KHONDKER SALMAN SAYEED

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Research Interest

• Natural Language Processing • Multimodal Learning • Information Retrieval • Low Resource Deep Learning

My research focuses on developing intelligent agents capable of understanding and interacting with the world through natural language. I specialize in natural language processing (NLP) and vision-language understanding, aiming to create trustworthy, interpretable, and continuously learning AI systems that can address complex, real-world challenges.

Education

- **Bangladesh University of Engineering and Technology (BUET)** *April 2019 - June 2024*
  Bachelor of Science in Computer Science and Engineering Dhaka, Bangladesh
  CGPA: 3.9/4.0, placed on the dean's list in all terms.
  (session delay due to the COVID-19 pandemic)

Publications

C = Conference, W = Workshop

C1 Haz Sameen Shahgir†, **Khondker Salman Sayeed**†, Abhik Bhattacharjee, Wasi Uddin Ahmad, Yue Dong, Rifat Shahriyar
Title: "IllusionVQA: A Challenging Optical Illusion Dataset for Vision Language Models".
[webpage] [arXiv] [openreview]
COLM 2024: *The 1st Conference on Language Modeling*

W1 Haz Sameen Shahgir, Rownok Zahan Ratul, Md Toki Tahmid, **Khondker Salman Sayeed**, Atif Hasan Rahman
Title: "RNA-DCGen: Dual Constrained RNA Sequence Generation with LLM-Attack".
[bioRxiv]
NeurIPS 2024 MLSB: *Workshop on Machine Learning in Structural Biology*

C2 Tamzeed Mahfuz, Satak Kumar Dey, Ruwad Naswan, Hasnaen Adil, **Khondker Salman Sayeed**, Haz Sameen Shahgir
Title: "Too Late to Train, Too Early To Use? A Study on Necessity and Viability of Low-Resource Bengali LLMs".
[arXiv]
COLING 2025: *The 31st International Conference on Computational Linguistics*

W2 H.A.Z. Sameen Shahgir†, **Khondker Salman Sayeed**†, Tanjeem Azwad Zaman†, Md. Asif Haider†, Sheikh Saifur Rahman Jony, M. Sohel Rahman
Title: "Ophthalmic Biomarker Detection Using Ensembled Vision Transformers – Winning Solution to IEEE SPS VIP Cup 2023".
[icip] [arXiv]
ICIP 2023: *IEEE SPS Video and Image Processing Cup*

C3 **Khondker Salman Sayeed**, Haz Sameen Shahgir, Tamzeed Mahfuz, Satak Dey, M Saifur Rahman
Title: "Efficient Real-Time Video Colorization on Low-End CPUs via Pruning and Quantization".
[acm] [nsyss]
NSysS 2024: *The 11th International Conference on Networking, Systems and Security*

Work Experience

- **IQVIA [🔗]** *June 2024 - Present*
  Machine Learning Engineer Remote
  ◦ Working on the development and deployment of IQVIA's in-house Large Language Models for generating expert domain-specific insights. Developing a Mixture-of-Agents based AI Assistant pipeline using LangGraph, CrewAI. Serving business users with data-informed intelligent and interactive responses.

- **BUET CSE NLP Lab [🔗]** *March 2023 - June 2024*
  Research Assistant Dhaka, Bangladesh
  ◦ Prepared a benchmark illusion dataset that tests the visual understanding capabilities of Vision Language Models to identify visual illusions in images and correctly describe them. Published this first-author work at COLM 2024.
  ◦ Worked on the multimodal extension of the XLSum dataset from BUET CSE NLP group to include images and BBC article-summary pairs. Explored the potential improvement for abstractive summarization by including article images in addition to text using Vision Language Models.

Supervisors: Prof. Rifat Shahriyar, Prof. Tahmid Hasan, CSE BUET. & Wasi Uddin Ahmad, Senior Research Scientist, NVIDIA.

Honors and Awards

- **IEEE Upsilon Pi Epsilon Honor Society Award 2023 (Awardee)** *February 2024*
  IEEE Computer Society [🔗]
  - Received this prestigious award in recognition of my academic results and success in national and international deep learning competitions.
  - Awarded to only 4 applicants internationally.
  - Received a $1000 scholarship.
- **IEEE Video and Image Processing Cup 2023 (Champion)** *October 2023*
  IEEE Signal Processing Society, ICIP 2023 [🔗] [arXiv]
  - Champion in this annual international computer vision competition. 2023's edition was based on biomarker prediction from retina OCT scans.
  - Received travel grant to present our solution at ICIP 2023, Kuala Lumpur, and a $5000 scholarship prize.
  - **Summary:** In this work, we employed two vision transformer-based models: MaxViT and EVA-02. Our ensembled solution achieved a patient-wise F1 score of 0.81 in the first phase and 0.85 in the second and final phase, setting the state-of-the-art ophthalmic biomarker detection using OCT images.
- **DLSprint 2022 (Champion)** *September 2022*
  Optimizely, Bengali.AI, and CSE BUET [🔗] [arXiv] [🐙]
  - Champion in this Kaggle community competition based on Automatic Speech Recognition on the Bengali Common Voices Dataset.
  - Received a $1300 scholarship.
  - **Summary:** In this work, we fine-tuned wav2vec 2.0 for Bengali speech recognition using the Bengali Common Voice Speech Dataset. Our model achieved impressive results, with a word error rate (WER) of 0.25 on the validation set and a Levenshtein Distance of 2.61 after further training. This work bridges the gap for a widely spoken language.
- **EEE Day Datathon 2023 (First Runner-up)** *March 2023*
  EEE BUET, Apurba Technologies Ltd. [🔗] [arXiv] [🐙]
  - Runner-up in this Kaggle community competition based on Automatic Grammatical Error Tagging on Bengali Text.
  - Received a $500 scholarship.
  - **Summary:** In this work, we propose a method for detecting grammatical errors in Bangla using a Text-to-Text Transfer Transformer (T5) Language Model. We fine-tune the small variant of BanglaT5 on a corpus where errors are bracketed by the dedicated symbol $. Despite the T5 model's primary design for translation, we achieve low Levenshtein Distance in tagging grammatical errors in Bangla.
- **AI For Bangla 2023 (Honorable Mention)** *March 2023*
  EBLICT, Bangladesh Computer Council (BCC) [🔗] [arXiv] [🐙]
  - Prize winner in this national competition calling for advancements in AI for Bengali for creating the first Bengali Sign Language video dataset and preparing a baseline on that dataset.
  - Received a $500 scholarship.
  - **Summary:** In this research, we introduce a new word-level Bangla Sign Language dataset, BdSL40, comprising 611 videos across 40 words. We prepare two baselines for classification: one using a 3D Convolutional Neural Network (CNN) model and another employing a novel Graph Neural Network (GNN) approach.
- **Robi Datathon 2024 (First Runner-up)** *May 2024*
  Robi Axiata Ltd, Huawei [🔗]
  - Runner-up in this national data-science competition based on customer purchase behavior prediction in a data-scarce setting.
  - Received a $3000 scholarship.

Leadership Experience

- **Lead Organizer & Instructor of DLSprint 2.0 2023** *August 2023*
  BJIT Group, CSE BUET [🔗]
  - Served as an organizer of this open-for-all Computer Vision Competition on Automatic Document Layout Analysis for Bengali.
  - Conducted two workshops as an instructor on common competition practices, computer vision, and image segmentation.
  - Took ownership, being involved in the competition's conception to execution.

Projects

- **Ticketing** – A microservices web app that lets users buy and sell tickets
  - Backend: NodeJS, Typescript, MongoDB, NATS Streaming. Consists of 6 independent services, coordinated by an eventbased architecture.
  - Frontend: NextJS, TailwindCSS
  - Orchestration: Kubernetes
- **Sub-C-Compiler** – A compiler for a subset of the C programming language
  - Tools: Flex (Lexer), GNU Bison (Paser)
  - Languages: C, C++
- **Mobile-Doc** – A telemedicine web app
  - Backend: FastAPI, MongoDB, Redis, BigQuery
  - Frontend: React, MUI
  - Deployment: Netlify
  - Deployment: Pokedoc
- **Suntech** – An e-commerce web app
  - Backend: Flask, OracleDB
  - Frontend: Jinja2, HTML, CSS, VanillaJS
- **Ray-Tracing** – A rendering pipeline implementing ray tracing in OpenGL scenes
  - Language: C++
  - Algorithms: Phong Lighting Model, Recursive Reflection
- **Enhanced xv6 OS** – Copy-On-Write and Memory Page-Replacement in the xv6 OS
  - Language: C
  - System Calls, Process Schedulers, Page Replacement
- **twitt3r** – A Twitter clone using the t3 stack
  - Framework: NextJS
  - Stack: T3 (Typescript, trpc, TailwindCSS)
  - Persistence: PlanetScale, Prisma ORM
  - Deployment: Vercel
  - Deployment: twitt3r
- **DocumentQA** – A langchain LLM document chatbot
  - Language: Python
  - Libraries: langchain, OpenAI
  - UI: Chainlit
  - Database: ChromaDB Vector Database
- **IllusionVQA** – A Challenging Optical Illusion Dataset for Vision Language Models
  - This work is a part of my undergraduate thesis
  - Published at **COLM'24**
  - Paper: IllusionVQA: A Challenging Optical Illusion Dataset for Vision Language Models
  - Website: IllusionVQA

References

1. **Rifat Shahriyar (PhD)**
   Professor, Department of Computer Science and Engineering
   Bangladesh University of Engineering and Technology (BUET)
   Email: rifat@cse.buet.ac.bd
   Relationship: Undergraduate Thesis Supervisor
2. **AKM Ashikur Rahman (PhD)**
   Professor, Department of Computer Science and Engineering
   Bangladesh University of Engineering and Technology (BUET)
   Email: ashikur@cse.buet.ac.bd
   Relationship: Academic Advisor