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Abdul Muntakim Rafi

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Current Research Interest

Gene regulation

Education

Doctor of Philosophy in Biomedical Engineering   **2021 - present**
University of British Columbia   Vancouver, Canada
Supervisor: Carl de Boer, Assistant Professor, School of Biomedical Engineering

Master of Applied Science in Electrical and Computer Engineering   **2019 - 2021**
University of Windsor   Windsor, Canada
Supervisor: Jonathan Wu, Professor, Department of Electrical and Computer Engineering

Bachelor of Science in Electrical and Electronic Engineering(EEE)   **2014 - 2018**
Bangladesh University of Engineering and Technology (BUET)   Dhaka, Bangladesh
Supervisor: Md. Kamrul Hasan, Professor, Department of EEE

Research Experience

- **Graduate Research Assistant, de Boer Lab** [website]   May 2021 - present
  School of Biomedical Engineering, The University of British Columbia.
  Pursuing my Ph.D. in biomedical engineering in this lab under the supervision of Professor Dr. Carl de Boer. We are a mixed computational/experimental group. I apply machine learning to understand how the genome is regulated.

- **Graduate Research Assistant, Centre for Computer Vision and Deep Learning** [website]   Aug 2019 - Mar 2021
  Department of Electrical and Computer Engineering, University of Windsor.
  Pursued my Master's in Applied Science degree from this lab under the supervision of Professor Dr. Jonathan Wu. I worked on digital image forensics, biomedical image processing, and social media data analysis. During this time, I published four papers.

- **Research Assistant, Digital Signal Processing Research Laboratory** [website]   Oct 2018 - Mar 2019
  Department of Electrical and Electronic Engineering, BUET.
  Did my undergrad thesis under the supervision of Professor Dr. Md. Kamrul Hasan from this lab. After graduation, I joined the lab as a Research Assistant. I worked on digital image forensics and biomedical image processing. During this time, I published a paper and participated in two international signal processing competitions organized by IEEE.

Job Experience

- **Graduate Teaching Assistant, Master of Data Science, UBC**   Sep 2021 - present
  Joined UBC's Master of Data Science program as a full-time teaching assistant in Fall 2021 and continued working here. Courses I TAed here are Supervised Learning II, Statistical Inference and Computation II, Web and Cloud Computing, Data Science Workflows, Algorithms and Data Structures, and Computing Platforms for Data Science.

- **Graduate Teaching Assistant, Biology Program, UBC**   May 2022 - June 2022
  Joined UBC's Biology program as a full-time teaching assistant for the Summer 2022 term in the course Fundamentals of Genetics.

- **Mitacs Accelerate Intern, Lanner Electronics Inc.** [lanner]   Nov 2020 - Mar 2021
  Joined Lanner through the Mitacs Accelerate, which is Canada's premiere research internship program. I worked on the efficient inference of different AI-driven applications in edge devices.

- **Graduate Teaching Assistant, ECE Department, uWindsor**   Jan 2020 - Dec 2020
  Worked as a graduate teaching assistant for the courses Engineering Software Fundamentals and Computational Intelligence.

- **Deep Learning Engineer, IFIVEO** [i-50]   Oct 2019 - Apr 2020
  Joined IFIVEO through the Mitacs Accelerate. Here, my task was to perform activity recognition to measure and improve manufacturing floor production processes using deep learning based vision systems. I collected data from manufacturing floors, supervised the annotation process, and deployed deep learning models using Amazon Sagemaker.

- **Machine Learning Engineer, REVE Systems Ltd.**   Mar 2019 - July 2019
  Worked on designing a real-time Sign2Text translator for Bangla Sign Language.

List of Publications

- **Abdul Muntakim Rafi**, Thamidul Islam Tonmoy, Uday Kamal, Q.M. Jonathan Wu, Md. Kamrul Hasan, "RemNet: Remnant Convolutional Neural Network for Camera Model Identification", published in **Neural Computing And Applications.** [*SpringerLink*]

- Uday Kamal, **Abdul Muntakim Rafi**, Rakibul Hoque, Jonathan Wu, Md. Kamrul Hasan, "Lung Cancer Tumor Region Segmentation Using Recurrent 3D-DenseUNet", accepted at The Second International Workshop on Thoracic Image Analysis in conjunction with **MICCAI 2020**, October 2020. [*SpringerLink*]

- **Abdul Muntakim Rafi**, Shivang Rana, Rajwinder Kaur, Jonathan Wu, Pooya Moradian Zadeh, "Understanding Global Reaction to the Recent Outbreaks of COVID-19: Insights from Instagram Data Analysis", accepted at **IEEE International Conference on Systems, Man, and Cybernetics, 2020**, October 2020. [*IEEEXplore*]

- **Abdul Muntakim Rafi**, Jonathan Wu, Md. Kamrul Hasan, "L2-Constrained RemNet for Camera Model Identification and Image Manipulation Detection", presented in Advances in Image Manipulation workshop and challenges on image and video manipulation in conjunction with **ECCV 2020**, August 2020. [*SpringerLink*]

- **Abdul Muntakim Rafi**, Uday Kamal, Rakibul Hoque, Abid Abrar, Sowmitra Das, Robert Laganiere, Md. Kamrul Hasan, "Application of DenseNet in Camera Model Identification and Post-processing Detection", presented in **The IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, 2019, pp. 19-28**, Long Beach, CA, USA, June 2019. [*CVPR 2019 open access*]

- **Abdul Muntakim Rafi**, Nowshin Nawal, Nur Sultan Nazar Bayev, Lusain Nima, Celia Shahnaz, Shaikh Anowarul Fattah, "Image-based Bengali Sign Language Alphabet Recognition for Deaf and Dumb Community", presented in *2019 IEEE Global Humanitarian Technology Conference (GHTC)*, Seattle, WA, USA, October 2019. [*IEEEXplore*]

Talks and poster presentations

- **Tumor Segmentation from CT Scans Using Deep Learning**   2021
  Guest lecture at graduate level course 'ELEC 8280: Image Processing', University of Windsor

- **L2-Constrained RemNet for Camera Model Identification and Image Manipulation Detection**   2020
  Advances in Image Manipulation workshop and challenges on image and video manipulation in conjunction with ECCV 2020, United Kingdom

- **Lung Cancer Tumor Region Segmentation Using Recurrent 3d-denseunet**   2020
  The Second International Workshop on Thoracic Image Analysis in conjunction with MICCAI 2020, Peru

- **IEEE SPS Video and Image Processing Cup 2018 Final Round**   2018
  2018 IEEE International Conference on Image Processing, Greece

- **Shongket: Bengali Sign Language Alphabet Interpreter for the Deaf Community in Bangladesh**   2018
  4TH IEEE WIECON-ECE 2018 CONFERENCE, Thailand

Awards and Scholarships

- **Four Year Doctoral Fellowship (4YF)** [UBC 4YF]   2021-2025
  AWARD: 96,000 CAD in 4 years
  The Four Year Doctoral Fellowship (4YF) program ensures UBC's best Ph.D. students are provided with financial support plus tuition for up to four years of their doctoral studies.

- **SBME Graduate Support Initiative-Entrance Award** [UBC GSI]   2021
  AWARD: 4,000 CAD
  This one-time award is granted to top-ranked incoming Ph.D. students, or top-ranked Ph.D. students in the first year of their program in SBME (School of Biomedical Engineering).

- **International Tuition Award** [UBC ITA]   2021-graduation
  AWARD: 3,200 CAD per year
  International Tuition Awards assist international graduate students with their tuition fees if they are registered full-time in research-oriented masters and doctoral programs at UBC - Vancouver campus.

- **President's Academic Excellence Initiative Ph.D. Award** [UBC President's]   2021-graduation
  AWARD: 1,500 CAD per year
  Awards totalling approximately 4.3 million CAD per year are provided to recognize the significant contributions of Ph.D. students to the research activities of the university.

- **IEEE SPS Video and Image Processing Cup 2018** [IEEE SP Magazine]   2018
  AWARD: 2,500 USD
  Member of the team that won 2nd place among 28 teams from the whole world.

- **4th IEEE-WIECON-ECE 2018 Humanitarian Project Competition** [IEEE SIGHT BLOG] [YouTube]   2018
  AWARD: 500 USD
  Member of the team that placed 2nd among top 8 teams.

- **Bangladesh Math Olympiad** 2011-2013
  Divisional Champion
- **Bangladesh Astro Olympiad** 2012
  National 4th
- **Bangladesh Physics Olympiad** 2012
  Divisional Champion
- **Bangladesh Science Olympiad** 2011
  National 3rd

Funded projects

- **TPU resources for DREAM Challenge 2022** [website] May 2022 - July 2022
  Funding Source: **TPU Research Cloud, Google**
  Principal investigator: *Carl de Boer (UBC), Pablo Meyer (IBM research), Jake Albrecht (Sage Bionetworks)*
  Total Funding: 50 TPU quotas (each TPU quota consists of 5 v3-8s, 5 v2-8s, and 100 preemptible v2-8s)
  My Role: I co-organized the competition with Carl, Pablo, and Jake as the only graduate student in the committee.
- **Identifying selection on human gene expression with gene regulatory models** Jan 2022 - Dec 2022
  Funding Source: **The Digital Research Alliance of Canada**
  Principal investigator: *Carl de Boer*
  Total Funding: 6 GPU years of cloud computing resources
  My Role: I assisted Professor de Boer with writing the proposal for this grant.
- **Efficient edge inference benchmarking for AI-driven applications** [lanner] Nov 2020 - Mar 2021
  Funding Source: **Mitacs Accelerate**
  Principal investigator: *Jonathan Wu*
  Total Funding: 15,000 CAD
  My Role: I was the only co-applicant in this project. I wrote the proposal with Professor Wu's supervision.
- **Spatio-Temporal Human Activity Recognition on Manufacturing Floors** [i-50] Oct 2019 - Apr 2020
  Funding Source: **Mitacs Accelerate**
  Principal investigator: *Jonathan Wu*
  Total Funding: 22,500 CAD
  My Role: I was one of the co-applicants in this project. I assisted Professor Wu with writing this proposal.

Peer-review Activities

Primary reviewer:

- *Neurocomputing*
  Number of papers reviewed: **2**
- *Journal of Real-Time Image Processing*
  Number of papers reviewed: **2**
- *Cyber-systems and Robotics*
  Number of papers reviewed: **1**

Secondary reviewer (assisted PI with permission from the editor):

- *Proceedings of the National Academy of Sciences of the United States of America*
  Number of papers reviewed: **1**
- *Molecular Systems Biology*
  Number of papers reviewed: **1**

Extracurricular Activities

- **Project co-ordinator and organizer**, *DREAM Challenge 2022* [website] 2022
  Over 100 teams of ∼ 300 scientists from over 75 universities and companies worldwide participated in DREAM Challenge 2022 to create machine learning models that predict gene expression from DNA sequences. I co-organized the competition with Carl de Boer (UBC), Pablo Meyer (IBM research), Jake Albrecht (Sage Bionetworks). I was responsible for the daily operation of the competition.
- **Mentor**, *SUS-GSS Mentorship Program*, University of British Columbia [website] 2022
  Mentored second-year undergrads regarding professional development skills.
- **Secretary**, *Biomedical Engineering Graduate Association*, University of British Columbia 2021-2022
  Organized social events for SBME graduate students to increase interaction between different research groups.

- **Graduate Student Rep**, *SBME Sustainability Committee*, University of British Columbia   2021-2022
  Worked towards adopting sustainable thinking into the daily operations and culture of the SBME.
- **Assistant Treasurer**, *IEEE Joint Chapter SP/COM, IEEE Windsor Section*, University of Windsor   2020-2021
  Researched and analyzed financing alternatives and provided recommendations.
- **Vice President**, *Satyen Bose Science Club*, BUET   2017 - 2018
  Arranged scientific talks, seminars, and debates for university students to create an environment where students engage in active discussions on different topics of science.
- **Assistant General Secretary**, *Satyen Bose Science Club*, BUET   2017
  Worked as the foot soldier in the events organized by the club.
- **Volunteer tutor** for *illiterate workers of BUET dormitory canteen*   2014-2015
  Taught illiterate kids and adults to read and write who were working at the dorm canteen.
- **Volunteer tutor** for *Bholananda Night High School*, Sylhet   2011-2012
  Taught kids who were required to work during day to support their families. I tried my best to inspire them to continue their education despite their circumstances.

SKILLS

- **Programming Languages:** Python (Advanced), R (Advanced), MATLAB (Advanced), C++ (Intermediate), C (Intermediate), Assembly(Intermediate), Verilog (Basic)
- **Machine Learning Libraries:** Pytorch, Tensorflow, MXNet, Scikit-learn, OpenCV
- **Machine Learning Inference:** Amazon SageMaker (cloud), Intel OpenVINO (edge), Nvidia TensorRT (edge)
- **Cloud Computing:** Amazon S3, AWS SageMaker, Amazon ECS, Amazon Kinesis
- **Simulation & Design Tools:** OrCAD PSpice, Cadence EDA Tools (Virtuoso), Proteus7, Auto-CAD, emu8086, AVRstudio, CYME PSAF
- **Typesetting Software:** LaTeX(Advanced)
- **Graphic Design:** Adobe Illustrator (Advanced), Adobe Photoshop (Intermediate), Adobe Premiere Pro(Intermediate)