Abdul Rahman Shaikh

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Area of Expertise

As a Ph.D. candidate in Computer Science, I specialize in Machine Learning, Large Language Models (LLMs), Computer Vision, and Visual Analytics. My research includes designing and implementing advanced systems, including transformer-based architectures for visual question answering, fine-tuned LLMs for domain-specific applications, and predictive modeling solutions. Proficient in Python, Java, JavaScript, R, and C/C++, I architect and implement AI techniques to solve complex challenges.

Education

Northern Illinois University Dekalb, IL
Ph.D. Computer Science *Aug 2020 - May 2025*

Northern Illinois University Dekalb, IL
M.S. Computer Science *Jan 2018 - May 2020*

Osmania University Hyderabad, India
B.E. Computer Science *Aug 2013 - Aug 2017*

Experience

Researcher (DATA Lab, VA Lab & WASTE Lab) Jan 2018 - present
Northern Illinois University *Dekalb, IL*

- Led the design of advanced ML pipelines using Vision Transformers, Diffusion Models, and Mixtral-8x7B, GPT-4V, and Claude-3, driving breakthroughs in predictive modeling and generative AI.
- 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.
- Launched a scalable visual analytics platform that significantly streamlined data analysis, ultimately resulting in two IEEE VIS publications.
- Developed domain-specific applications using Hugging Face Transformers and LoRA fine-tuning for image captioning and contextual text generation, enhancing model accuracy on specialized datasets.
- Implemented cutting-edge algorithms like CLIP, SAM, and GPT for tasks ranging from semantic segmentation to domain-specific text generation.
- Pioneered an image captioning system using fine-tuned foundation models and advanced prompt engineering, processing 100K+ social media images with 91% accuracy in health-related content classification.
- Performed multimodal topic modeling using CLIP-based encodings, GPT-based vectorizations, LDA, and BERT to uncover emerging health themes in Instagram data, providing fresh insights into social media trends.
- 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 (CSCI 240 & CSCI 466) Aug 2018 - May 2020
Northern Illinois University *Dekalb, IL*

- 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.
- Designed and 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.

Quality Specialist Sep 2017 - Dec 2017

Amazon *Hyderabad, India*

- 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**, 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.
- **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**, M. Sun, H. Alhoori, J. Zhao, and D. Koop, "iTrace: Interactive Tracing of Cross-View Data Relationships". Conference: EuroVis 2025.
- **A. R. Shaikh**, H. Alhoori, M. Sun, and M. Shahzad, "Health Conversations on Instagram: A Comparative Study of Textual and Visual Content". Conference: WebSci 2025.
- 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". Journal: Remote Sensing Applications: Society and Environment.

In Progress

- **A. R. Shaikh**, H. Alhoori, and M. Sun, "LLM4MV: Enabling Cross-View Data Visualization 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".
- **A. R. Shaikh**, M. Ambati, M. Uddin, and M. Vaezi, "Building Classification: A Comprehensive Dataset and DenseNet201-Based Approach".
- **A. R. Shaikh**, H. Alhoori, M. Sun, M. Shahzad, "The Visual Pandemic: Captioning Instagram's Health Narratives through COVID-19 and Beyond."
- M. Karasani, **A. R. Shaikh**, M. Uddin, and M. Vaezi, "Deep Learning Models for MSW Prediction: A Comparative Analysis".
- M. Sun, **A. R. Shaikh**, Y. Ma, D. Koop, and H. Alhoori, "Toward the Design of Transformative Multiple-View Visualizations".

Projects

LLMFlow: AI-Powered Summarization of Scholarly Documents | *Python, 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 | *Python, 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 | *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 | *Python, 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.

SignDecoder: Real-Time Prediction of Sign Language via AI | *Python, CV* Aug. 2019 – Dec. 2019
- Created a real-time sign language prediction platform with Keras, PyTorch, and OpenCV, using CNNs and long short-term memory (LSTM) networks for facilitating communication for the hearing-impaired.

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.

WashAway: Your Laundry Attendant App | *AndroidStudio, Java* May. 2016 – Mar 2017
- Developed a mobile-first laundry service platform connecting users with local providers via real-time tracking, secure payment processing, and automated scheduling.

Invited Talks & Presentations

- **MSW Predictive Modeling: A comprehensive approach**, *CEET Innovation Showcase*, DeKalb, 2024
- **Multi-Class Building Classification**, *IIN Sustainability Research Conference*, Chicago, 2024
- **Toward Systematic Design Considerations of Organizing Multiple Views**, *IEEE VIS* conference, 2022
- **Predicting Patent Citations to measure Economic Impact**, *JCDL 2019*, Urbana-Champaign, 2019.
- **Utilizing Multiple Views to analyze data**, *Northern Illinois University, CSCI 658*, DeKalb, 2023.
- **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.
- **Visualizing BikeShare Dynamics in Chicago**, *Northern Illinois University, CSCI 627*, DeKalb, 2019.

Honors & Awards

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

Leadership

- **Lab Head**, *Visual Analytics Lab*, NIU, DeKalb, *2020 - present*
- **Mentor**, WASTE Lab, NIU, DeKalb, 2024
- **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 2023
- CIKM 2024

Reviewer

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

Professional Memberships

- IEEE
- ACM

Skills

Languages: Python, R, JavaScript, C, C++, Java, HTML/CSS, LaTex
ML Tools: TensorFlow, PyTorch, Keras, OpenCV, Scikit-learn, SHAP, Transformers, HuggingFace, MLlib
Data Science: Pandas, NumPy, Matplotlib, Seaborn, Plotly, LDA, BERT, SpaCy, SHAP
Web Development: React, Node.js, Express.js, D3.js, REST APIs
Databases:MySQL, MongoDB, PostgreSQL, SQLite
DevOps & Version Control: Git/GitHub, CI/CD Pipelines, Jenkins