Hossein Fathollahian

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Summary/Objective

My research advances biomedical data visualization, medical imaging, and brain connectomics, with a focus on mapping neuronal pathways to better understand drug delivery mechanisms and neurological disorders, such as Alzheimer's and Autism. By integrating AI, machine learning, computer vision, and human–computer interaction, I develop powerful analytical and visualization tools that uncover structure in complex biomedical data, supporting more effective scientific and clinical decision-making.
• Software/Web Development • Data Science/Visualization • Computer Vision • Machine Learning

Skills

Programming Languages:
Python, JavaScript, MATLAB, C++, PowerShell, SQL

Frameworks and Libraries:
PyTorch, TensorFlow, Keras, OpenCV, Pillow
Pandas, NumPy, SciPy, scikit-learn, Dask
Seaborn, Matplotlib, Plotly

Developer Tools:
IDE (Visual Studio, PyCharm), Virtualization (Docker, Kubernetes)
WebDev (Flask, D3.js, Three.js, React, Next.js, Node.js, Observable)
Game Development and version control:
Unity, Unreal Engine

Experience

August 2025-August 2026, Researcher

University of Illinois Chicago (EVL)-Department of Communication Chicago, IL

AI-Enhanced Modeling of Human Communication Behaviors (Prof. Zizi Papacharissi)
Contribution: I am pleased to serve in the Department of Communication under the supervision of Professor Zizi Papacharissi. In this role, I support projects that utilize AI and machine learning to enhance our understanding of human communication, integrating computational methods with communication research to identify meaningful patterns in how people interact.

Summer 2025 Researcher

University of Illinois Chicago (EVL)-Argonne National Laboratory Chicago, IL

SAGE Project (Prof. Michael E. Papka)
Contribution: Contributed to the NSF-funded SAGE project in collaboration with Argonne National Laboratory. Developed AI pipelines for sensor data using NVIDIA Jetson edge devices. Focused on real-time data integration and deployment of ML models.

Since Spring 2024, Researcher

University of Illinois Chicago (EVL) Chicago, IL

Bioinformatics Visualization and Visual Analytics (Prof. G. Marai)
Contribution: I contribute to the design and development of visual analytics tools that support the exploration of high-dimensional bioinformatics data, with a focus on spatial transcriptomics. My work integrates visualization, computational analysis, and interactive interfaces to help researchers identify patterns, compare samples, and interpret complex biological mechanisms.

Jan. 2024 - Jun. 2025
(Research Assistant)

University of Illinois Chicago - Graduate Research Assistant Chicago, IL

• **ST Project: Multi-Region Analysis of Spatial Transcriptomics.**
Contribution: I helped design and implement Loom's multi-view and glyph-based visualization framework to support cross-sample analysis and discovery of spatiotemporal gene-expression patterns in spatial transcriptomics.
Tools: Python, R, AI.

• **BI-LAVA: A Visual Analytics and Active Learning System for Biomedical Image Taxonomies.**
Contribution: Developed a Computer vision caption finding and Frontend upgrading.
Tools: Web development, Database, Machine Learning.

• **Camera Best View Positioning for Multidimensional Biomedical Imaging**.
Contribution: Propose and conduct new Algorithm based on 3D Gaussian splatting.
Tools: MATLAB, Python, Deep-Learning.

• **Early stage Axillary Lymph node detection in mammography image**.
Contribution: Leveraging radiomics extraction instead of only segmentation for improving machine learning efficiency .
Tools: MATLAB, Python, Deep Learning, data labeling.

Jan. 2024 - Present
(Teaching Assistant)

University of Illinois, Chicago- Graduate Teaching Assistant Chicago, IL

CS211: Computer Programming practicum (Prof. Scott Reckinger)
CS141: C++ programming (Prof. Mark Hodges)
Duties: Led lab sessions, provided coding assistance, held office hours, graded assignments and exams, and facilitated discussions to reinforce programming concepts and support student learning.

Education

Jan 2024- Expected
Sep 2028 GPA=4.0

PhD. in Computer Science: Chicago, IL, USA
(Visual Computing - Computer Vision - AI/ML)
University of Illinois Chicago (UIC)
Advised by Professor Georgeta-Elisabeta Marai
Research area: My research explores visual computing and AI, leveraging deep learning to analyze complex data. I focus on medical diagnostics, predictive modelling, and biomarker discovery to enhance healthcare innovation.

Graduated
GPA=3.8/4.0

MSc. in Telecommunication Engineering: Tehran, Iran
(Digital Image and Video Processing)
Shahid Beheshti University of Tehran (SBU)
Advised by Professor Farah Torkamani-Azar
Thesis title: Video Compression and Quality Assessment Using Singular Value Decomposition (SVD) for Applications in Computer Vision.

2023-2025

Relevant Coursework:
Algorithm, Data Structure
Artificial Intelligence, Machine Learning, Advanced Natural Language Processing
Advanced Computer Vision, Visual Data Science, Computer Graphics, Human-Computer Interaction(HCI)

Selected Projects

Fall 2025

A Context-Aware GAT Network for ROI Discovery in Multichannel Microscopy Environments."
Developed a web app with deep learning (GAN, Autoencoder) to detect and visualize Melanoma cancer tissue.

Spring 2024

Deep Learning-Based Denoising of Medical Chest X-Rays web application
Developed a web app with deep learning (U-Net, GAN, Autoencoder) to denoise and visualize chest X-rays.

Fall 2024

Interactive 3D Visualization of U.S. Crime Rates Web Application
Developed a 3D web app to visualize U.S. crime data using JavaScript, React, D3.js, and Three.js.

Spring 2024

3D MAZE (Video Game - Unity 3D)
3D Unity game where players navigate a dynamic maze across six cube sides using movement and memory.

Awards & Honours

Award of Merit- Aug 2025

Attention-based ROI Discovery in 3D Tissue Images

Award of Merit, IEEE Vis Biomedical Challenge 2025, Vienna, Austria.
Award of Merit for Abstract paper submissions

Award of Merit- Aug 2025

From Peaks to Patterns

Award of Merit, IEEE Vis Biomedical Challenge 2025, Vienna, Austria.
Award of Merit for Abstract paper submissions

Researcher Reviewer, 2025

Reviewer, ALT.VIS — IEEE VIS 2025 Vienna, Austria

Reviewed submissions for the ALT.VIS
1-track, focusing on creative, experimental, and unconventional visualization approaches.
2-Provided peer-review feedback to ensure the quality, clarity, and originality of contributions to the IEEE VIS community.

Researcher Reviewer, 2026

Reviewer, The Annual ACM Conference on Intelligent User Interfaces Paphos, Cyprus

Reviewed submissions for the IUI:
1- Trustworthy Automated Scientific Discovery with Human Oversight
2-Map4Blind: An Intelligent Interface for Accessible Map Conversion Using Vision-Language Models

Publications

J: journal, C: conference/symposium, W: workshop, UR: Under Review

[J] 2015 Farah Torkamani-Azar, Hassan Imani, **Hossein Fathollahian**. ”Video Quality Measurement Based on 3-D Singular Value Decomposition.” *Journal of Visual Communication and Image Representation*, Volume 27, February 2015, Pages 1–6. doi:10.1016/j.jvcir.2014.12.004.

[J] 2025 Tayebi, Safiyeh, Ayse Sert Oti, **Hossein Fathollahian**, and Ubydul Haque. ” Mapping War Trauma: A Machine Learning Approach to Predict Mental Health Impacts in Ukraine.” *SSM–Population Health*, 2025:101879. doi:10.1016/j.ssmph.2025.101879

[C] 2025 **Hossein Fathollahian**, Siyuan Zhao, Nafiul Nipu, and G. Elisabeta Marai. ”Attention-Based ROI Discovery in 3D Tissue Images.” IEEE Transactions on Visualization and Computer Graphics, Bio+MedVis Challenge, Nov 2025, pages 2-4

[C] 2025 **Hossein Fathollahian**, Marziye Salahshour.” From Peaks to Patterns.” IEEE Transactions on Visualization and Computer Graphics, Bio+MedVis Challenge, Nov 2025, pages 22-24

[UR] 2026 Siyuan Zhao, Nafiul Nipu, **Hossein Fathollahian**, Ameen Salahudeen, Hao Chen, Olga Karginova, and G. Elisabeta Marai. ”Loom: Multi-Region Analysis of Spatial Transcriptomics with Local Neighborhoods and Global Trajectories.”(EuroVis 2026, under review)

[UR] 2026 **Hossein Fathollahian**, Siyuan Zhao, Nafiul Nipu, Wei Tang, Saeed BoorBoor, and G. Elisabeta Marai. ”ConGAT: A Context-Aware Graph Attention Network for Region-of-Interest Discovery in Multichannel Microscopy Environments.” (ICHI 2026, under review)