Md Marufi Rahman

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Education

University of North Texas *Aug 2019 - present*
Ph.D., Computer Science and Engineering GPA: 3.85/4.0

Rajshahi University of Engineering and Technology *March 2013 - Dec 2017*
B.Sc., Electronics and Telecommunication Engineering GPA: 3.32/4.0

Research Interests

Medical image analysis, Computer vision, Artificial intelligence, and Deep learning

Publications

1. Y. Li, J. Baik, **M. M. Rahman**, I. Anagnostopoulos, R. Li, and T. Shu, "Pareto optimization of CNN models via hardware-aware neural architecture search for drainage crossing classification on resource-limited devices", *in Proceedings of the SC '23 Workshops of The International Conference on High Performance Computing, Network, Storage, and Analysis*, Denver CO USA, 2023.
2. **M. M. Rahman**, JH Oh, Wallapak Tavanapong and Piet C. de Groen, "Content Based Image Retrieval Using Depth Maps for Colonoscopy Images", *2023 In Proceedings of the 16th International Joint Conference on Biomedical Engineering Systems and Technologies*, Lisbon, 2023, pp. 301-308.
3. **M. M. Rahman**, JH Oh, Wallapak Tavanapong, Johnny Wong and Piet C. de Groen, "Automated Bite-block Detection to Distinguish Colonoscopy from Upper Endoscopy using Deep Learning", *2021 16th International Conference on Visual Computing (ISVC)*, virtual, 2021, pp. 216-228.
4. **M. M. Rahman**, M. K. Hosain, S. Ahmed and M. W. A. Azad, "Investigation of coil designs for transcranial magnetic stimulation on realistic head model", *2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC)*, Dhaka, 2017, pp. 279-283.
5. **M. M. Rahman**, J. R. Mou, K. Tara and M. I. Sarkar, "Real time Google map and Arduino based vehicle tracking system", *2016 2nd International Conference on Electrical, Computer and Telecommunication Engineering (ICECTE)*, Rajshahi, 2016, pp. 1-4.

Employment History

Graduate Teaching Assistant/Fellow, CSE, UNT August 2019 - Present

- Worked for courses CSCE 4350(Fundamentals of Database Systems), CSCE5390 (multimedia computing), CSCE5350 (fundamentals of databases), CSCE5050 (Application of Cryptography), CSCE4355 (Database Administration), CSCE2110 (computing foundation), CSCE1030(problem solving using C++).
- Created assignments, graded papers, proctored exams, and mentored students with courseworks.

Graduate Research Assistant, CSE, UNT Aug 2020- May 2022

- Worked on image analysis for the gastrointestinal videos dataset project.
- Explored various key challenges in medical video dataset.
- Deployed several deep learning as well as traditional image processing techniques to tackle those challenges.

Undergraduate Research Assistant, ETE, RUET Dec 2016- Jul 2018

- Worked on the project "Design and analysis of transcranial magnetic coils to stimulate brain neurons for various neurological disorders."
- My solution increased value of magnetic field with focality as is 1.21E-5 T.

Technical Skills

Programming	C plus plus, Python, R, Matlab, SQL, CUDA
Framework and Library	Tensorflow, Keras,Pythorch, OpenCV, NLTK, Pandas, Numpy, Scipy
Cloud Platform	GCP

Research Projects

Predicting unexplored area inside the colon May 2023 - Present

- Colonoscopy cameras can fail to explore certain areas of the colon resulting in inappropriate diagnosis.
- Usually 3D reconstruction is needed to solve this challenge.
- I am developing new ideas to tackle this challenge by using motion detection and deep learning instead of 3D reconstruction.

The (body) language of social interactions Jan 2023 - May 2023

- Worked on H20 Social Interaction Dataset which is divided into posture, motion and social interaction images.
- Research goal was to predict social interactions accurately and efficiently.
- For this I developed several multi-label CNNs and object detection models.
- CNN trained with multilabel(posture and motion data) achieved 83% F1 accuracy while CNN only trained with social interaction data achieved 77%.

Similarity detection of colonoscopy medical images using depth map Jan 2022 - Jan 2023

- A similarity measure based on low-level visual features is not effective for some type of images such as colonoscopy images captured from colonoscopy procedures.
- My proposed solution can compare these type of images and find their similarity in terms of their surface structures with an around F1 accuracy of 86.8 to 92.5%.

Predict Colorectal cancer cells using Single Cell Trio-seq data Aug 2021 - Jan 2022

- Several studies have predicted cancer cells from Single Cell RNA-seq (scRNA-seq) data using only gene expression or DNA methylation.
- Here I have processed high volume of mehtylation data and built deep learning models integrating biological information with above two.
- The proposed solution has predicted colorectal cancer cells from tumors and their metastases precisely(with macro average of 85%).

Distinguishing Colonoscopy from Upper Endoscopy April 2020 - May 2021

- One of the fundamental steps for the automated quality feedback system is to distinguish a colonoscopy from an upper endoscopy.
- By detecting this bite-block appearance,it can be distinguished.
- My proposed solution has utilized Hue-Saturation information and two Convolutional Neural Networks (CNNs)to solve the task with Precision (0.78) and Sensitivity (0.81).