

SYED RIFAT RAIYAN

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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:** L^AT_EX, Markdown
- **IDE:** Codeblocks, Apache NetBeans, IntelliJ, Visual Studio Code, Google Colab, Jupyter Notebook, Qt, Android Studio, T_EXmaker, 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

- [Redacted]
- [Redacted]
- [Redacted]