

Abdul Rahman Shaikh

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AREA OF EXPERTISE

Ph.D. candidate in Computer Science working at the intersection of artificial intelligence, multimodal learning, and human-centered systems. My research investigates transformer-based and LLM-driven approaches for scalable, interpretable, and interactive AI systems, with applications spanning visual analytics and data-driven decision-making. I have led multiple peer-reviewed publications and mentored student researchers, contributing both methodological innovations and deployable research prototypes.

EDUCATION

Northern Illinois University <i>Ph.D. Computer Science (GPA: 3.9)</i>	Dekalb, IL <i>Aug 2020 - Present</i>
Northern Illinois University <i>M.S. Computer Science (GPA: 3.9)</i> <i>Thesis: Modeling the Broader Impact of Science and Health Using Social Media</i>	Dekalb, IL <i>Jan 2018 - May 2020</i>
Osmania University <i>B.E. Computer Science (GPA: 3.6)</i>	Hyderabad, India <i>Aug 2013 - Aug 2017</i>

EXPERIENCE

Researcher (DATA Lab, VA Lab & WASTE Lab) <i>Northern Illinois University</i>	Dekalb, IL <i>Jan 2018 - present</i>
<ul style="list-style-type: none">Built LLM-powered analytical pipelines for reasoning, extraction, and multimodal analysis; improved task accuracy and response consistency through prompt design, retrieval, and evaluation-driven iteration.Architected and deployed an LLM-assisted cross-view visualization framework that reduced data exploration time by 35% and increased insight discovery by 45% in controlled user studies (25+ participants).Developed production-grade computer vision pipelines with ViT, SAM, and diffusion-based augmentation for classification and semantic segmentation, improving robustness across heterogeneous imagery datasets.Applied multimodal representation learning (CLIP embeddings, transformer encoders, and topic modeling) to surface themes and clusters in large-scale datasets, enabling faster exploratory analysis and downstream modeling.Fine-tuned open-source LLMs with LoRA adapters, cutting GPU memory usage by 60% and training time by 45% while maintaining strong domain-task performance on held-out evaluation sets.Designed multi-agent automation workflows (LangChain, AutoGen/crewAI, Flowise, n8n) to orchestrate retrieval, synthesis, and QA, reducing literature review and summarization turnaround time by 50%+.Optimized GenAI pipelines for real-time captioning, reasoning, and topic discovery across 300K+ social media images, delivering public-health trend insights with scalable indexing and vector search.Mentored 5 graduate researchers, delivering a 100% project completion rate and co-authoring 4 research papers through structured milestones, code reviews, and experiment design guidance.	
Teaching Assistant (Algorithms, Databases, C/C++, & JAVA) <i>Northern Illinois University</i>	Dekalb, IL <i>Aug 2018 - May 2023</i>
<ul style="list-style-type: none">Provided academic support to over 70 students, facilitating a deeper understanding of algorithms, C/C++ programming concepts, memory management, data structures, and SQL database management.Evaluated assignments emphasizing efficient algorithm design, optimized database queries, and real-world problem-solving in C++ and SQL, ensuring alignment with industry standards.Conducted weekly sessions and personalized mentoring, improving students' problem-solving abilities and leading to a 20% increase in class performance metrics.	

- Implemented SQL and MongoDB pipelines to optimize data querying for performance bottlenecks, reducing database query latency by 30%.
- Utilized Python libraries (Pandas, NumPy, Scikit-learn) to perform detailed data cleansing, exploratory analysis, and quality assurance, significantly enhancing the reliability of critical datasets.
- Collaborated with cross-functional development teams to provide actionable, data-driven insights that improved database system performance and streamlined operations.

PUBLICATIONS

Published

- **A. R. Shaikh**, M. Sun, X. Liu, H. Alhoori, J. Zhao, and D. Koop, “iTrace: Interactive Tracing of Cross-View Data Relationships”, *Graphics Interface 2025*. [doi: 10.48550/arXiv.2505.23079]
- **A. R. Shaikh**, H. Alhoori, and M. Sun, “YouTube and Science: Models for Research Impact,” *Journal of Scientometrics*, 2022. [doi: 10.1007/s11192-022-04574-5]
- **A. R. Shaikh**, M. Sun, and H. Alhoori, “Toward systematic design considerations of organizing multiple views”, *IEEE Visualization and Visual Analytics (VIS)*, 2022. [doi: 10.1109/VIS54862.2022.00030]
- M. Rezaei, M. R. Moghadam **A. R. Shaikh**, H. Alhoori, and R. Freedman, “Generation, Evaluation, and Explanation of Novelists’ Styles with Single-Token Prompts,” *ACM/IEEE Joint Conference on Digital Libraries, JCDL, Dec 15-19, 2025*. [doi:10.48550/arXiv.2511.20459]
- M. J. Mokarrama, **A. R. Shaikh**, and H. Alhoori, “Examining the Representation of Youth in the US Policy Documents through the Lens of Research,” in 2024 IEEE International Conference on Big Data, Washington, USA, Dec 15-18, 2024. [doi: 10.1109/BigData62323.2024.10825996]
- M. Sun, **A. R. Shaikh**, Y. Ma, D. Koop, and H. Alhoori “Boundary Blending: Reconsidering the Design of Multi-View Visualizations” 2023. [doi: 10.48550/arXiv.2306.09812]
- M. Sun, **A. R. Shaikh**, H. Alhoori, and J. Zhao, “SightBi: Exploring Cross-View Data Relationships with Biclusters,” *IEEE Transactions on Visualization and Computer Graphics*, vol. 28, no. 1, 2022. (Proceedings of IEEE VIS 2021). [doi: 10.1109/TVCG.2021.3114801] **Best Paper Honorable Mention**.
- M. Shahzad, H. Alhoori, Reva Freedman, and **A. R. Shaikh**, “Quantifying the online long-term interest in research,” *Journal of Informetrics*, 2022. [doi: 10.1016/j.joi.2022.101288]
- **A. R. Shaikh** and H. Alhoori, “Predicting Patent Citations to measure Economic Impact of Scholarly Research,” in Proceedings of ACM/IEEE Joint Conference on Digital Libraries (JCDL), Champaign, Illinois, USA, June 2-6, 2019. [doi: 10.1109/JCDL.2019.00089]
- **A. R. Shaikh**, “Modeling the Broader Impact of Science and Health Using Social Media,” Master’s thesis. [link]

Under Review

- M. Sun, **A. R. Shaikh**, Y. Ma, D. Koop, and H. Alhoori, “Toward the Design of Transformative Multiple-View Visualizations”. PacificVis2026
- N. Vooda, M. Uddin, **A. R. Shaikh**, M. Karasani, M. Hughes and M. Vaezi, “USS-Water Dataset and U-Net+ Model: A Novel High-Resolution Satellite Imagery Approach for Surface Water Detection in the United States”. PLOS Water Journal

In Progress

- **A. R. Shaikh**, H. Alhoori, M. Sun, and M. Shahzad, “Health Conversations on Instagram: A Comparative Study of Textual and Visual Content”. Target Conference: ICCV 2026,
- **A. R. Shaikh**, M. Sun, and H. Alhoori, “Boundary Blending: Transforming the Design of Multiple View Visualizations”. Target Conference: IEEEVIS 2026
- **A. R. Shaikh**, M. Ambati, M. Uddin, and M. Vaezi, “Building Classification: A Comprehensive Dataset and DenseNet201-Based Approach”. Target Journal: Remote Sensing of Environment
- M. Karasani, **A. R. Shaikh**, M. Uddin, and M. Vaezi, “Machine-Learning-Based County-Level Prediction of Municipal Solid Waste in the United States with Socioeconomic and Demographic Integration”. Target Journal: Waste Management & Research: The Journal for a Sustainable Circular Economy (WM&R)
- **A. R. Shaikh**, H. Alhoori, and M. Sun, “From Video to Paper: Unraveling the Connection Between YouTube Narratives and Scholarly Research via LLMs”. Target Journal: Scientometrics

PROJECTS

- GenHealth: Multimodal Medical Report Analysis** 📄Code | *Transformers, FastAPI* May 2025 – July 2025
- GenHealth is a multimodal AI system that combines text processing, medical imaging analysis, and structured data integration to boost diagnostic extraction accuracy from medical reports.
- Rufus: Intelligent Web Data Extraction for LLMs** 📄Code | *RAG, Selenium* Jan 2025 – Mar 2025
- Developed an AI-powered web crawler that extracts and synthesizes relevant content into structured documents for Retrieval-Augmented Generation (RAG) systems.
- LLMFlow: AI-Powered Summarization of Scholarly Documents** 📄Code | *LangChain* Jun 2024 – Dec 2024
- Integrated GPT, Claude and Llama with LangChain to generate concise summaries of large-scale research documents, reducing academic reading time.
- MixArt: Generative Artwork with Stable Diffusion** 📄Code | *Stable Diffusion, LoRA* Jan 2024 – July 2024
- Developed a pipeline for generating abstract and photorealistic art using Stable Diffusion, leveraging LoRA fine-tuning to personalize outputs for user-requested styles.
- VoxCore: Voice Authentication System** 📄Code | *Python, Whisper, PyTorch* June 2023 – Sep 2023
- Implemented a voice authentication system using OpenAI's Whisper for transcription and custom PyTorch models for speaker verification, achieving 89% accuracy in multi-speaker environments.
- InstaHealth: Fine-Tuning Caption Generation for Instagram Posts** 📄Code | *CV* Aug. 2022 – Dec 2022
- Fine-tuned a language model to generate context-aware captions for health-related content on Instagram data, automating large-scale social media captioning.
- Semantic Segmentation with SAM & Custom U-Net** | *Python, CV* Jan 2021 – May 2021
- Integrated the Segment Anything Model (SAM) with a custom U-Net architecture to achieve semantic segmentation on high-resolution aerial images.
- TweeTopics: Uncovering Patterns with BERT and LDA** | *Python, BERT, LDA* Aug. 2020 – Dec. 2020
- Implemented BERT and LDA for deep learning text and topic modeling, employing unsupervised learning algorithms to analyze social discourse dynamics on Twitter.
- Urban Pedals: Visualizing BikeShare Dynamics in Chicago** | *Python, R, Tableau* Jan. 2019 – July 2019
- Utilized Pandas, R for data analysis, and Tableau, JavaScript for visualizations, applying clustering algorithms and time-series analysis to uncover patterns in Chicago's BikeShare system, revealing urban transportation patterns.
- Predicting popularity using Altmetric** | *Python, ScikitLearn, API (Altmetric)* Jan. 2018 – May 2018
- Employed ScikitLearn and Python for predictive modeling using regression algorithms and decision trees to forecast future citation counts of scholarly articles using Altmetric data, identifying early impactful research.

INVITED TALKS & PRESENTATIONS

- **Fluid Multi-View Analytics: Generative Multi View Systems**, *DePaul University CDM*, Chicago, 2025.
- **iTrace: Interactive Tracing of Cross-View Data Relationships**, *University of British Columbia*, BC, 2025.
- **MSW Predictive Modeling: A comprehensive approach**, *CEET Innovation Showcase*, DeKalb, 2024
- **Multi-Class Building Classification**, *IIN Sustainability Research Conference*, Chicago, 2024
- **Utilizing Multiple Views to analyze data**, *Northern Illinois University, CSCI 658*, DeKalb, 2023.
- **Toward Systematic Design Considerations of Organizing Multiple Views**, *IEEE VIS conference*, 2022
- **Exploring COVID data using Instagram Images**, *Northern Illinois University, CSCI 656*, DeKalb, 2022.
- **Modeling the Broader Impact of Science**, *Northern Illinois University, CSCI 600*, DeKalb, 2022.
- **Organizing layout of Multiple View systems**, *Northern Illinois University, CSCI 628*, DeKalb, 2021.
- **Cross-Device interaction to explore 3D Vis**, *Northern Illinois University, CSCI 626*, DeKalb, 2021.
- **Predicting Patent Citations to measure Economic Impact**, *JCDL 2019*, Urbana-Champaign, 2019.
- **Visualizing BikeShare Dynamics in Chicago**, *Northern Illinois University, CSCI 627*, DeKalb, 2019.

HONORS & AWARDS

- **Best Paper Honorable Mention**, *IEEE VIS*, 2022
- **Society Involvement Award**, *Honor Society*, 2020
- **Community Service Award**, DeKalb, 2019

LEADERSHIP

- **Lab Head**, *Visual Analytics Lab*, NIU, DeKalb, 2020 - present
- **Mentor**, *WASTE Lab*, NIU, DeKalb, 2024 - 2025
- **Chief Coordinator**, *Computer Society of MJCET*, Hyderabad, 2017
- **Leader – Web/Graphic Design Head**, *Entrepreneurship Cell, MJCET*, 2016
- **Lead Developer**, *College's Annual Technical Fest Website (Adsophos)*, 2015

SERVICES

Program Committee Member

- CIKM 2025
- WWW 2026
- JCDL 2025
- CIKM 2024
- CIKM 2023

Reviewer

- Scientometrics Journal
- Frontier of Psychology
- New Media & Society
- PacificVis
- WebSci
- PLOS ONE

Professional Memberships

- IEEE
- ACM

SKILLS

Programming: Python, Java, C/C++, JavaScript/TypeScript, SQL, R, HTML/CSS, LaTeX

ML & CV: PyTorch, TensorFlow/Keras, Hugging Face, Scikit-learn, XGBoost/LightGBM, OpenCV, ViT, CLIP, SAM

GenAI & LLM: RAG, prompt engineering, tool/function calling, embeddings, LoRA/QLoRA (PEFT), quantization; OpenAI/Anthropic/Google APIs; LLaMA, Mixtral, Vicuna; Whisper; Stable Diffusion/DreamBooth

Agents & Orchestration: LangChain, LangGraph, AutoGen, CrewAI, ReAct, n8n, Flowise, LlamaIndex

Retrieval & Data: FAISS, ANN indexing, hybrid search (BM25+dense), reranking; PostgreSQL, MongoDB, Redis, Snowflake, BigQuery, Kafka

Evaluation & Observability: A/B testing, SHAP/LIME; hallucination/bias testing, golden sets; Ragas/TruLens/DeepEval, LangSmith

MLOps & Deployment: Docker, Kubernetes, FastAPI, MLflow, Weights & Biases, DVC, Git/GitHub Actions, CI/CD, model versioning, inference optimization

Visualization: Pandas, NumPy, Matplotlib, Seaborn, Plotly, Streamlit/Dash, Tableau/Power BI, D3.js