Nafis Karim

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Education

Bangladesh University of Engineering and Technology (BUET) Dhaka, Bangladesh
BSc. in Computer Science and Engineering *May 2019 – June 2024*
CGPA: 3.81/4.00 (3.97 in final year)

Notre Dame College (NDC) Dhaka, Bangladesh
Higher Secondary School *Jul 2016 – Oct 2018*

Professional Experience

Lecturer, CSE Department, Brac University *July 2024 to Present*
Courses Taught: CSE321 (**Operating Systems**), CSE230 (**Discrete Mathematics**), CSE111 (**OOP**), CSE220(**Data Structures**), CSE110(**Programming Language 1**)

Research Interest

Cybersecurity, Machine learning for security, Security for Machine Learning

Research experience

- **Exploring Few shot learning for Named Entity Recognition in Cyber Threat Intelligence: Insights and Comparisons with Transformer-based Models** *May 2023 - November 2024*

  Supervisor: Dr. Md. Shohrab Hossain
  Collaborators: Dr. Ying-Dar Lin and Dr. Ren-Hung Hwang

  – Evaluated few-shot learning with LLMs (**GPT-3.5, GPT-4.0, Gemini**) for NER in CTI.
  – Compared few-shot learning (unexplored in CTI) with fine-tuned models (**BERT, RoBERTa**) for cybersecurity entity extraction on **DNRTI** and **APTNER** datasets.
  – Highlighted limitations of few-shot learning in domain-specific tasks like CTI.
  – Achieved state-of-the-art results on **DNRTI** using **SecureBERT**: **F1: 85.9%, Acc: 95.6%**.
  – Demonstrated potential of **GPT-4.0** in low-resource scenarios: **F1: 69.9%, Acc: 73.0%**, emphasizing transformer superiority.

  Status: Under review at *ACM Transactions on Privacy and Security* [PDF]

- **Forecasting of COVID-19 cases using a custom deep learning architecture incorporating vaccination** *June 2023 - December 2023*

  Award: Best Student Poster at NSysS, 2023 [Poster]

  – Built a deep learning model integrating vaccination and hospital data for COVID-19 forecasting.
  – Outperformed CNN and LSTM (**F1: 0.89**) on 40-day USA/UK data.
  – Found **-0.85 correlation** between vaccination rates and cases, showing vaccination's role in reducing infections.
  – Predicted a 30% case decline in 60 days in the USA with mass vaccination.
  – Noted moderate correlation (**-0.45**) in India due to variants and gatherings, stressing additional measures.
  – Highlighted vaccination's critical role in controlling pandemics.

- **Exploring Post-Mortem Neural Signal Processing: Uncovering Computational Potentials in Deceased Animal Brains**

  Supervisor: Dr. A.B.M Alim Al Islam *March 2021 - December 2023*
  Award: Best Student Poster at NSysS, 2021

  – Investigated the potential of a deceased animal brain to process signals.
  – Explored the ability of a deceased goat brain to function as a memory unit.
  – Analyzed transfer characteristics using representative circuits.

  Status: Under review[PDF]

Relevant Courseworks

Computer Security, Machine Learning, Artificial Intelligence, Operating Systems, Computer Networks, Software Engineering, Discrete Mathematics

Academic Projects

Neural Style Transfer using CNN *Nov 2023 - Feb 2024*

- Artistic style transfer inspired by Gatys et al., enabling style transfer from one image to another.

sub-C Compiler *June 2022 - Sep 2022*

- Developed a C compiler performing lexical, syntax, and semantic analysis, converting C code to x86 assembly.

Ray Tracing Project *May 2023 - Aug 2023*

- Generated realistic images of geometric shapes using ray tracing techniques.

Cryptography Algorithms, Security Vulnerabilities, and Attacks *May 2023 - Sep 2023*

- Explored malware, buffer overflow attacks, and browser exploitation using BeEF.

Nmap - Computer Security Project *June 2023 - Sep 2023*

- Explored various features of the network scanning tool, Nmap.

Non-invasive Mechanical Ventilator (Microcontroller Project) *June 2022 - Aug 2022*

- Designed and implemented a cost-effective non-invasive ventilator system.

Operating Systems Sessional *Dec 2022 - Feb 2023*

- Implemented various functionalities of the xv6 Operating System.

Technical Skills

- **Programming Languages:** Java, C++, Python, JavaScript
- **Security Tools:** WireShark, NS2, CamFlow, Nmap
- **Frameworks:** Django, NodeJS, React, Pytorch, TensorFlow
- **Markup Languages:** HTML, CSS, XML, LATEX
- **Version Control System:** Git

Standardized Test Scores

Graduate Record Examination (GRE) November 27, 2024

Total	Quantitative	Verbal	Analytical
323	163	160	4.5

Test of English as a Foreign Language (TOEFL) September 21, 2024

Total	Reading	Listening	Speaking	Writing
111	28	29	27	27

Academic Recognition and other achievements

- University Dean's List Scholarship (Levels 1, 2, 4)
- University Merit List Scholarship(Levels 1, 2, 4)
- Talentpool Scholarship (HSC/A Level): 10th position in Dhaka Board
- Talentpool Scholarship (SSC/O level): 12th position in Dhaka Board
- Student Poster Champion: 8th International Conference on Networking, Systems and Security
- Student Poster Champion: 10th International Conference on Networking, Systems and Security