Md Salman Shamil

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EDUCATION

School of Computing, National University of Singapore — Singapore
PhD in Computer Science — *August 2022-present*
Research Focus: Utilizing 3D hand poses for video understanding
Advisor: Dr. Angela Yao

Bangladesh University of Engineering and Technology — Dhaka, Bangladesh
Bachelor of Science in Computer Science and Engineering — *February 2016-February 2021*
CGPA: 3.81/4.00 (Major CGPA: 3.95/4.00)

PROFESSIONAL EXPERIENCE

Graduate Teaching Assistant at School of Computing — *January 2023-Present*
National University of Singapore — Singapore

Lecturer at Department of Computer Science & Engineering — *March 2021-July 2022*
United International University (UIU) — Dhaka, Bangladesh

RESEARCH INTEREST

Deep Learning, Computer Vision, Video Understanding

PUBLICATIONS & PREPRINTS

1. **Shamil, M.S.**, Chatterjee, D., Sener, F., Ma, S. and Yao, A., 2024. On the Utility of 3D Hand Poses for Action Recognition. *arXiv preprint arXiv:2403.09805*.
2. Farheen, F., **Shamil, M.S.**, Ibtehaz, N. and Rahman, M.S., 2022. Revisiting segmentation of lung tumors from CT images. *Computers in Biology and Medicine*, p.105385. *[Co-first author]*
3. **Shamil, M.S.**, Farheen, F., Ibtehaz, N., Khan, I.M. and Rahman, M.S., 2021. An Agent-Based Modeling of COVID-19: Validation, Analysis, and Recommendations. *Cognitive Computation*, pp.1-12.
4. Habib, M., **Shamil, M.S.** and Rahman, M.S., 2021. Counting and Verifying Abelian Border Arrays of Binary Words. *arXiv preprint arXiv:2111.00259*.

RESEARCH EXPERIENCE

- **On the Utility of 3D Hand Poses for Action Recognition**, *December 2022-Present*. Working with Asst. Prof. Dr. Angela Yao and Dr. Fadime Sener.
  - Developed HandFormer, a novel multimodal transformer, to efficiently recognize hand actions.
  - Proposed a factorized pose representation that can combine 3D hand poses with sparsely sampled RGB frames for high accuracy and efficiency.
  - Achieved new state-of-the-art performance on Assembly101 and H2O datasets, showcasing the utility of 3D hand poses for egocentric and multi-view action recognition.
- **True Random Number Generator as a Byproduct of DNA Storage Operation**, *August 2022-December 2022*. Worked with Asst. Prof. Dr. Djordje Jevdjic.

  - Proposed a method leveraging DNA sequencing to generate a free source of true random numbers, minimizing bias and achieving NIST compliance.
  - Developed and experimentally validated a practical approach for constructing truly random bit streams based on the order of DNA molecules during the readout process.

- **Segmentation of Lung Tumor from CT Images using Deep Learning**, as part of B.Sc. thesis. *September 2019-February 2021.* Worked with Prof. Dr. M. Sohel Rahman.
  - Worked on Lung-Originated Tumor Segmentation from Computed Tomography Scan (LOTUS) Benchmark dataset.
  - Proposed a unique preprocessing technique by combining neighboring CT slices for context and wavelet transforms for texture analysis.
  - Experimented with several deep learning models and incorporated deep supervision in MultiResUNet for achieving the best results.

- **Agent-based Modeling of COVID-19**, *May 2020-May 2022.* Worked with Prof. Dr. M. Sohel Rahman.
  - Implemented and validated an Agent Based Model (ABM) with individual action details.
  - Examined the impacts of different interventions and the effectiveness of digital herd immunity.
  - Worked on a project to develop COVID-19 forecasting models and data-driven responses to address high-priority public health challenges in Aspire to Innovate (a2i). The project is implemented by the ICT Division and Cabinet Division of the Government of Bangladesh.

- **Counting and Verifying Abelian Border Arrays of Binary Words**, *September 2019-September 2020.* Worked with Prof. Dr. M. Sohel Rahman.
  - Showed that the number of valid abelian border arrays of length n is 2^{n-1}.
  - Reduced the abelian border array verification problem to computing the abelian border array of a particular binary word to propose an $O\left(\frac{n^2}{\log^2 n}\right)$ time algorithm.

TEACHING EXPERIENCE

- **National University of Singapore (NUS)** *Singapore*
  Teaching Assistant duty at SoC, NUS.
  - **CS4243: Computer Vision and Pattern Recognition.** (Prof. Angela Yao) Designed and graded lab sessions, assignments, and other assessments. Assisted in coordinating logistical aspects.
  - **BT3017: Feature Engineering for Machine Learning.** (Prof. Ng Teck Khim) Conducted tutorial classes for teaching data handling and feature engineering. Evaluated assignments and provided consultation hours.

- **United International University (UIU)** *Dhaka, Bangladesh*
  Performed duties such as preparing and delivering lectures, creating assessments, conducting exams, grading assignments, and offering student consultations. Courses instructed as a **full-time lecturer**:
  - CSI 423: Simulation & Modeling (Fall 2021, Summer 2021)
  - CSI 424: Simulation & Modeling Laboratory (Fall 2021, Summer 2021, Spring 2021)
  - CSE 4510: Operating System Concepts Laboratory (Fall 2021, Summer 2021)
  - CSE 493: Introduction to Bioinformatics (Fall 2021)

- CSE 2233: Theory of Computation (Summer 2021)
- CSE 3522: Database Management Systems Laboratory (Summer 2021)
- CSE 429: Digital System Design (Spring 2021)
- EEE 2113: Electrical Circuits (Spring 2021)

TECHNICAL SKILLS

Programming Languages: Python, C, C++, Java, C#, MATLAB, bash

Deep Learning Frameworks: PyTorch, TensorFlow, Keras

Data Science Libraries: NumPy, Pandas, SciKit-Learn, Matplotlib, Seaborn

Markup Languages: HTML, LaTeX **DBMS:** Oracle, MySQL

Others: Git, Django, OpenGL, Assembly (8086), Flex, Bison

AWARDS AND PRIZES

- SoC Research Incentive Award
- University Merit Scholarship
- Dean's List Scholarship
- First Runner-up, Math Olympiad (University Level), BUET Math Festival 2018
- First Runner-up, Puzzle Olympiad, BUET Math Festival 2018
- Champion, Puzzle and Logic Contest, BUET CSE DAY 2016
- Education board scholarships in SSC and HSC
- 5th place in National Round, 5th Bangladesh Physics Olympiad (BdPhO 2015)
- Second runner-up in National Round, 9th Bangladesh Mathematical Olympiad (BdMO 2011)

OTHER ACTIVITIES

- External reviewer for *Combinatorial Algorithms*, 31st International Workshop, IWOCA 2020, Bordeaux, France, June 8–10, 2020, Proceedings.
- Academic team member, Bangladesh Physics Olympiad (BdPhO) 2018.
- Co-founder and trainer (2015-2016), Paradox Physics School, Chittagong. (A voluntary organization aimed at helping physics enthusiast school students to pursue physics olympiads)

REFERENCE

Dr. Angela Yao, Dean's Chair Assistant Professor, School of Computing, National University of Singapore (ayao@comp.nus.edu.sg)

Dr. M. Sohel Rahman, Professor, Department of CSE, BUET, ECE Building, West Palasi, Dhaka-1205, Bangladesh (msrahman@cse.buet.ac.bd)