Kazi Tasnim Zinat

Email: kzintas@umd.edu | LinkedIn | GitHub | Website | College Park, MD

Over five years of experience in complex sequential data analysis using machine learning and visual analytics. Designed and implemented LLM-powered systems for structured knowledge extraction, and neural network architectures for causal inference. Developed domain-specific benchmarks to evaluate Multimodal Language Models. Experienced with Python, PyTorch, AutoGen, React, D3.js, scikit-learn, LlamaIndex and HPC cluster.

Education

University of Maryland, College Park — College Park, MD
Ph.D. Candidate in Computer Science (Advisor: Leo Zhicheng Liu) — *Aug 2019 – Present*
Thesis: Beyond Domain Boundaries: Enhancing Generalizability of Event Sequence Visual Analytics Research

University of Maryland, College Park — College Park, MD
Master of Science in Computer Science; GPA: 3.97/4 — *Aug 2019 – 2024*

Bangladesh University of Engineering & Technology — Dhaka, Bangladesh
***Bachelor of Science in Computer Science and Engineering**; GPA: 3.71/4* — *Feb. 2013 – Sept. 2017*

Selected Publications

Conference Papers

P1. *ProcVQA: Benchmarking VLM Performance on Mined Process Visualizations* (2025).
K.T. Zinat, S.M. Abrar, S. Saha, S. Duppala, S.N. Sakhamuri, Z. Liu. **EMNLP** Findings.

P2. *Uncovering Causal Relation Shifts in Event Sequences under Out-of-Domain Interventions* (2025).
K.T. Zinat, Y. Zhou, X. Lyu, Y. Wang, P. Xu. **ICANN**.

P3. *A Multi-Level Task Framework for Event Sequence Analysis* (2024).
K.T. Zinat, S.N. Sakhamuri, A.S. Chen, Z. Liu. IEEE **VIS** (TVCG).

P4. *A Comparative Evaluation of Visual Summarization Techniques for Event Sequences* (2023).
K.T. Zinat, J. Yang, A. Gandhi, N. Mitra, Z. Liu. **EuroVis** (Computer Graphics Forum).

P5. *Comparing Native and Non-native English Speakers' Behaviors in Collaborative Writing* (2025).
Y. Chen, Y. Xiao, **K.T. Zinat**, N. Yamashita, G. Gao, Z. Liu. ACM **CHI**.

Workshop Papers

W1. *Evaluating VLMs as Accessibility Bridges for Process Visualizations* (2025).
K.T. Zinat, S.M. Abrar, S. Duppala, S.N. Sakhamuri, Z. Liu. **CVPR** VizWiz Grand Challenge Workshop .

W2. *Comparing Native and Non-native English Speakers' Behaviors* (2025).
Y. Chen, Y. Xiao, **K.T. Zinat**, N. Yamashita, G. Gao, Z. Liu. **NAACL** In2Writing Workshop.

Full list available at Google Scholar.

Experience

Applied Science Research Intern - Machine Learning — Summer 2022, 2023
Amazon Web Services (AWS) - Bedrock Generative AI & ML Solutions Lab — *Santa Clara, CA*

- Derived theoretical proofs and implemented counterfactual treatment effect estimator with propensity score matching for detecting causal relation shifts under interventions
- Validated framework on healthcare and industrial maintenance logs, confirming findings against medical literature

Graduate Research Assistant - Human Computer Interaction — Spring 2021 – Present
University of Maryland (Human-Data Interaction Lab) — *College Park, MD*

- Designed and curated ProcVQA benchmark, for evaluating vision-language models on process visualizations, revealing key failure modes in reasoning and information extraction.
- Developed domain-agnostic frameworks (multi-level taxonomy) for analyzing event sequences across healthcare, industrial, and collaborative writing data.

- Conducted large-scale human studies to evaluate visual summarization techniques, uncovering accuracy–efficiency tradeoffs and design implications.

Graduate Research Assistant - Bioinformatics Fall 2019 – Summer 2020
University of Maryland (HCBravo Lab) *College Park, MD*

- Co-authored scTreeViz BioConductor package for interactive single-cell RNA-seq analysis with hierarchy
- Implemented clustering methodology and PCA-based dimensionality reduction for genomic data visualization

Research Projects

Human-in-the-Loop Multi-Agent Event Sequence Analysis | *AutoGen, LangChain, Conversational AI* 2025
- Designing multi-agent orchestration system with specialized LLM-based agents (Planning, Coding) for translating analysis objectives into executable workflows using AutoGen framework
- Developing framework mapping system linking research questions to 4-level taxonomy
- Integrating tool-augmented LLM agents with Python execution for automatic code generation and analysis

Event Sequence Knowledge Base | *RAG, Document AI, LlamaIndex, Docling, FastAPI, React, Pydantic* 2025
- Building document processing pipeline converting 100+ research papers to structured knowledge base using
- Engineering automated extraction framework with Pydantic models to capture analysis and dataset information
- Implementing hybrid retrieval architecture combining BM25 and vector embeddings for domain-specific queries

ProcVQA: VLM Benchmark for Process Visualizations (P1, W1) | *VLM, Multi-modal AI, Benchmark* 2024-25
- Created benchmark evaluating 19 VLMs on 118 process charts with 2.5k+ ground truth pairs
- Identified failure modes: 30% performance drop from single-hop to multi-hop reasoning, edge-value hallucinations
- Pioneered quantitative information density metrics revealing accuracy degradation when charts exceed 20 nodes

Causal Inference Framework for Event Sequences (P2) | *PyTorch, Transformer, CNN, Temporal Modelling* 2022-24
- Developed out-of-domain intervention framework extending Rubin's causal model to temporal point processes
- Engineered hybrid Transformer-CNN with multi-headed attention for capturing temporal dependencies
- Achieved 88% RMSE reduction and 90% MAE reduction on industrial maintenance logs

Multi-Level Task Framework for Event Sequence Analysis (P3) | *Qualitative Analysis, Open and Axial Coding* 2023-24
- Developed domain-agnostic framework analyzing 58 visualization systems across 16 venues
- Created 4-level taxonomy (6 objectives, 5 intents, 15+ strategies) with action-input-output-criteria quartets
- Established theoretical foundation for intelligent assistance tools and executable benchmarks

Visual Summarization Technique Benchmarking (P4) | *Crowdsourcing, Python, React, Mixed-Effect Model* EuroVis 2023
- Conducted controlled experiment: 108 visual summaries, 180+ participants, 1,620 observations across 6 datasets
- Reimplemented 3 techniques (CoreFlow, SentenTree, Sequence Synopsis) with standardized encoding
- Identified accuracy-efficiency tradeoff: Technique achieving highest quality required longerst time

Technical Skills

Languages: Python, JavaScript, Java, R, C++
AI/ML: PyTorch, Transformers, HuggingFace, scikit-learn, AutoGen, LlamaIndex, Neural Networks
Web Development: React, FastAPI, HTML5/CSS3, Node.js
Data Visualization: D3.js, Tableau, Plotly, Leaflet.js, React

Relevant Coursework

Graduate (UMD): Multimodal Foundation Models, Deep Learning, Foundations of Deep Learning, Causal Inference and Evaluation Methods, Computational Linguistics, Information Visualization, Interactive Data Analytics, Advanced Numerical Optimization, Algorithms for High-Throughput Genomics
Undergraduate (BUET): Data Structures, Algorithms, Artificial Intelligence, Machine Learning, Software Engineering, Computer Graphics

Selected Achievements & Service

C**onference Reviewer**: IEEE VIS (2023, 2025), EuroVis (2025), ACM CHI (2025), PacificVis (2025); received "Highly Useful" recognition at IEEE VIS, PacificVis, EuroVis

Grants & Fellowships: AWS Cloud Credit for Research ($5000, 2023), Jacob K. Goldhaber Travel Grant (2023), Grace Hopper Celebration (GHC) Student Scholar (2023), Dean's Fellowship (UMD, 2019–2020)

Teaching: Served as Teaching Assistant for 7 courses, including Information Visualization, Programming Languages, Bioinformatics Algorithms, and Web Development