Syed Rifat Raiyan

Phone: [redacted] **Website:** starscream-11813.github.io
Email: rifatraiyan@iut-dhaka.edu, rifatraiyan99@gmail.com
GitHub: github.com/Starscream-11813 **LinkedIn:** syed-rifat-raiyan
Address: 37 Shah Makhdum Avenue, Sector-12, Uttara, Dhaka-1230

Education

Islamic University of Technology (IUT) — Gazipur, Bangladesh
B.Sc. (Hons.), Computer Science and Engineering — *2019–2023*
CGPA: 3.98/4.00 (***1st*** in class)

- **Thesis:** *"Variational Mathematical Reasoning: Enhancing Math Word Problem Solvers with Linguistic Variants and Disentangled Attention"*
  Supervisor: Mohsinul Kabir, Assistant Professor, Dept. of CSE, IUT

Notre Dame College (NDC) — Dhaka, Bangladesh
Higher Secondary School Certificate (HSC), Science — *2016–2018*
GPA: 5.00/5.00 (***98th*** in Dhaka Board)

RAJUK Uttara Model College (RUMC) — Dhaka, Bangladesh
Secondary School Certificate (SSC), Science — *2011–2015*
GPA: 5.00/5.00

Experience

Battery Low Interactive Ltd. — Dhaka, Bangladesh
Industrial Training, *Mobile Application Development* with *Flutter* — *October 2021*

- Learnt about the basics of the Flutter framework, Dart programming language, Flutter Widgets, State Management, API Integration, and UI/UX design.
  Final Project: A mobile application for Competitive Programmers with features like Contest Calendar, Profile Statistics Visualization, Problemset Filtering, and Visually Distinctive UI Themes.

Research Projects

Undergraduate Thesis Project | aclanthology.org/2023.acl-srw.49 — Published in *ACL-SRW 2023*
Variational Mathematical Reasoning: Enhancing Math Word Problem Solvers with Linguistic Variants and Disentangled Attention

- We proposed a framework for Math Word Problem (MWP) solvers based on the generation of linguistic variants of the problem text and electing the predicted expression with the majority of the votes.
- We also introduced a challenging dataset, ParaMAWPS, consisting of paraphrased, adversarial, and inverse variants of MWPs.

Bangla Sentiment Analysis | aclanthology.org/2023.findings-acl.80 — Published in *Findings of ACL 2023*
BanglaBook: ***A Large-scale Bangla Dataset for Sentiment Analysis from Book Reviews***

- We presented BanglaBook, a large-scale dataset of Bangla book reviews consisting of 158,065 samples classified into three broad categories: *Positive*, *Negative*, and *Neutral*.
- We statistically analyzed the dataset and employed multiple machine learning models to establish baselines.
- Our findings demonstrated a substantial performance advantage of pre-trained models over models that rely on manually crafted features.

Survey on Math Word Problem and Geometry Problem Solving — Paper *work-in-progress 2022*
Solving Math Word Problems and Geometry Problems using Natural Language Processing and Multi-modal Reasoning: A Review of the Recent Approaches

- We provided an analytical, critical, chronological, and comprehensive review of the literature in the domain of MWP & Geometry Problem Solving and outlined our future expectations about this research frontier.

Publications

[1] M. Kabir, O. B. Mahfuz, **S. R. Raiyan**, H. Mahmud, and M. K. Hasan, "BanglaBook: A Large-scale Bangla Dataset for Sentiment Analysis from Book Reviews", in *Findings of the Association for Computational Linguistics: ACL 2023*, Association for Computational Linguistics, Jul. 2023, pp. 1237–1247. DOI: 10.48550/arXiv.2305.06595.

[2] **S. R. Raiyan**, M. N. Faiyaz, M. J. Kabir, M. Kabir, H. Mahmud, and M. K. Hasan, "Math Word Problem Solving by Generating Linguistic Variants of Problem Statements", in *Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (Volume 4: SRW)*, Jul. 2023, pp. 362–378. DOI: 10.48550/arXiv.2306.13899.

Other Projects

Hand Shadow Puppet Recognition | Python/PyTorch — CSE 4836, Paper *work-in-progress*
HASPER: ***A Large-scale Repository of Images for Hand Shadow Puppet Recognition*** — *2023*

- We introduced a large-scale dataset consisting of *8,340 images* of hand shadow puppets across *11 classes* extracted from both professional and amateur hand shadow puppeteer clips.
- We provided a detailed *statistical analysis* of the dataset and employed a range of deep learning-based image classification models to *establish baselines*.

Motion-based Gaming | Python/MediaPipe | tinyurl.com/FitQuestExergames — CSE 4849: HCI
FITQUEST EXERGAMES: ***Motion-based Gameplay for Simple Sedentary Games*** — *2023*

- Re-imagined the gaming experience of 2 simple sedentary games, *Chrome Dino* and *Pinball*, into *motion-based* forms by sensing the user's motion via an *external camera*.

MWP Solver | Python/TensorFlow/HuggingFace | tinyurl.com/MathBotModel — CSE 4622: ML Lab
MATHBOT: ***A Transformer-based Math Word Problem (MWP) Solver*** — *2022*

- Implemented a *Transformer* model that translates an MWP statement to a valid *math expression*, which when evaluated, yields the *solution* to the problem.

Competitive Programming IDE | Python/Flask/Bootstrap | tinyurl.com/CpZenIDE — CSE 4510: SD Lab
CPZEN: ***An Online Integrated Development Environment (IDE) for Competitive Programmers*** — *2021*

- Created a Codemirror text editor area with Syntax Highlighting, Auto-Indentation, Auto-Brackets Matching, Auto-Brackets Highlighting, and Line Highlighting. Supports a total of 20 programming languages.
- Users can *Compile/Run* codes, *Save* their codes/templates, view a list of *Upcoming Contests* on 12 online judges, view *Profile Statistics*, and keep track of the *Algorithms* they learn throughout their CP journey.

Islamic Productivity App | Javascript/PERN Stack | tinyurl.com/PMuslimApp — CSE 4508: RDBMS Lab
PRODUCTIVE MUSLIM: ***A Productivity App for the Adherents of the Islamic Faith*** — *2021*

- Users can view a wide variety of *Duas* (supplications) categorized based on emotions, view a list of *Salah Waqts*, use a *Fasting Calendar*, maintain a *To-do List*, choose to participate in a *"30-days, 30-deeds"* challenge, and converse with others in a *Discussion Forum*. **Stack:** PostgreSQL, Express, React, Node.js

3D Modeling of Architectural Landmark | Blender | tinyurl.com/ToriiGate — CSE 4552: CGMS Lab
TORII GATE: ***A 3D Blender Model of the Itsukushima Shrine Torii Gate*** — *2021*

- Created a day-night timelapse scene featuring the Itsukushima Shrine Torii Gate, a Japanese Shinto shrine.

Offline Programming Judge | Java/Swing/Socket/SQLite | tinyurl.com/IUTForces — CSE 4402, CSE 4408
IUTFORCES: ***An Offline Judge Application to Automate the Lab Task Evaluation Process*** — *2020*

- Lab Instructors can *create problemsets* as programming lab tasks, automatically *assess* the students' solutions, view *Rank-lists*, view a *Status Table* of the submissions, and view the students' *Submission History*. Students can *submit* their code and view the *verdicts* of their submissions.

Sketchbook Application | C++/Qt | tinyurl.com/InQAppQt — CSE 4302: OOP Lab
INQ: ***A Digital Canvas for Painting with a Virtual Palette of Colors and Tools*** — *2020*

- Users can adjust *Brush Thickness*, select colors of different shades/hues/saturations from a *Color Palette*, draw *Geometric Shapes*, use a *Floodfill* tool, *Zoom* in/out, *Open/Save* image files, and change their *Resolution*.

ASCII Art-based Console Game | C/SDL | tinyurl.com/IntoThePokeverse — CSE 4202: SP-II Lab
POKÉMON - INTO THE POKÉVERSE: ***A Simple Pokémon Game with ASCII Art Characters*** — *2019*

- Users play as Pokémon trainers, engage in *Pokémon battles* against opponents of varying *difficulty levels*, purchase *items*, *heal* Pokémons, and *explore* a 2D map of the game world.

Relevant Undergraduate Courses

Structured Programming, Data Structures, Algorithms, Machine Learning, Pattern Recognition, Data Mining, Technical Report Writing, Algorithm Engineering Lab, Engineering Drawing Lab, Discrete Mathematics, Linear Algebra, Object Oriented Programming, Database Management Systems, Operating Systems, RDBMS Programming Lab, Mathematical Analysis, Digital Image Processing Lab, Numerical Methods, Artificial Intelligence Lab, Graph Theory, Theory of Computing

Research Interests

- **Natural Language Processing:** Mathematical Reasoning, Sentiment Analysis, Text Classification, Watermarking
- **Computer Vision:** Image Classification, Image Processing
- **Deep Learning:** Artificial General Intelligence

Skills

- **Programming Languages:** C, C++, Python, MATLAB, Octave, Java, Bash, Javascript, Dart
- **Framework & Libraries:** Pytorch, Tensorflow, Scikit-learn, Keras, OpenCV, MediaPipe, HuggingFace, Matplotlib, OpenGL, Bootstrap, HTML5, CSS3, Flask, React, Express, Node.js, Java Swing, JavaFX, Qt Creator, SDL
- **Database:** SQLite, SQLAlchemy, PostgreSQL, PL/SQL
- **Prototyping:** Adobe XD
- **Version Control:** Git Bash, GitHub Desktop
- **Typesetting:** LaTeX, Markdown
- **IDE:** Codeblocks, Apache NetBeans, IntelliJ, Visual Studio Code, Google Colab, Jupyter Notebook, Qt, Android Studio, TeXmaker, Edit Plus, Sublime Text
- **Operating System:** Windows 10, Linux Ubuntu
- **Microsoft Office Suite:** Word, Excel, PowerPoint
- **Graphics/Editing Software:** Blender, Adobe Photoshop, Adobe Premiere Pro, DaVinci Resolve, Draw.io

Conference Presentations

- **Virtual Attendee** at *61st Annual Meeting of the Association for Computational Linguistics* *2023*
  - Virtually presented a poster of my thesis work at Pier 7&8 of the Westin Harbour Castle, Toronto, Canada.

Languages

- **Bangla:** Native or bilingual proficiency
- **English:** Fluent or full professional proficiency

Extracurricular Activities

- **Competitive Programming** *2019–2022*
  Participated in *100+ contests* and solved *1000+ programming problems* across many online judges.
  - **Codeforces:** Starscream-11813 (Max. 1656, **Expert**)
  - **CodeChef:** starscream_51 (Max. 1703, **3★**)
  - **AtCoder:** Starscream (Max. 610, **7 Kyu**)
- **Gaming/E-sports** *2019–2022*
  Vice President at *IUT Dota 2 Society (IUTD2S)*
  Organized and participated in Dota 2 tournaments.
- **Bangla Poetry Recitation** *2008–2009*
  Performed in my primary school's *Annual Function*.
  Participated in *several cultural competitions*.

Awards, Achievements & Scholarships

- **IUT Gold Medal**, for standing ***1st*** in the batch of CSE-18, Islamic University of Technology *2023*
- **Partial OIC Scholarship**, awarded by the Islamic University of Technology *2019–2023*
- **Talentpool Scholarship**, for standing ***98th*** in the 2018 HSC Examination, Dhaka Board *2019–2022*
- **Programming Contests**
  - RUET Inter University Programming Contest (IUPC) 2022, ***39th*** among 97 teams *2022*
  - ICPC Dhaka Regional Contest 2020, ***24th*** among 110+ teams *2021*
  - Codeforces - Good Bye 2020, ***32nd*** in Bangladesh *2020*
  - National Collegiate Programming Contest (NCPC) 2020, ***73rd*** among 150 teams *2020*
  - 20th IUT Computer Programming Contest (IUTCPC) 2019, ***38th*** among 70 teams *2019*
- RAJUK Uttara Model College **Annual General Knowledge Competition**, ***1st*** position *2015*
- Sonali Bank Ltd. **Annual Cultural Competition** (Chittagong Division), Poem Recitation, ***3rd*** position *2009*
- Sonali Bank Ltd. **Annual Cultural Competition** (Chittagong-South), Poem Recitation, ***1st*** position *2009*

Leadership & Volunteering

- **Instructor** at *IUT ACM Community* *2021–2022*
  - Mentored freshman/sophomore year CP aspirants.
  - Organized and conducted weekly classes.
  - Created problemsets for weekly contests.
- **Volunteer** at *IUT 10th ICT Fest* *April 2019*
  - Seminar
  - Logistics
  - Gaming

References