

Abdul Rahman Shaikh

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AREA OF EXPERTISE

Ph.D. candidate in Computer Science with 7+ years of experience in machine learning, computer vision, and generative AI. Specialized in transformer architectures, multimodal learning, and LLM-driven applications. Proven track record in publishing research, mentoring teams, and delivering scalable AI systems with PyTorch, TensorFlow, Hugging Face, and LangChain. Skilled in translating cutting-edge research into real-world, production-grade solutions. Proficient in Python, Java, JavaScript, R, and C/C++.

EDUCATION

Northern Illinois University <i>Ph.D. Computer Science (GPA: 3.9)</i> <i>Dissertation: Systematic Exploration of Coordinated Data Relationships Using Bicluster</i>	Dekalb, IL Aug 2020 - Aug 2025
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 Jan 2018 - May 2020
Osmania University <i>B.E. Computer Science (GPA: 3.6)</i>	Hyderabad, India Aug 2013 - Aug 2017

EXPERIENCE

Researcher (DATA Lab, VA Lab & WASTE Lab) <i>Northern Illinois University</i>	Dekalb, IL Jan 2018 - present
<ul style="list-style-type: none">Engineered and fine-tuned large language models (LLMs) like GPT-4 Turbo, Claude-3, and Mixtral-8x7B into high-performance analytical pipelines, improving natural language reasoning and multimodal analysis accuracy.Architected and deployed an innovative cross-view visualization framework powered by LLMs, reducing data exploration time by 35% and improving insight discovery rates by 45% across user studies with 25+ participants.Developed production-ready computer vision solutions using Vision Transformers (ViT), SAM, and diffusion models, achieving significant gains in image classification and semantic segmentation tasks across diverse datasets.Applied advanced multimodal learning strategies including CLIP-based vectorization, GPT embeddings, and BERT-LDA hybrid models to uncover hidden patterns in large-scale datasets.Implemented LoRA-adapted LLMs combined with CLIP and SAM embeddings to enable domain-specific captioning, multimodal retrieval, and visual question answering with over 91% accuracy at scale.Designed multi-agent automation workflows using n8n, LangChain, crewAI, Flowise, and AutoGen, reducing research review and summarization turnaround time by over 50%.Optimized GenAI pipelines for real-time captioning, reasoning, and topic discovery across 100K+ social media images, delivering actionable insights for public health trend analysis.Mentored and supervised 5 graduate students, resulting in 100% project completion rate and 3 research papers, while maintaining an innovative and collaborative research environment.	
Teaching Assistant (Databases, C/C++, & JAVA) <i>Northern Illinois University</i>	Dekalb, IL Aug 2018 - May 2020
<ul style="list-style-type: none">Provided academic support to over 70 students, facilitating a deeper understanding of C/C++ programming concepts, including pointers, 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. 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. 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]
- **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]
- 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]
- 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]
- **A. R. Shaikh**, “Modeling the Broader Impact of Science and Health Using Social Media,” Master’s thesis. [link]

Under Review

- **A. R. Shaikh**, H. Alhoori, M. Sun, and M. Shahzad, “Health Conversations on Instagram: A Comparative Study of Textual and Visual Content”.
- **A. R. Shaikh**, M. Ambati, M. Uddin, and M. Vaezi, “Building Classification: A Comprehensive Dataset and DenseNet201-Based Approach”.
- M. Karasani, **A. R. Shaikh**, M. Uddin, and M. Vaezi, “Deep Learning Models for MSW Prediction: A Comparative Analysis”.
- 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”.

In Progress

- **A. R. Shaikh**, H. Alhoori, and M. Sun, “LLM4MV: Cross-View Data Exploration with Large Language Models”.
- **A. R. Shaikh**, H. Alhoori, and M. Sun, “From Video to Paper: Unraveling the Connection Between YouTube Narratives and Scholarly Research via LLMs”.
- M. Rezaei, **A. R. Shaikh**, H. Alhoori, and R. Freedman, “Generating and Evaluating Writing Style of Different Authors using LoRA, QLoRA & DoRA”.
- M. Sun, **A. R. Shaikh**, Y. Ma, D. Koop, and H. Alhoori, “Toward the Design of Transformative Multiple-View Visualizations”.

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
- **Chief Coordinator**, *Computer Society of MJCT*, Hyderabad, 2017
- **Leader – Web/Graphic Design Head**, *Entrepreneurship Cell, MJCT*, 2016
- **Lead Developer**, *College's Annual Technical Fest Website (Adsophos)*, 2015

SERVICES

Program Committee Member

- CIKM 2025
- CIKM 2024
- CIKM 2023

Reviewer

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

Professional Memberships

- IEEE
- ACM

SKILLS

Programming Languages: Python, R, Java, C++, C, JavaScript, TypeScript, SQL, HTML5, CSS3, LaTeX

AI/ML Frameworks: PyTorch, TensorFlow, Keras, Hugging Face, Scikit-learn, XGBoost, LightGBM, FastAI, OpenCV, SpaCy, CNNs, ViT, CLIP, SAM

Gen AI & LLMs: GPT-4, Claude 3, Gemini, Mixtral, GPT-4V, LLaMA, Vicuna, Stable Diffusion, DreamBooth, DALL-E, Whisper, RAG, LoRA, QLoRA, PEFT

Multi-Agent Systems & LLM Tools: LangChain, LangGraph, AutoGen, CrewAI, ReAct, n8n, Flowise, AgentGPT

Data Science & Vis: Pandas, NumPy, Matplotlib, Seaborn, Plotly, SHAP, LIME, Streamlit, Dash, Tableau, Power BI

Cloud, MLOps & DevOps: AWS, Azure, Docker, Kubernetes, MLflow, Airflow, Terraform

Databases: PostgreSQL, MySQL, MongoDB, SQLite, Redis, Snowflake, BigQuery, Apache Kafka

Web & API Dev: React.js, Next.js, Node.js, Express.js, Flask, FastAPI, Django, D3.js, Tailwind CSS, REST APIs