Azher Ahmed Efat

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https://scholar.google.com/citations?user=FKhDKqMAAAAJ&hl=en

PERSONAL STATEMENT

I am a computer science graduate student with a high interest in research work. My research interests lie in natural language processing, machine learning and computer vision. Apart from my research experience, I have worked as a software engineer at a software company and an adjunct lecturer at a university in Bangladesh.

EDUCATION

Ph.D. in Computer Science, Iowa State University Jan 2024 – Dec 2028 | Ames, IA, USA

CGPA: 3.67 | Credits Completed: 7

Related Coursework: Design and Analysis of Algorithms, Advanced Topics in Software Engineering: Foundations (In progress), Distributed Systems (In progress), Machine Learning (In progress), Natural Language Processing, Responsible AI: Risk Management in Data Driven Discovery (In progress).

B.Sc in Computer Science and Engineering, Brac University Jan 2018 – Jan 2022 | Dhaka, Bangladesh

CGPA: 3.97 out of 4.0

Related Coursework: Programming Language I, Programming Language II, Data Structures, Algorithms, Discrete Mathematics, Software Engineering, Artificial Intelligence, Special Topics (Focused on Reinforcement Learning).

Academic Achievements: 10 VC's List and 1 Dean's List | Academic Standing: Highest Distinction

RESEARCH INTERESTS

Natural Language Processing, Computer Vision, Vision Language Models, Large Language Models, Machine Learning, Artificial Intelligence.

PUBLICATIONS

[1] Efat, A.A., Atiq, A., Abeed, A.S., Momin, A. and Alam, M.G.R., 2023. EMPOLITICON: NLP and ML based approach for context and emotion classification of political speeches from transcripts. IEEE Access, 11, pp.54808-54821.

[2] Abeed, A.S., Atiq, A., Anjum, A.A., Efat, A.A. and Karim, D.Z., 2022, December. Bomacnet: A convolutional neural network model to detect bone marrow cell cytology. In 2022 25th International Conference on Computer and Information Technology (ICCIT) (pp. 686-691). IEEE.

ONGOING RESEARCH ACTIVITIES

- RAG-VLM based Chart Understanding.
- Multimodal LLM based Medical Image Classification

INDUSTRY WORK EXPERIENCE

Kona Software Lab LTD Dhaka, Bangladesh
Graduate Engineer June, 2022 – December, 2023

- Developed 50% of the admin panel of an E-commerce platform that is based on blockchain using Angular framework.
- Developed 30% generic and reusable components for the frontend team.
- Developed and maintained 4 backend micro-services in .NET Core framework, utilizing MongoDB as database.
- Integrated 100% the korean payment service (Kona card) into the platform.
- Developed 100% of the content management system in the admin panel which is the key module of the project.

Banglalink Digital Communications Limited Dhaka, Bangladesh
Network Service Management Intern May, 2021 – July, 2021

- Familiarized with the architecture of GSM, UMTS, and LTE networks.
- Acquired knowledge in subnetting, and implemented routing protocols such as OSPF and BGP, including MPLS.
- Gained insights into organizational structure and business processes within a telecommunications environment.

TEACHING EXPERIENCE

Department of Computer Science, Iowa State University Ames, IA, USA
Graduate Teaching Assistant January, 2024 – Present

- Conducted labs of Object-oriented programming consisting 200+ students.
- Graded exams, assignments scripts and provided office hours to 200+ students.

Department of Computer Science and Engineering, Brac University Dhaka, Bangladesh
Adjunct Lecturer September, 2023 – January, 2024

- Conducted the lab classes of Data Structure, and System Analysis and Design courses consisting 200+ students.
- Evaluated the academic performance of 200+ students.

Department of Computer Science and Engineering, Brac University Dhaka, Bangladesh
Undergraduate Teaching Assistant February, 2020 - January, 2022

- Taught Discrete Mathematics, and Automata and Computability courses to 1000+ students and graded their assignments.
- Assisted the faculties with preparing course materials.
- Provided office hours to 1000+ students.

SKILLS

- Languages: Java, Python, Typescript, HTML, CSS.
- Framework: Angular, Angular Material, .Net Core.
- Libraries: Keras, Tensorflow, numpy, pandas, scikit-learn.

PROJECT

RAG Based Question Answering System.
Libraries and Language used: Langchain, Pinecone, Gradio.io, Open AI, Python.

- Extracts text from PDFs and index it in Pinecone.
- Retrive text data based on given query.
- Uses gpt-3.5-turbo-0613 model to generate answer.

PROFESSIONAL SERVICE

Paper Reviewer

- International Conference on Electrical, Computer and Energy Technologies (ICECET 2024)

CO-CURRICULAR ACTIVITIES

Brac University Film Club Dhaka, Bangladesh

Director, Human Resources September, 2021 – December, 2022

- Managed the recruitment process of the club.
- Promoted the club members based on their performance.
- Managed and resolved any member related issues.

Secretary, Human Resources July, 2020 – September, 2021

- Groomed the juniors.
- Arranged and Conducted club meetings.

Executive, Human Resources March, 2019 – July, 2020

- Managed club database.
- Communicated with club alumni and club members.

Apprentice, Human Resources October, 2018 – March, 2019

- Participated in club activities.
- Completed all the assigned tasks in a timely manner.

General Member, Human Resources February, 2018 – October, 2018

- Participated in club activities.
- Completed all the assigned tasks in a timely manner.

AWARDS AND ACHIEVEMENTS

- Awarded with Quality Jounal Publication Award by Brac University.
- Awarded with VC certificate by BRAC University.
- Second Prize, BRACU Intra University Programming Contest.

Personal Statement of Azher Ahmed Efat

I am Azher Ahmed Efat, a first-year graduate student at Iowa State University, writing to express my interest in pursuing a Ph.D. in Computer Science at Columbia University. My passion for research has led me to publish two peer-reviewed papers, and I am currently working on several more. I am eager to pursue my Ph.D. at Columbia University to further my career as a researcher, with a focus on **natural language processing, computer vision, and AI/ML**. Specifically, I am interested in but not limited to multimodal foundation models, vision-language models, large language models, and the application of NLP and computer vision techniques to solve real-world and social challenges.

Columbia University's emphasis on research work is what draws me to the PhD in Computer Science program. Its diverse range of faculties working in various sub-domains of computer vision and natural language processing strongly appeals to me. Furthermore, the research works by **Natural Language Processing group** and **Computer-Enabled Abilities Laboratory** impressed me a lot and highly matches with my research interest.

My ongoing research involves two projects in large vision language models. The first one focuses on using RAG and large vision language models to analyze charts with a focus on summarizing the charts and answering various types of questions such as short answer, MCQ, and fill in the blanks. In the second project, we are exploring various prompting techniques—such as zero-shot, few-shot, chain-of-thought, and reasoning-based prompts—to classify medical images using large multimodal models like GPT-4o and Claude 3. Additionally, in my machine learning course, I am currently working on a project that combines both machine unlearning and natural language processing. In this project we aim to remove biased data from a trained model's parameter using machine unlearning techniques.

During my undergraduate studies, I conducted a thesis that intersected NLP with real-world applications. Recognizing the global impact of political dynamics, my team and I classified speeches of the leaders of the USA, UK, Russia, and China based on context and expressed emotions. A significant challenge we faced was the lack of a suitable dataset, so we created a novel dataset of 2,010 labeled transcripts. We then developed two ensemble learning models for the classification tasks. My contributions include dataset creation, model development and training, literature review, and manuscript preparation. I also managed the entire publication process, leading to our work being published in the IEEE Access journal, for which I received the Quality Journal Publication Award from Brac University. A follow-up interest from this project is to develop a model that relates past political and financial speeches and news articles to current events, with the goal of predicting a country's future political and economic situation.

In another independent research project, I worked on developing a CNN-based model for classifying bone marrow cells. My role includes conducting the literature review, training the model, and drafting the manuscript. This research was peer-reviewed and published in a conference.

The breadth of research opportunities at Columbia University is a significant draw for me. I am particularly interested in working with **Professor Kathleen McKeown**, whose research on natural language processing, summarization and Large Language models aligns closely with my interests. Her works like Benchmarking Large Language Models for News Summarization, Reading Subtext: Evaluating Large Language Models on Short Story Summarization with Writers, See It from My Perspective: Diagnosing the Western Cultural Bias of Large Vision-Language Models in Image Understanding attracted me a lot and highly matches with my interest. Moreover, I am also eager to work with **Professor Zhou Yu**, as her work on natural language processing and LLMs

encompasses my research areas. Her works LIONs: An Empirically Optimized Approach to Align Language Models and Cost-Efficient Large Language Model Serving for Multi-turn Conversations with Cached Attention caught my attention. Additionally, **Professor Brian A. Smith's** work incorporating AI, accessibility, and computer vision intrigued me. I find his works, Surveyor: Facilitating Discovery Within Video Games for Blind and Low Vision Players, and Help Supporters: Exploring the Design Space of Assistive Technologies to Support Face-to-Face Help Between Blind and Sighted Strangers very impactful and would love to be a part of works like these. Besides, I am interested in **Professor Eugene Wu's** work at the intersection of LLM agents and data systems. His works such as: Cocoon: Semantic Table Profiling Using Large Language Models, Relationalizing Tables with Large Language Models: The Promise and Challenges, Towards Accurate and Efficient Document Analytics with Large Language Models matches my interests.

After completing my Ph.D., I aspire to apply my knowledge to solve real-world problems and making a significant impact in computer science research. My goal is to work as a research scientist in leading labs such as Google, IBM, Microsoft, or Meta, while maintaining a strong connection with academia through collaborative work.

Beyond my research experience, my diverse professional background has shaped a well-rounded skill set. I currently work as a graduate teaching assistant at Iowa State University which enabled me to communicate with students of diverse backgrounds and allowed me to help them in their studies. Before that, I worked as a software engineer at Kona Software Lab LTD and as an adjunct faculty at Brac University. My roles as a software engineer, faculty member, and active participant in co-curricular activities have allowed me to grow as a team player and work with diverse

background of people and refined my career aspirations and strengthened my belief that I am well-qualified to pursue a Ph.D. at a prestigious institution like Columbia University.

In conclusion, the Ph.D. program in Computer Science at Columbia University stands out to me because of its diverse research opportunities and the exceptional faculty members whose work aligns with my interests. I am confident that my previous research background, academic background and work experience has prepared me to succeed in a Ph.D. program and this program will provide the ideal environment for me to advance my research career and make meaningful contributions to the field.

Sincerely,

Azher Ahmed Efat