

Md Ehashan Rabbi Pial

Statesboro, Georgia, USA

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Research Interests

Deep Learning | Natural Language Processing | Computer Vision | Biomedical AI | Medical Image Analysis |

Education

M.Sc. in Computer Science

Georgia Southern University

GPA: 3.84/4.00

Aug. 2025 – Expected July 2027

Statesboro, Georgia, USA

B.Sc. in Computer Science and Engineering

Khulna University of Engineering & Technology (KUET)

CGPA: 3.73/4.00 Class Rank: 14th/120

Jan. 2019 – Mar. 2024

Khulna, Bangladesh

Research Experience

Graduate Research Assistant

Georgia Southern University

Aug. 2025 – Present

Statesboro, Georgia, USA

Advisor: Dr. Salim Sazzed

Protein Secondary Structure Segmentation from Cryo-EM Density Maps

- Developing deep learning methods for voxel-level segmentation of alpha helices, beta sheets, NPSS, and DNA/RNA from cryo-EM density maps across varying resolutions.
- Conducting end-to-end research including dataset analysis, preprocessing, class-imbalance handling, model development, training, quantitative evaluation, and cross-resolution performance analysis.
- Investigating model generalization across low- and high-resolution cryo-EM data, with particular emphasis on challenging secondary structures such as beta sheets.
- Research findings are currently being prepared for publication.

Actin Filament Segmentation from Cryo-EM / Cryo-ET Data

- Conducted deep learning-based research on actin filament segmentation from cryo-EM and simulated cryo-electron tomography density maps.
- Performed preprocessing, model development, training, segmentation evaluation, and robustness analysis under varying imaging and noise conditions.
- Evaluated deep learning architectures for their ability to preserve filament structures under challenging noise conditions.
- Resulted in a peer-reviewed publication at IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2025).

Peer-Reviewed Publications

- [1] Hasan, N., Pial, M. E. R., Das, S., Siddique, N., and Wang, H., “DIA-VXNET: A framework for automated diabetic eye disease detection using transfer learning with feature fusion network,” *Biomedical Signal Processing and Control*, Vol. 100, Part C, 106907, 2024. [DOI](#)
- [2] Pial, M. E. R., Dehan, F. N., Wriggers, W., and Sazzed, S., “Evaluating Deep Learning Architectures for Actin Filament Segmentation Under Varying Noise Conditions in Simulated Cryo-ET Tomograms,” in *2025 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, pp. 7058–7065, 2025. [DOI](#)
- [3] Sazzed, S., Pial, M. E. R., and Dehan, F. N., “SocialDemoExtract: A Tool for Extracting Self-Reported Age and Gender from Social Media Text,” in *2025 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, Wuhan, China, pp. 7645–7649, 2025. [DOI](#)
- [4] Sazzed, S., Azade, R. S., Dehan, F. N., and Pial, M. E. R., “Evaluating the Few-Shot Performance of Large Language Models for Classifying Clinical Risk Factors in Mental Health Text,” in *2025 IEEE International Conference on Big Data (BigData)*, Macau, China, pp. 7714–7718, 2025. [DOI](#)

Research Projects		
CSP-TransUNet: Fuzzy Cluster-Guided Transformer with Spatial Proximity Attention for Medical Image Segmentation		
<i>CNN, Transformer, TransUNet, Fuzzy C-Means, Self-Attention, Medical Image Segmentation</i>		
- Proposed a hybrid CNN–Transformer architecture extending TransUNet with dual-bias self-attention based on fuzzy cluster similarity and Gaussian spatial proximity priors. - Designed an FCM-guided skip-gating mechanism that uses fuzzy membership information to adaptively modulate CNN skip features and emphasize anatomically relevant regions. - Incorporated explicit cluster and spatial inductive biases while preserving the Transformer’s ability to model long-range dependencies.		
Fuzzy C-Means Based Graph Cut Approach for Image Segmentation		
<i>Python, Scikit-Fuzzy, Fuzzy C-Means, Graph Cut, Max-Flow/Min-Cut</i>		
- Developed a binary image segmentation framework combining Fuzzy C-Means clustering with Graph Cut optimization. - Implemented the Max-Flow/Min-Cut algorithm from scratch using Edmonds–Karp and residual graph-based min-cut extraction. - Integrated fuzzy memberships into graph-based optimization to combine data-driven clustering with spatial regularization.		
TrRes: A Transformer–CNN Fusion Model for Weld Defect Classification		
<i>Deep Learning, Transformer, ResNet50, CLAHE, Image Processing</i>		
- Developed a Transformer–ResNet50 fusion architecture for classifying cracks, lack of penetration, porosity, and defect-free weld radiographs. - Applied guided filtering and CLAHE-based preprocessing and achieved 98.93% test accuracy on the RIAWELC dataset.		
AI-Driven Modeling for High-Performance Concrete Strength Prediction and Mix Optimization		
<i>CatBoost, LightGBM, XGBoost, NGBoost, ANN, Ensemble Learning</i>		
- Developed and compared machine learning and deep learning models for predicting high-performance concrete compressive strength. - Built a stacking ensemble using gradient-boosting models and regularized meta-learners, achieving $R^2 = 92.13\%$ and RMSE = 4.50 MPa.		
Industry Experience		
Jr. Software Engineer		Nov. 2024 – Aug. 2025
<i>W3 Engineers Ltd.</i>		<i>Dhaka, Bangladesh</i>
Jr. Software Engineer		Dec. 2023 – Nov. 2024
<i>Lynorg Technologies Limited</i>		<i>Dhaka, Bangladesh</i>
Technical Skills		
Programming Languages: Python, C++, Java, Go, JavaScript Machine Learning / Deep Learning: PyTorch, TensorFlow, Keras, Scikit-learn Scientific Computing & Data Analysis: NumPy, Pandas, MATLAB Computer Vision & Visualization: OpenCV, Matplotlib Web Development: React.js, Spring Boot, Node.js, ASP.NET Core Databases: MySQL, MongoDB, Firebase Tools: Git, Linux, WSL, LaTeX, Excel		
Awards & Honors		
Allen E. Paulson Student Scholarship Endowment		2026–2027
Georgia Southern University		
Dean’s Award		2022–2023
Khulna University of Engineering & Technology		
Government Merit Scholarship		2016–2018
Awarded based on academic performance in Secondary School Certificate and Higher Secondary Certificate examinations.		