------------------------------------------------------|
| <b>Programming Languages</b> | Python, JavaScript, MATLAB, C++                                                                  |
| <b>Frameworks/Libraries</b>  | PyTorch, TensorFlow, Keras, OpenCV, Pandas, NumPy, SciPy, scikit-learn, Dask, Matplotlib, Plotly |
| <b>Developer Tools</b>       | PyTorch, TensorFlow, Keras, OpenCV, Pandas, NumPy, SciPy, scikit-learn, Dask, Matplotlib, Plotly |
| <b>Communication</b>         | English, Farsi (fluent speaker)                                                                  |

### TECHNICAL EXPERIENCE

**Researcher / ConGAT (3D Region of Interest Discovery in Multiplexed Microscopy Images)** Nov 2025 — Present  
UIC(EVL) (Prof. Saeed Boorboor), (Prof. G. Elisabeta Marai) Chicago, IL

- Self-supervised graph attention for spatial protein interaction analysis.
- Visual computing techniques for early-stage and low-intensity protein interaction detection.
- Interactive 3D visual analytics for biomarker exploration and hypothesis generation.

**Research Collaboration, Visual analytics / BioSet (Interactive Visual Analysis of Biomarker Co-localization)** Dec 2025 — Present  
UIC(EVL)-NYU (Prof. G. Elisabeta Marai), (Prof. Saeed Boorboor), (Prof. Robert Krueger) Chicago, IL

- Automated entropy-driven camera positioning for optimal visual exploration.
- Provenance-aware bookmark lineage and exploration history management.
- Seamless high-resolution image navigation using computer vision techniques.
- Agentic AI-powered report generation and visual storytelling from annotations.

**Researcher, Visualization / Loom (Multi-Region Analysis of Spatial Transcriptomics)** May 2025 — Present  
UIC(EVL) (Prof. G. Elisabeta Marai) Chicago, IL

- Developed trajectory analysis and visualization methods for spatial transcriptomics exploration.
- Designed and refined glyph-based visual encodings for cellular and spatial pattern analysis.
- Implemented multi-resolution and clustering visualizations for scalable exploration of large datasets.

**Researcher, Computational Social Science / AI and Visual Analytics for Digital Communication** Aug 2025 — Present  
UIC(Communication department)(Prof. Zizi Papacharissi) Chicago, IL

- Built data collection and preprocessing pipelines for large-scale social media datasets.
- Developed visual analytics tools to explore communication patterns, engagement, and online discourse.
- Applied AI and machine learning methods to analyze human communication behaviors across digital platforms.

**Visualization-AI Engineer / SAGE (The Edge Computing for Wildfire Detection/ Healthcare/ Discovery)** May 2025 — Aug 2025  
Argonne National Laboratory-(EVL)(Prof. Michael E. Papka) Chicago, IL

- Edge AI pipelines for real-time sensor data analytics.
- Sensor integration and machine learning workflow development.
- Real-time ML model deployment on NVIDIA Jetson devices.

**Software developer / BI-LAVA (Biocuration with Hierarchical Image Labeling )** Jan 2024 — Aug 2024  
UIC(EVL) (Prof. G. Elisabeta Marai) Chicago, IL

- Implemented front-end features for taxonomy exploration, image visualization, and active learning workflows.
- Enhanced backend architecture and Docker-based DevOps infrastructure for reliable deployment and development.
- Accelerated machine learning search and data processing pipelines for large biomedical image repositories.

**Teaching Assistant / C++ (CS211-CS141: Computer Programming practicum)** Jan 2024 — May 2025  
UIC (Prof. Scott Reckinger), (Prof. Mark Hodges) Chicago, IL

- Conducted lab sessions and facilitated active learning in introductory computer science courses.
- Provided programming support and mentorship in C++, debugging, and software development fundamentals.
- Assessed assignments and examinations while promoting student engagement and learning outcomes.

## EDUCATION

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|------------------------------------------------------------------------------|-----------|
| PhD Student in Computer Science, <i>University of Illinois Chicago (UIC)</i> | 2024-2028 |
| Master of Telecommunication Engineering, <i>Shahid Beheshti University</i>   | 2010-2012 |
| Bachelor of Electronics Engineering, <i>Semnan University</i>                | 2006-2010 |

## ACTIVITIES

### Awards - Honors

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|----------------------------------------------------------------------------------------------------------|------|
| Award of Merit – IEEE VIS Bio+MedVis Challenge, <i>Attention-Based ROI Discovery in 3D Tissue Images</i> | 2025 |
| Award of Merit – IEEE VIS Bio+MedVis Challenge, <i>From Peaks to Patterns</i>                            | 2025 |

### Professional Service

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|-------------------------------------------------------------------------------------------------------|-----------|
| Conference Reviewer (17 completed reviews), <i>IEEE VIS, CHI, DIS, IDC, IMX, CogSci, AMCIS</i>        | 2024–2026 |
| Reviewer – IEEE VIS alt.vis, <i>Alternative Visualization and Experimental Visualization Research</i> | 2025      |
| Reviewer – IEEE VIS Short Papers, <i>Visualization Research</i>                                       | 2026      |
| Reviewer – ACM CHI Posters, <i>Human Factors in Computing Systems</i>                                 | 2026      |
| Reviewer – ACM DIS, IDC, IMX, <i>Design, Interaction, and Multimedia Systems Research</i>             | 2026      |
| Reviewer – Cognitive Science and AMCIS, <i>Computational Cognition and Information Systems</i>        | 2026      |

## PUBLICATIONS

1. **Fathollahian, H.**, Zhao, S., Nipu, N., Tang, W., BoorBoor, S., and Marai, G. E. (2026). *ConGAT: A Context-Aware Graph Attention Network for Region-of-Interest Discovery in Multichannel Microscopy Environments*. *Computers & Graphics*, 2026 • Elsevier. [10.1016/j.cag.2026.104728](https://doi.org/10.1016/j.cag.2026.104728)
2. Zhao, S., Nipu, N., **Fathollahian, H.**, Salahudeen, A., Chen, H., Karginova, O., and Marai, G. E. (2026). *Loom: Multi-Region Analysis of Spatial Transcriptomics with Local Neighborhoods and Global Trajectories*. *IEEE Transactions on Visualization and Computer Graphics*.
3. Tayebi, S., Oti, A. S., **Fathollahian, H.**, and Haque, U. (2025). *Mapping War Trauma: A Machine Learning Approach to Predict Mental Health Impacts in Ukraine*. *SSM–Population Health*, 101879. [doi:10.1016/j.ssmph.2025.101879](https://doi.org/10.1016/j.ssmph.2025.101879)
4. **Fathollahian, H.**, Zhao, S., Nipu, N., and Marai, G. E. (2025). *Attention-Based ROI Discovery in 3D Tissue Images*. *IEEE Transactions on Visualization and Computer Graphics (Bio+MedVis Challenge)*, 2–4.
5. **Fathollahian, H.**, and Salahshour, M. (2025). *From Peaks to Patterns*. *IEEE Transactions on Visualization and Computer Graphics (Bio+MedVis Challenge)*, 22–24.
6. Torkamani-Azar, F., Imani, H., and **Fathollahian, H.** (2015). *Video Quality Measurement Based on 3-D Singular Value Decomposition*. *Journal of Visual Communication and Image Representation*, 27, 1–6. [doi:10.1016/j.jvcir.2014.12.004](https://doi.org/10.1016/j.jvcir.2014.12.004)