

Muhammad Rafsan Kabir

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RESEARCH INTERESTS

Natural Language Processing, Large Language Models, AI Ethics & Alignment, LLM Reasoning, Multilingual NLP, Prompt Engineering, Information Retrieval

EDUCATION

- **University of Calgary** Calgary, Alberta, Canada
• *Master of Science in Computer Science (Thesis-based), **CGPA 4.00** (out of 4)* *Jan 2026 - **Present***
Thesis: Reliability-Aware Federated Learning for Robustness under Heterogeneous Settings
 - Supervisor: [Dr. Marina Gavrilova](#)
- **North South University** Dhaka, Bangladesh
• *Bachelor of Science in Computer Science & Engineering, **CGPA 3.87** (out of 4)* *Jan 2020 - Jun 2024*
Thesis: [Beyond Labels: Aligning Large Language Models with Human-Like Reasoning](#)
 - Supervisor: [Dr. Nabeel Mohammed](#)

HONORS & AWARDS

- Alberta Graduate Excellence Scholarship (AGES), University of Calgary *Sept. 2026*
- Faculty of Graduate Studies International - Master's Scholarship, University of Calgary *Sept. 2026*
- International Graduate Tuition Award, University of Calgary *Jan. 2026*
- International Graduate Recruitment Award, University of Calgary *Jan. 2026*
- Summa Cum Laude (Highest Distinction), North South University *Jun. 2024*
- 100% Scholarship, North South University *Jan. 2020 - Jun. 2024*

PUBLICATIONS

- **Muhammad Rafsan Kabir**, Md Shopon, and Marina Gavrilova, "CAFE: Explainable Corruption-Aware Federated Aggregation for Robust Document Understanding," In *TrustDOC Workshop, International Conference on Pattern Recognition (ICPR)*, 2026.
- **Muhammad Rafsan Kabir**, Md Shopon, and Marina Gavrilova, "ReSoFed: Reliability-Guided Model Souping for Robust Federated Learning in Heterogeneous Classroom Environments," In *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*, 2026. ([Poster Presentation—Denver, USA](#)) [\[Link\]](#)
- Jawad Ibn Ahad, Maisha Rahman, Amrijit Biswas, **Muhammad Rafsan Kabir**, Robin Krambroeckers, Sifat Momen, Nabeel Mohammed, and Shafin Rahman, "Beyond Real Weights: Hypercomplex Representations for Stable Quantization," In *Winter Conference on Applications of Computer Vision (WACV)*, 2026. [\[Link\]](#)
- **Muhammad Rafsan Kabir**, Jawad Ibn Ahad, Robin Krambroeckers, Silvia Ahmed, M M Lutfe Elahi, Nabeel Mohammed, and Shafin Rahman, "Bidirectional Reasoning Supervision for Multilingual Financial Decision Making," In *Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2025. [\[Link\]](#)
- Nafew Azim, Abrar Ur Alam, Hasan Bin Omar, Abdullah M. M. Adnan Jami, Jawad Ibn Ahad, **Muhammad Rafsan Kabir**, Md. Ismail Hossain, Fuad Rahman, Mohammad Ruhul Amin, Shafin Rahman, and Nabeel Mohammed, "AutoDSPy: Automating Modular Prompt Design with Reinforcement Learning for Small and Large Language Models," In *Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2025. [\[Link\]](#)
- Md. Mohibur Rahman Nabil, **Muhammad Rafsan Kabir**, Rakibul Islam, Fuad Rahman, Nabeel Mohammed, and Shafin Rahman, "Decoding Bangla Hate Speech: Fine-Grained Type and Target Detection via Transformer Ensembles," In *Workshop on Bangla Language Processing (BLP), Association for Computational Linguistics*, 2025. [\[Link\]](#)
- Jawad Ibn Ahad, **Muhammad Rafsan Kabir**, Robin Krambroeckers, Sifat Momen, Nabeel Mohammed, and Shafin Rahman, "LAET: A Layer-wise Adaptive Ensemble Tuning Framework for Efficient Financial Natural Language Processing," In *IEEE International Conference on Big Data (IEEE BigData)*, 2025. [\[Link\]](#)

- Samiul Basir Bhuiyan, Md. Sazzad Hossain Adib, Mohammed Aman Bhuiyan, **Muhammad Rafsan Kabir**, Moshir Farazi, Shafin Rahman, and Nabeel Mohammed, “Z-Pruner: Post-Training Pruning of Large Language Models for Efficiency without Retraining,” In *ACS/IEEE International Conference on Computer Systems and Applications (AICCSA)*, 2025. [\[Link\]](#)
- Md. Nasim Ahmed*, Dipta Neogi*, **Muhammad Rafsan Kabir***, Shafin Rahman, Sifat Momen, and Nabeel Mohammed, “A Triple Pronged Approach for Ulcerative Colitis Severity Classification Using Multimodal, Meta, and Transformer Based Learning,” In *Nature Scientific Reports*, 2025. (IF 4.9) (* Equal Contribution) [\[Link\]](#)
- **Muhammad Rafsan Kabir**, Rashidul Hassan Borshon, and Riasat Khan, “Federated Learning for Human Activity Recognition: Balancing Privacy, Efficiency, and Accuracy through Innovative Aggregation Techniques,” In *Array (Elsevier)*, 2025. (IF 5.3) [\[Link\]](#)
- **Muhammad Rafsan Kabir**, Rafeed Mohammad Sultan, Fuad Rahman, Mohammad Ruhul Amin, Sifat Momen, Nabeel Mohammed, and Shafin Rahman, “LegalRAG: A Hybrid RAG System for Multilingual Legal Information Retrieval,” In *International Joint Conference on Neural Networks (IJCNN)*, 2025. [\[Link\]](#)
- Gazi Hasan Al Masud, Rejaul Islam Shanto, Ishmam Sakin, and **Muhammad Rafsan Kabir**, “Effective Depression Detection and Interpretation: Integrating Machine Learning, Deep Learning, Language Models, and Explainable AI,” In *Array (Elsevier)*, 2025. (IF 5.3) (Role: Supervisor) [\[Link\]](#)
- **Muhammad Rafsan Kabir**, Rafeed Mohammad Sultan, Ihsanul Haque Asif, Jawad Ibn Ahad, Fuad Rahman, Mohammad Ruhul Amin, Nabeel Mohammed, and Shafin Rahman, “Beyond Labels: Aligning Large Language Models with Human-Like Reasoning,” In *International Conference on Pattern Recognition (ICPR)*, 2024. [\[Link\]](#)
- **Muhammad Rafsan Kabir**, Md. Mohibur Rahman Nabil, and Mohammad Ashrafuzzaman Khan, “BanglaEmbed: Efficient Sentence Embedding Models for a Low-Resource Language Using Cross-Lingual Distillation Techniques,” In *International Conference on Algorithms, Computing and Artificial Intelligence (ACAI)*, 2024. [\[Link\]](#)
- **Muhammad Rafsan Kabir**, Rashidul Hassan Borshon, Mahiv Khan Wasi, Rafeed Mohammad Sultan, Ahmad Hossain, and Riasat Khan, “Skin Cancer Detection using Lightweight Model Souping and Ensembling Knowledge Distillation for Memory-constrained Devices,” In *Intelligence-Based Medicine (Elsevier)*, 2024. [\[Link\]](#)

Manuscripts Under Review

- Dipta Neogi, Nourash Azmine Chowdhury, **Muhammad Rafsan Kabir**, Ahmed Faizul Haque Dhrubo, Mohsin Sajjad, Mohammad Abdul Qayum, and Mohammad Ashrafuzzaman Khan, “Video-Based MPAA Rating Prediction: An Attention-Driven Hybrid Architecture Using Contrastive Learning,” In *IEEE Transactions on Artificial Intelligence (IEEE TAI)*, 2026. [\[Link\]](#)

RESEARCH EXPERIENCE

- **Graduate Research Assistant** Calgary, Canada
Biometric Technologies Lab (BTLab), University of Calgary Jan. 2026 - **Present**
Supervisor: [Dr. Marina Gavrilova](#)
Research Area: Computer Vision, Privacy-Preserving AI, and Trustworthy AI
 - Developed reliability-aware federated aggregation methods for learning under heterogeneous and corrupted data
 - Designed and evaluated reliability-guided aggregation strategies across image and document classification tasks
- **Research Assistant** Dhaka, Bangladesh
Machine Intelligence Lab (MILab), North South University May 2024 - Dec. 2025
Supervisors: [Dr. Shafin Rahman](#), [Dr. Nabeel Mohammed](#), [Dr. Sifat Momen](#)
Research Area: Natural Language Processing, Computer Vision and Machine Learning
 - Explored bidirectional reasoning for fine-tuning LLMs in multilingual settings (EMNLP 2025)
 - Applied advanced computer vision techniques to classify ulcerative colitis severity (Nature Scientific Reports)
- **Research Assistant** Dhaka, Bangladesh
Apurba-NSU R&D Lab, North South University Oct. 2024 - Nov. 2024
Supervisor: [Dr. Nabeel Mohammed](#)
Research Area: Natural Language Processing and Information Retrieval
 - Developed an advanced RAG pipeline for multilingual legal document analysis (IJCNN 2025)

TEACHING EXPERIENCE

- **Graduate Teaching Assistant** Calgary, Canada
Jan. 2026 - Present
Department of Computer Science, University of Calgary
Courses: CPSC 217, CPSC 219, CPSC 231, CPSC 383
- **Graduate Teaching Assistant** Dhaka, Bangladesh
Sept. 2024 - Dec. 2025
Department of Electrical & Computer Engineering, North South University
Courses: CSE115: Programming Language I, CSE323: Operating Systems, CSE445: Machine Learning, CSE465: Pattern Recognition
- **Course Instructor** Remote
Mar. 2024 - Sept. 2024
Python & ML for Research
 - Conducted a research-focused course covering Python programming and Machine Learning [\[Course Outline\]](#)
 - One student group published a journal article (IF 5.3) under my supervision based on the course project
- **Undergraduate Teaching Assistant** Dhaka, Bangladesh
Summer 2022
Department of Mathematics & Physics, North South University
Courses: PHY107: Physics I

ACADEMIC SERVICE & LEADERSHIP

- **Vice President–Internal**, Computer Science Graduate Society (CSGS), University of Calgary *2026*
- **Reviewer**, EMNLP 2026 (Industry Track) *2026*
- **Reviewer**, Nature Scientific Reports (Impact Factor: 4.9) *2026*
- **Reviewer**, International Joint Conference on Neural Networks (IJCNN) *2025, 2026*
- **Reviewer**, Computer Speech & Language (Impact Factor: 3.0) *2025*
- **Reviewer**, Neurocomputing (Impact Factor: 6.7) *2025*
- **Reviewer**, Knowledge-Based Systems (Impact Factor: 8.0) *2025*
- **Reviewer**, Engineering Applications of Artificial Intelligence (Impact Factor: 9.0) *2024, 2025*
- **Reviewer**, Expert Systems with Applications (Impact Factor: 9.4) *2024, 2025*
- **Senior Member**, NSU ACM Student Chapter, North South University *2022, 2023*

INVITED TALKS & WORKSHOPS

- **Instructor** — Invited to conduct a workshop titled “*From Idea to Innovation: Starting Your Research Journey*” in the Skill Development Venture 4.0 organized by the IEEE NSU Student Branch. (*Aug. 2025*)
- **Podcast Guest** — Invited to discuss *AI Alignment and Large Language Models* based on my accepted paper at ICPR 2024. Featured on [Luke Monington], available on [YouTube](#). (*Dec. 2024*)
- **Instructor** — Conducted a technical session on *Prompt Engineering and Retrieval-Augmented Generation (RAG)* during a 5-day workshop organized by MILab and Apurba-NSU R&D Lab. (*Oct. 2024*)

TECHNICAL SKILLS

- **Programming Languages:** Python, C, C++, JAVA, JavaScript, PHP
- **ML Libraries:** PyTorch, TensorFlow, Scikit-Learn, Hugging Face Transformers, LangChain, Sentence Transformers
- **Tools:** Git, Linux, LaTeX

REFERENCES

- [Dr. Marina Gavrilova](#) Professor
University of Calgary, Canada
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- [Dr. Nabeel Mohammed](#) Professor
North South University, Bangladesh
Email: nabeel.mohammed@northsouth.edu