Ibrahim Al Azher

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Area of Expertise

My research goal is to make scientific articles more reliable, robust, reproducible, and transparent to the researchers, reviewers, and policymakers by extracting, generating Limitations and future goals, and making interpretable models. My work also incorporates visual and textual Large Language Models (LLMs), LLM Agents, Retrieval Augmented Generation (RAG), and Graph. My work digs deep into collaborative multi-agent LLM frameworks to generate meaningful text, multimodal LLM (images & texts) in scientific articles, and robust evaluation framework for LLM & RAG. Besides the scientific article domain, my work spans software code vulnerability detection, healthcare patient analysis with LLM, and Bank fraud detection with Federated Learning and Graph Neural Networks.

Education

Northern Illinois University Dekalb, IL
PhD Computer Science; GPA: 3.73 *August 2023 -*

Northern Illinois University Dekalb, IL
M.S Computer Science; GPA: 3.70 *August 2023 - May 2025*

Shahjalal University of Science and Technology Sylhet, Bangladesh
B.Sc. Computer Science; GPA: 3.69 *March 2016 - March 2021*

Experience

Research Assistant May 2025-Aug 2025
Northern Illinois University *Dekalb, IL*

- Limitation generation of scientific article with multiple LLM Agents and RAG
- Bank Fraud Detection with Federated Learning and Graph Neural Network

Teaching Assistant Aug 2024-May 2025
Northern Illinois University *Dekalb, IL*

- Worked as teaching assistant in CSCI 340 (Data Structures and Algorithm Analysis)
- Conducting weekly lab sessions, office hours, one-to-one sessions, and grading for over 30 students, facilitating hands-on exercises in Data structures and Algorithms.

Research Assistant May 2024-Aug 2024
Northern Illinois University *Dekalb, IL*

- Published paper 'LimTopic: LLM-based topic modeling and text summarization with scientific articles' limitation'.
- LLM for code vulnerability detection, image analysis with large vision language models
- Contributed to the research, publishing papers, and writing of an NSF grant proposal.

Teaching Assistant Aug 2023-May 2024
Northern Illinois University *Dekalb, IL*

- Worked as teaching assistant in CSCI 241 (C++). Conducting weekly lab sessions, office hours, and one-to-one sessions.

Software Engineer June 2021 - Feb 2022
BYSL Global Technology Group *Dhaka, Bangladesh*

- Works on scalable projects from design to coding, testing, and installation using Python, XML, Javascript, PostgreSQL, and jQuery in Linux OS.

- Linux OS. Designed and developed various ERP-based business software and modules like sales, inventory, purchase, website, and e-commerce using Python language in Odoo.

Junior Software Engineer December 2020 - May 2021
Unisoft Systems Limited *Dhaka, Bangladesh*

- Research, assess, and lead the initiation of new technologies to maximize performance. Interact with clients and analyze requirements and develop an application in Python.
- Had written various SQL to generate numerous reports and created various modules using the OOP, Database model.

Publications

Published

- **Ibrahim Al Azhar**, Miftahul Jannat Mokarrama, Zhishuai Guo, Sagnik Ray Choudhury, Hamed Alhoori. "BAGELS: Benchmarking the Automated Generation and Extraction of Limitations from Scholarly Text". The 2025 Conference on Empirical Methods in Natural Language Processing (EMNLP) Paper.
- **Ibrahim Al Azher**, Venkata Devesh Reddy Seethi, Akhil Pandey Akella, and Hamed Alhoori."LimTopic: LLM-based Topic Modeling and Text Summarization for Analyzing Scientific Articles' Limitations." . 2024 ACM/IEEE Joint Conference on Digital Libraries, December 2024, Hong Kong. We introduced LimTopic, a strategy for using topic generation with meaningful titles and descriptions in limitation sections in scientific articles with Topic Modeling and Large Language Models (LLMs). Paper. Arxiv. Code.
- **Ibrahim Al Azher**, and Hamed Alhoori. "Generating Suggestive Limitations from Research Articles Using LLM and Graph-Based Approach." 2024 ACM/IEEE Joint Conference on Digital Libraries, December 2024, Hong Kong. Generate scientific article limitations using LLM, Retrieval Augmented Generation (RAG), and graph combination. Paper
- **Ibrahim Al Azher**, Miftahul Jannat Mokarrama, Zhishuai Guo, Sagnik Ray Choudhury, Hamed Alhoori "FutureGen: A RAG-based Approach to Generate the Future Work of Scientific Article" . International Workshop on AI for Scientific Communication (Ai4SC 2025), IEEE eScience 2025, Chicago. An LLM-based RAG approach to generate future work for scientific articles with a self-feedback approach. Paper .
- **Ibrahim Al Azher**, and Hamed Alhoori. "Mitigating Visual Limitations of Research Papers." 2024 IEEE International Conference on Big Data (IEEE BigData 2024), December 2024, Washington D.C. We focus on visual limitations in scientific research papers, such as charts, graphs, and diagrams, with a multimodal LLM (QWen, Llava, Llama, and GPT-4) to generate clear, concise descriptions incorporating LLM feedback and LLM as a judge for evaluation. Paper. PDF.
- **Ibrahim Al Azher**, Hamed Alhoori. "Generating Suggestive Limitations from Research Articles Using LLM and Graph-Based Approach" The 11th IEEE International Conference on Data Science and Advanced Analytics (DSAA 2024), October 2024, San Diego, CA . A graph-based approach to recommend limitations of a paper by creating a knowledge graph using citations and the semantic relations of papers, incorporating the subgraph into LLM.
- **Ibrahim Al Azher**, Sohel Ahmed, and Md. Saiful Islam."Identifying Author in Bengali Literature by Bi-LSTM with Attention Mechanism." 24th International Conference on Computer and Information Technology (ICCIT), December 2021. Paper. PDF
- Tamzid Azad, **Ibrahim Al Azher**, Sagnik Ray Choudhury, and Hamed Alhoori. "Predicting Scholarly Impact with Retrieval-Augmented LLMs" Association of Computational Linguistic (ACL), Scholarly Document Processing (SDProc), 2025, Vienna, Austria. Paper.
- Murtuza Shahzad, Joey Wilson, **Ibrahim Al Azher**, Hamed Alhoori, and Mona Rahimi. "From Theory to Practice: Code Generation Using LLMs for CAPEC and CWE Frameworks" 2nd International Workshop on Large Language Models for Code (LLM4Code 2025), ICSE 2025. Paper.
- Christy Muasher-Kerwin, M Courtney Hughes, Michelle Foster, **Ibrahim Al Azher**, Hamed Alhoori. "Exploring Large Language Models for Summarizing and Interpreting an Online Brain Tumor Support Forum." Sage Jounral. Paper
- MD Saifur Rahman Chowdhury, Nahiyan Habib Khan, Dip Singha, **Ibrahim Al Azher**, Tufael Ahmed, Geerbani Pal Shashi."Leveraging Self-Sovereign Identity (SSI) with Hyperledger Indy: A Decentralized Identity Ecosystem for Secure Document Management in Bangladesh." 27th International Conference on Computer and Information Technology (ICCIT) 20-22 December 2024, Cox's Bazar, Bangladesh. Paper

- Harish Verma, Miftahul Jannat Mokarrama, **Ibrahim Al Azher** and Hamed Alhoori."A Comparative Study of ORKG and LLM identified Research Contributions" 2nd Workshop on Innovation Measurement for Scientific Communication (IMSC) in the Era of Big Data, JCDL, December 2024, Hong Kong.
- **Ibrahim Al Azher**."Limitations of Scientific Articles and Navigated Future Directions with LLM and RAG." Masters Thesis. Northern Illinois University, May 2025. Paper

In Progress

- **Ibrahim Al Azhar**, Bhanu Kedhaar, Zhishuai Guo, Sagnik Ray Choudhury, and Hamed Alhoori. "LimAgents: Limitation Generation of Scientific Article with LLM Agents adn RAG". Generating scientific article limitations using multiple LLM Agents such as Extractor, Analyzer, Reviewer, Graph, Image, Self feedback, and Master Agents. Proposing a novel dual RAG system where important information of cited papers is stored in 1st RAG database. Improve the RAG performance by incorporating LLM Re-ranker.
- **Ibrahim Al Azhar**, Sagnik Ray Choudhury, and Hamed Alhoori. "A Survey on Retrieval Augmented Generation Evaluation Framework".
- **Ibrahim Al Azhar**, Sagnik Ray Choudhury, and Hamed Alhoori. "A Survey on Scientific Article Idea Exploring and Novelty Measurement".
- Tamzid Azad, **Ibrahim Al Azher**, Sagnik Ray Choudhury, and Hamed Alhoori. "Scientific Knowledge Transfer with LLMs: Recommending Methods Across Disciplines."
- Tamzid Azad, **Ibrahim Al Azher**, and Hamed Alhoori. "How Large Language Models (LLM) affect the Readability Score in Scientific article. "
- **Ibrahim Al Azher**, and Hamed Alhoori. "Image Limitations in Scientific Article."
- **Ibrahim Al Azher**, and Hamed Alhoori. "Trend Prediction of Scientific Article with Time Series Analysis."
- Bhanu Kedhar **Ibrahim Al Azher**, and Hamed Alhoori. "From Text to Scientific Article Flowchart / Diagram Generation"

Machine Learning works | *Python, Keras, Tensorflow* Jan 2020 – July 2022

- Predicting mortality, hospital length of stay in health dataset (MIMIC IV). Analysis Amazon reviews datasets with various models and data preprocessing. Apply CNN, LeNet, AlexNet, GoogleNet, ResNet, VGG16, and VGG19 models and transfer learning models on image data.

Other Poster

Midwest Speech and Language Day, University of Notre Dame, Indiana: Automated Extraction and Generation Limitations of Scientific Article, April, 2025.

Greater Chicago Workshop, Loyola University, Chicago: Optimizing Database Performance in Retrieval-Augmented Generation with Adaptive Retrieval and Efficient Evaluation Methods, May, 2025.

Midwest Machine Learning Symposium, University of Chicago: LimAgents: Limitation Generation with LLM Agents and RAG, June 2025.

Skills

Programming Languages: C, C++, Python, Javascript, Java, PHP

Framework and Technologies: Django, Laravel, HTML, CSS, Bootstrap, Odoo, Django REST framework

Open Source Library: Keras, Tensorflow, Pytorch, numpy, pandas, scikit learn, matplotlib,

Tools: Oracle Sql, MySql, Postgresql, Git, Github, CodeBlocks, Pycharm, Visual Studio, Anaconda, Jupyter notebook, Latex, Overleaf

Honors & Awards

- **Google GCP Grant Award**, Google — Feb 2024 to Feb 2025
- **3MT Best Paper Presentation Award**, Joint Conference on Digital Libraries (JCDL), Hong Kong — December 2024
- **IEEE Travel Grant**, IEEE International Conference on Data Science and Advanced Analytics (DSAA), San Diego, California — October 2024
- **SIGIR Student Travel Grant**, 2024 ACM/IEEE Joint Conference on Digital Libraries (JCDL), Hong Kong — December 2024
- **NIU Student Travel Grant**, October - December 2024

Other Professional Information

Reviewer

- [ACL Workshop 2024, 2025], [SDM 2025], [Springer Nature]

Program Committee

- [Web Science 2025]

Session Chair

- [JCDL 2024]

Volunteer

- [DSAA 2024]

Speaker

- [NIU AI/ML Seminar]:February 2025: Large Language Models, How, why and how? Video Website
- [NIU AI/ML Seminar]: April 2025: Evaluation system of Retrieval Augmented Generation. Video
- [NIU AI/ML Seminar]: May 2025: Limitations and Future Directions of Scientific Article. Video
- Blog: Recent LLM Developments ibrahimalazhar/LLM

References

Dr. Hamed Alhoori
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Dr. Sagnik Ray Choudhury
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University of North Texas
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