Shayekh Bin Islam

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Education

Bangladesh University of Engineering and Technology (BUET)   March'18 - May'23
B.Sc. (Engg.) **(Honours)**, Computer Science & Engineering | **CGPA: 3.78**
Coursework: Machine Learning, Artificial Intelligence, Numerical Methods, Computer Architecture, Statistics

Research Experience

M-RewardBench: Evaluating Reward Models in Multilingual Settings   July'24 - Now
Remote Collab. with Cohere For AI | Advisors: Marzieh Fadaee, Sara Hooker [Proposal Code]
> Benchmarking generative, classifier, and DPO reward models in 23 languages to assess reasoning and safety capabilities.
> Developing dataset to measure unintended bias and cultural understanding of those models.

PRM-Bench: Evaluating Process-based Reward Models   July'24 - Now
Remote Collab. with DuckAI | Mentors: Alex Havrilla, Aran Komatsuzaki | Keywords: PRM, MCTS [Code]
> Benchmarking PRMs in math, code, reasoning, game, and agent tasks with human-annotated process-level rewards.

Open-RAG: Enhanced Retrieval Augmented Reasoning with Open-Source Large Language Models   Jan'24 - June'24
Remote Collab. with QCRI | Advisor: Md Parvez | Keywords: Mixture-of-Experts, Self-Reflection, RAG [Manuscript]
> Proposing an open-source RAG framework capable of complex reasoning tasks.
> Developing efficient Mixture-of-Experts RAG models from dense models.

Learning from Instance Gradients   Aug'23 - Dec'23
Fatima Fellowship with UMich | Mentor: Mohamed El Banani | Keywords: Optimization, Byzantine ML, Data Pruning
> Developing a gradient-based optimization algorithm that selectively back-propagates based on the quality of the gradient signal of each instance in a mini-batch.
> Unifying the ideas of Byzantine ML and Data Pruning methods at the mini-batch level.

Improving Offline Meta-Reinforcement Learning With Ensemble-Diversified Actor-Critic   March'22 - June'23
Remote Collab. with Mila | Mentor: *H Ishfaq* | Keywords: Offline RL, Meta-RL, Uncertainty Estimation [Manuscript]
> Proposing uncertainty-aware learning in offline meta-RL setup based on ensemble diversity.

Foundation Models and Sampling Methods for Protein Design   Oct'23 - Jan'24
Remote Collab. with Dreamfold/Mila | Mentor: R Islam | Keywords: RL, Protein Foundation Models, Multi-modality
> Developing RL environments and reward models for protein structure and sequence design.
> Working on multi-modal foundation models with preference optimization for protein design.   [Code]

A Scalable Bitcoin Blockchain Network by Dynamic Block Size Adjustment using RL   June'23 - Dec'23
Thesis Co-Supervisor, Brac University | *Advisor: Md. Golam Rabiul Alam* | Keywords: Offline RL, Inverse RL
> Proposing a dynamic block size adjustment system that maximizes the miner's revenue based on the condition of the blockchain network; and exploring online, offline, and inverse RL algorithms in this domain.

bbOCR: An Open-source Multi-Domain OCR Pipeline for Bengali Documents   June'23 - Dec'23
Local Industry Collab. | *Advisor: Farig Sadeque* | Keywords: Document OCR, Geometric & Illum. Correction
> Developing Bengali.AI-BRACU-OCR (bbOCR): an open-source scalable document OCR system that can reconstruct Bengali documents into a structured searchable digitized format.
> Taking geometric distortions and illumination variation into account.   [Preprint]

Bangla Grammatical Error Detection Leveraging Transformer-based Token Classification   Feb'23 - Aug'23
Undergrad Project | *Advisor: Dr. Mohammed Eunus Ali* | Keywords: NLP, GED, GEC, ELECTRA, XLM-RoBERTa
> Developing models for detecting grammar, spelling, and punctuation errors in Bangla text using transformer-based architectures, ensemble learning, and rule-based methods. [Report] [Code]
> Winning solution for Bhashabhrom: Bangla Grammatical Error Detection Challenge

Publications

*=Equal Contribution

[1] **Open-RAG: Enhanced Retrieval-Augmented Reasoning with Open-Source LLMs** [🌐 Manuscript]
Shayekh Bin Islam, Md Asib Rahman, K S M Tozammel Hossain, Enamul Hoque, Shafiq Joty, Md Rizwan Parvez
[Submitted to EMNLP 2024, Score: 3.17/5.00]

[2] **Improving Offline Meta-Reinforcement Learning With Ensemble-Diversified Actor-Critic** [🌐 Manuscript]
Shayekh Bin Islam, Haque Ishfaq
[Submitted to AISTATS 2024]

[3] **bbOCR: An Open-source Multi-Domain OCR Pipeline for Bengali Documents** [🌐 Preprint]
Shayekh Bin Islam*, Imam Mohammad Zulkarnain*, ..., Md Nazmuddoha Ansary, Asif Sushmit, Farig Sadeque
[Submitted to EAAI-AAAI 2024]

Notable Projects

Expedition Aya 2024 | Cohere for AI | Mentors: Marzieh Fadaee, Sara Hooker　　　　July'24 - Aug'24
Won **Silver** Prize & **Most Promising** Project | Keywords: Knowledge Distillation, Data Filtering, Multi-modality, Perplexity
> **Maya**: Multimodal Aya – curating a new multilingual image-text dataset and training Aya/SigLIP models with that data.
> **Global Exams**: Localized MMLU Benchmark to evaluate current generations on state-of-art models.
> Identifying mislabeled instances in Aya datasets (instruction and red-teaming datasets).
> On the relation between perplexity and performance of multilingual LLMs.
> **DistAya** – An open-source small multilingual model distilled from Aya models and datasets for edge applications.

The Trojan Detection Challenge 2023 (LLM Edition)　　　　Sep'23 - Dec'23
Received Compute Credit Grants | Keywords: LLM, AI Safety, Trojan Detection
> Aiming to advance the understanding and development of methods for detecting hidden functionality in LLMs.
> Applying PEZ to approach the Trojan Detection Track.

Q-TCP: Improving TCP Congestion Control with Machine Intelligence　　　　Jan'22 - Feb'22
Open-source contribution to DianGroup's NS3-AI Module | Keywords: RL, DQN, TCP Congestion Control, Networking
> Q Learning agent for TCP congesting control.
> Implementing agent state (i.e., EWMA of the ACK inter-arrival time, packet inter-sending time, current RTT and minimum RTT ratio, the slow start threshold, and current window size) and reward (throughput, delay-based). [🌐 Code]

HummingBird　　　　Nov'20
An Unity ML-Agents Project In ML-Agents: Hummingbirds Course | Keywords: PPO, Unity ML-Agents, Game Playing
> A Reinforcement Learning game using Unity ML-Agents with intelligent flying hummingbirds that can navigate to flowers, dip their beaks in and drink nectar.
> A training environment is created and neural networks are trained to perform this challenging task, then a player can compete against the birds in a simple mini-game. [🌐 Code]

Complex Named Entity Recognition in Bengali Texts　　　　Feb'23
Second Runner-Up solution for the First NLP Hackathon in Bangladesh | Keywords: NLP, NER, ELECTRA, XLM-RoBERTa
> Identifications and classification of named entities in Bengali language texts. The project is designed to be used in various applications such as text analytics and information retrieval systems. [🌐 Report] [🌐 Code]

People Counter App　　　　Mar'20 - June'20
Intel® Edge AI for IoT Developers **Scholarship Project** | Keywords: SSD, Computer Vision, IoT, Edge AI
> Detection of people in a designated area, providing the number of people in the frame, average duration of people in the frame, and total count.
> Leverages the power of deep learning frameworks like Tensorflow, PyTorch, and Caffe combined with Intel's OpenVINO toolkit to impact a real-world computer vision application with an accuracy of about 75% using the SSD512 model.

Professional Experience

Computer Science and Engineering, Brac University [🌐 Site]   June'23 - May'24
Visiting Lecturer
> Instructed Artificial Intelligence, Robotics, Software Engineering, and Data Communications courses.
> Designed Basic ROS, Kinematics, and PID Control assignments using Husky, UR5, and Hector Drone simulators.
> Supervised undergrads working on Reinforcement Learning, Robotics, and NLP toward theses and projects.

DataLab | Data Science and Engineering Research Laboratory   Jan'20 - June'20
Undergraduate Researcher | Advisor: Dr. Mohammed Eunus Ali
> Worked on developing datasets for a health-care chatbot in Bengali language using machine learning and NLP.

Academic Service

Reviewer	ICLR'25, NeurIPS'24, BehavioralML-NeurIPS'24, LLM-Cognition-ICML'24, AutoRL-ICML'24, AI4ED-AAAI'24, NuCLeaR-AAAI'24, ACL-BEA'23
Member	Association for Computational Linguistics (ACL) 2020-21, ACL SIGEDU 2023
Virtual Volunteer	NeurIPS'21, ICLR'21, ICML'21, ACL'21, NAACL'21, ACL'22, ICLR'22, ICML'22, ICLR'23
Co-founder	Robotics and Intelligent Systems Research Group (RIS), Brac University 2023
Co-founder	BUETSEC: BUET Cyber Security Club 2022
Organizer	Intra-BUET Capture the Flag Competition and Workshop 2023

Honours and Awards

Cohere For AI's Expedition Aya 2024 | Silver Prize Project   Received $4000 API Credits

Cohere For AI's Expedition Aya 2024 | Most Promising Project   Received $1000 API Credits

Fatima Fellowship 2023 | Research Collaboration, Mentoring, and Compute Support   Sponsored by Hugging Face

The Trojan Detection Challenge 2023 (LLM Edition) | Compute Grant   Received $500

Simulation Humanoid Robot Wrestling Competition, ICRA 2023 | Participant to the 1/8 finals

Bengali.AI Speech Recognition 2023 | 67/744 Teams (Top 10%)   Kaggle Bronze Medal

Bhashabhrom: Bengali Grammatical Error Detection Challenge 2023 | Champion   Phase I and II, Awarded $750

Association for Computational Linguistics (ACL) | Membership   2020-21

Intel® Edge AI Scholarship 2020 | 750 Seats   Full Free Intel® Edge AI for IoT Developers Nanodegree Program

First NLP Hackathon BD, 2023 | Second Runner-UP   Awarded $200

Dean's List Scholarship, BUET   2018-19

National Science Olympiad, Bangladesh | Divisional Champion, Rajshahi   2016

Education Board Scholarship, Government of Bangladesh   2010-2023 ($800 in Total)

Talks and Presentations

"Evaluating Reward Models in Multilingual Settings"
> Expedition Aya Lightning Talk, Cohere For AI Community Meetup [🌐 Slides]   Aug 2024 (Online, Cohere For AI)

"Introduction to Deep Learning with Keras"
> Keras Community Day Bangladesh 2023 [🌐 Slides]   Oct 2023 (Brac University)

"Bangla Grammatical Error Detection Leveraging Transformer-based Token Classification"
> Bhashabhrom: Bangla Grammatical Error Detection Challenge 2023 [🌐 Slides]   Mar 2023 (Dept. of EEE, BUET)

"Introduction to Steganography"
> Intra-BUET Capture the Flag Competition Workshop 2023 [🌐 Slides]   Jan 2023 (BK-IAC, Dept. of CSE, BUET)

Technical Skills

Languages   Python, Java, C/C++, JavaScript, HTML/CSS, Shell, Matlab, Intel 8086 Assembly Language, MIPS Assembly

ML Tools   PyTorch, HuggingFace, OpenAI Gym, Spacy, Tensorflow, OpenCV, NLTK, Pandas, Matplotlib, Scikit-Learn

Developer Tools   Slurm, Kubernetes, Latex, Git, Docker, VS Code, Visual Studio, IntelliJ Idea, Postman

Operating Systems   Linux, Windows, MacOS

Web Frameworks   React, Node.js, Django, Bootstrap

Database   Oracle, PostgreSQL, MySQL, Sqlite