Farhanaz Farheen

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RESEARCH INTEREST

Bioinformatics — Machine Learning — Computer Vision — Agent Based Modeling

EDUCATION

Bangladesh University of Engineering and Technology Dhaka, Bangladesh
Bachelor of Science in Computer Science and Engineering *Feb 2016 – Feb 2021*

  Thesis: Lung Tumor Segmentation from CT Scan Images using Deep Supervision
  Supervisor: Dr. M. Sohel Rahman, Professor, Department of CSE, BUET
  CGPA: 3.81 out of 4.00
  Major CGPA: 3.95 out of 4.00
  Final two-year CGPA: 3.96 out of 4.00

Viqarunnisa Noon School and College Dhaka, Bangladesh
Higher Secondary Certificate *2013 – 2015*

EMPLOYMENT

Lecturer (Full-time), Department of Computer Science and Engineering Feb 2021 – Present
United International University [Faculty Profile] *Madani Ave, Dhaka*

- **Courses taught by me**: Object Oriented Programming, Object Oriented Programming Laboratory, System Analysis and Design, Software Engineering Laboratory

English News Presenter (Part-time), Bangladesh National Radio 2017 – 2021
Bangladesh Betar *Agargaon, Dhaka*

PUBLICATION

An Agent-Based Modeling of COVID-19: Validation, Analysis, and Recommendations [PDF]
Published: February 19, 2021

  Published in: International peer-reviewed scientific journal Cognitive Computation, Impact factor: 4.98, Publisher: Springer
  Authors: Md. Salman Shamil, Farhanaz Farheen, Nabil Ibtehaz, Irtesam Mahmud Khan & M. Sohel Rahman

RESEARCH EXPERIENCE

An Agent-Based Modeling of COVID-19: Validation, Analysis, and Recommendations 2020
- Supervisor: Dr. M. Sohel Rahman, Professor, Department of CSE, BUET
- Published in **Cognitive Computation** Journal's Special Issue: Data-Driven Artificial Intelligence approaches to Combat COVID-19; Programming Language: Python; [Source Code], [PDF]
- **Description**: Our study proposes an agent-based model that simulates the spread of COVID-19 in a city. We have considered each person as an agent susceptible to COVID-19 in the model. Infected agents can transmit the disease via various actions performed every hour. The study can be divided into two key portions: **model validation** (done using data of Ford County, KS, USA) and **experiments run on a scaled-down version** of New York City, USA. In the latter, we applied different interventions, including contact tracing and determined the parameters that lead to a controlled epidemic. Our experiments suggest that contact tracing via smartphones with more than 60% of the population owning a smartphone combined with city-wide lockdown results in the effective reproduction number (R_t) to fall below 1 within 3 weeks of intervention. For 75% or more smartphone users, new infections are eliminated, and the spread is contained within 3 months of intervention.

Lung Tumor Segmentation from CT Scan images using Deep Supervision 2019 – Present
- Supervisor: Dr. M. Sohel Rahman, Professor, Department of CSE, BUET
- Programming Language: Python; Framework: Keras; Backend: Tensorflow

- **Description**: Our work focuses on the problem of detecting lung tumors from two dimensional CT images using image processing and deep learning techniques. We have applied two-dimensional discrete wavelet transform (DWT) on the LOTUS dataset whilst integrating information from neighboring CT slices before feeding them to a Deeply Supervised MultiResUNet model. We have also experimented with other models like: U-Net, MultiResUNet and Deeply Supervised U-Net. The challenges in the dataset were handled. Variations in learning rates, decay and optimization algorithms while training the network have led to different dice coefficients. We have obtained a dice co-efficient of 0.8458.

An Agent-Based Modeling of COVID-19 for Bangladesh   2020 – Present
- Supervisor: Dr. M. Sohel Rahman, Professor, Department of CSE, BUET
- Programming Language: Python
- **Description**: Here, we have developed an Agent-Based Model that simulates COVID-19 spread in Bangladesh. This experiment allows agents i.e. humans to be either susceptible, asymptomatic, mild symptomatic, severe symptomatic, recovered or dead. The agent pool is divided into age groups. A tool known as "Contact Matrix" is used to measure or approximate the number of people who meet each other on average everyday. Different parameters have been utilized to reflect non-pharmaceutical interventions, infection probability etc. The Agent-Based Model can capture the nature of changes that occur in the trend of COVID-19 spread when the model parameters are varied.

NOTABLE PROJECTS

CRISPR cas9 on-target Knockout Efficacy Prediction   2020
- Supervisor: Dr. Atif Hasan Rahman, Assistant Professor, Department of CSE, BUET
- Programming Language: Python; Framework: Keras; [Source Code]
- **Dataset**: DeepHF Dataset (Containing 59,000 gRNAs with corresponding 21mers)
- **Project Description**: The experiment was conducted for 3 cas9 variants: WT-SpCas9, eSpCas9 and SpCas9-HF1. We used two basic methods for preparing the input instance: One hot encoding and learning word embeddings using shallow neural networks. For training our dataset, we experimented with many different deep learning models like: Simple CNN model, CRNNCrispr seq branch only, LSTM, GRU, Bi-LSTM, Bi-LSTM with Attention and Hierarchical Attention Networks (HAN). For the test set, we evaluated the Spearman Correlation co-efficients for all three variants. The best results were obtained for Bi-LSTM with Word2Vec: 0.8516, 0.8349 and 0.8303 respectively.

Online Service Provider Website   2019
- Supervisor: Dr. A. B. M. Alim Al Islam, Professor, Department of CSE, BUET
- Programming Language: Python; Framework: Django; [Source Code]
- **Project Description**: This involves four subsystems in total: account subsystem, verification subsystem, order subsystem and feedback subsystem. Services are divided into categories and service providers can upload their commercial content from their accounts. Customers can order any service from (one or more) service providers and add them to their carts. Admins are responsible for customer service and account verification. Customers can provide feedback to service providers for their services. Customers are given the option of chatting with service providers.

Refugee Camp Management System   2017
- Supervisor: Nazmus Saquib, Assistant Professor, Department of CSE, BUET
- Programming Language: Java; [Source Code]
- **Project Description**: This project is focused on creation and management of a large database that allows the storage of personal and medical details of the refugees in a camp. Information of doctor appointments, prescriptions etc. are also stored in the database. The system can store and manage information about camp volunteers as well.

GRE Mock Questions Generator   2016
- Supervisor: Md. Shariful Islam Bhuyan, Assistant Professor, Department of CSE, BUET
- Programming Language: Java; Application Framework: JavaFX [Source Code]
- **Project Description**: The system allows a mock test taker to sit for preparation exams and view their scores. This is a server-client system where the server hosts the GRE question bank and details of the client account. The client gets to choose the difficulty level, and the test ends once the fixed time is up. The score is shown to the client along with the correct answers.

Harry Potter Maze Game   2016
- Supervisor: Mohammed Kaysar Abdullah, Former Lecturer, Department of CSE, BUET
- Programming Language: C (igraphics); [Source Code]
- **Project Description**: This is a simplistic one-player maze game with 7 levels. Obstacles can appear dynamically at any point of movement. The player has to avoid all the obstacles and reach the exit.

Leadership Experience

Former General Secretary, BUET Debating Club	2019 – 2020
Former President, Viqarunnisa Noon Debating Club	2018 – 2019
Former Vice President (Quiz & Olympiad), Viqarunnisa Noon English Language Club	2016 – 2017

Achievements and Awards

Champion, East West University English Debate Tournament	2018
Representative of BUET Debating Club, World Universities Debating Championship, Netherlands	2017
Merit Talent Scholarship, Higher Secondary School Certificate, Dhaka Education Board	2015
Champion, BUET Interschool English Debate Tournament	2012
Champion, Interschool English Extempore Speech, VNSC Science Festival	2012
Representative of Bangladesh, National Children's Science Congress, Jaipur, India	2011
Champion, Science Project Display, VNSC Science Festival	2008, 2010
Champion, Interschool Astro Olympiad, VNSC Science Festival	2009

Technical Skills

Languages: Java, Python, C, C++, SQL, HTML, MATLAB, Intel 8086 Assembly Language; **Frameworks**: Keras, Django, OpenGL; **Developer Tools**: Git, VS Code, Codeblocks, Netbeans, Eclipse, Atmel Studio, Latex; **Libraries**: Pandas, NumPy, Matplotlib, SciPy, Scikit-Learn, Tensorflow; **Miscellaneous**: Microsoft Office, Powerpoint, Excel, Word

References

Dr. M. Sohel Rahman
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[URL], [Google Scholar], [Researchgate]