Md Shazid Islam

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Introduction

I am a Ph.D. candidate specializing in machine learning for scientific data, with a focus on data-efficient and reliable learning under distribution shift. My research develops agentic learning frameworks, combining domain adaptation, vision–language models, and active learning. I also have experience with GANs, GNNs, transformers, multimodal fusion, and federated learning.

Education

Ph.D., UC Riverside (Sept 2020 – Present)
Electrical & Computer Engineering
UCR Vision and Learning Group
Advisor: Amit K. Roy-Chowdhury

M.Sc., BUET (Oct 2017 – July 2020)
Electrical & Electronic Engineering (CGPA: 4.00)
Advisor: S.M. Mahbubur Rahman

B.Sc., BUET (Feb 2013 – Sept 2017)
Electrical & Electronic Engineering (CGPA: 3.89)
Advisor: Mohammad Ariful Haque

Research Interest

- Computer Vision
- Vision-Language Models (VLM)
- Large Language Models (LLM)
- Foundation Models
- Deep Learning
- Medical/Bio Imaging
- Multimodal Learning

Technical Skills

- **Languages:** Python, C/C++, MATLAB
- **Libraries:** PyTorch, TensorFlow,OpenCV
- **Models:** CLIP, SAM, BiomedParse, LLaVA
- **Bioimaging Tools:** Cellpose, MorphographX
- **Biomedical data:** MRI, CT,X-Ray, Ultrasound, EEG, EMG, CLSM Microscopy
- **Platforms:** CUDA, Colab, AWS, HPC
- **Data Libraries:** Numpy, Pandas, Sklearn
- **Others:** Docker, Git, LaTeX, SQL

Research Projects

- **Language-Guided Annotation in Active Learning for Image Segmentation**
  - Developed a **language-driven active learning framework** that replaces pixel-wise annotation with natural language feedback.
  - Used LLM to translate expert instructions into **executable refinement programs** for segmentation correction.
  - Reduced annotation interaction cost by up to **∼80%** while maintaining (with respect to manual polygonal delineation) or improving (with respect to superpixel annotation) segmentation performance.
  - Validated effectiveness under domain shift and limited supervision settings.
- **Online Domain Adaptation with Expert in the loop**
  - Proposed a **source-free, single-pass online domain adaptation framework** for medical image segmentation that integrates **expert-guidance** with minimal intervention to correct unreliable pseudo-labels under domain shift without additional storages.
  - Designed a novel **image pruning strategy** to discard least-informative images from the batch which reduces annotation time and proposed a novel **spatial and feature-wise diversity-aware acquisition mechanism** to maximize annotation efficiency.
  - Demonstrated consistent gains over test-time adaptation (+7.7% on average) and performance comparable to active domain adaptation across multiple medical datasets.
- **Agentic Medical Report Generation with Vision–Language Models (CXR)**
  - Designing an **agent-based vision–language framework** for chest X-ray report generation.
  - Incorporates **stepwise visual reasoning** grounded in image evidence and clinical priors.
  - Integrates **Retrieval-Augmented Generation (RAG)** over curated radiology knowledge bases and guidelines.
  - Explores **uncertainty-aware reasoning** to distinguish ambiguous from confident clinical findings.
- **Bio-image analysis obtained from Microscopy Imaging.**
  - Introduced a deep learning-based **deformable 3D GNN graph formulation** for tracking tightly packed plant cells, capturing spatial context beyond slice-wise or rigid representations and achieving **+6.83% precision, +5.96% recall, and +6.40% F1-score** over state-of-the-art cell pair matching baselines.
  - Developed a **3D registration and cell division detection framework** using joint 3D shape similarity and local graph structure, achieving **+15.38% recall and +14.78% F1-score** over traditional 2D methods on a public 3D microscopy dataset.
  - Performed **3D segmentation and 3D reconstruction** of plant cell and *Drosophila* wing disc microscopy images.
- **Music-to-Dance Synthesis via Multimodal Learning**
  - Developed a **CNN–LSTM–Mixture Density Network** to generate rhythmic human pose sequences from music.
  - Used a **Pix2pixHD GAN** to synthesize photo-realistic dance videos from predicted stick diagrams.
  - Evaluated across multiple dance styles (Ballet, Cha-Cha, Tango, Waltz), outperforming prior methods on motion error metrics.
- **Other Research Projects**
  - **Gait Phase Analysis:** Novel s-EMG algorithm to classify gait phases in DNS, UPS, and WAK locomotion.
  - **Asynchronous Federated Learning:** Delay-aware framework in Asynchronous Federated Learning addressing stragglers; introduces buffer diversification and contribution-based weighting.
  - **BRIAR:** Multi-person tracking with occlusion; silhouette segmentation; GAIT and ReID-based recognition.

Seletected Publications

- **Md Shazid Islam**, Sayak Nag, Arindam Dutta, Miraj Ahmed, Fahim Faisal Niloy,Shreyangshu Bera, Amit K. Roy Chowdhury, "*ODES: Online Domain Adaptation with Expert Guidance for Medical Image Segmentation*", International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI) 2025. paper
- **Md Shazid Islam**, Arindam Dutta, Calvin-Khang Ta, Kevin Rodriguez, Christian Michael, Mark Alber, G. Venugopala Reddy, Amit K. Roy Chowdhury, " *DEGAST3D : Learning Deformable 3D Graph Similarity to Track Plant Cells in Unregistered Time Lapse Images* ", IEEE Transactions on Computational Biology and Bioinformatics, 2025. paper
- **Md Shazid Islam**, Shreyangshu Bera, Sudipta Paul, Amit K. Roy Chowdhury, " *LINGUAL: Language-INtegrated GUidance in Active Learning for Medical Image Segmentation.* " (under review) pre-print
- **Md Shazid Islam**, SM Mahbubur Rahman, " *Synthesis of Dance by Learning Body Gestures from Music*" , Multimedia Tools and Applications, September 2025 paper video
- **Md Shazid Islam**, M Yashwanth, Xiangyu Chang, Anirban Chakraborty, Srikanth Krishnamurthy, Amit Roy-Chowdhury, " *DAAFL: Delay Aware Asynchronous Federated Learning*" (under review)
- Md Sanzid Bin Hossain, **Md Shazid Islam** , Md Saad Ul Haque Md Saydur Rahman " *Gait Phase Classification from sEMG in Multiple Locomotion Mode Using Deep Learning*", 9th International Congress on Information and Communication Technology, London, UK, 2024. paper
- **Md Shazid Islam**, ASM Jahid Hasan, Md Saydur Rahman, Jubair Yusuf, Md Saiful Islam Sajal, Farhana Akter Tumpa, " *Location Agnostic Source-Free Domain Adaptive Learning to Predict Solar Power Generation*", IEEE International Conference on Energy Technologies for Future Grids, Wollongong, Australia, 2023. paper
- Md Saiful Islam Sajol, ASM Jahid Hasan, **Md Shazid Islam** and Md Saydur Rahman, " *A ConvNeXt V2 Approach to Document Image Analysis: Enhancing High-Accuracy Classification*", IEEE 3rd Conference on Information Technology and Data Science, Debrecen, Hungary, 2024. paper
- Md Saiful Islam Sajol, ASM Jahid Hasan, **Md Shazid Islam** and Md Saydur Rahman, " *Transforming Social Media Analysis: TweetEval Benchmarking with Advanced Transformer Models*", International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT), Ankara, Turkey, 2024. paper

HONORS and AWARDS

- MICCAI NIH Registration Grant 2025
- Dean's Distinguished Fellowship, University of California, Riverside
- Dean's list Scholarship, Dept. of Electrical and Electronic Engineering, BUET .
- Merit Scholarship, Dept. of Electrical and Electronic Engineering, BUET.

GRADUATE COURSES

• Advanced Computer Vision • Pattern Recognition • Design And Analysis Of Algorithms
• Deep Learning • Stochastic Processes • State and Parameter Estimation Theory
• Convex Optimization • Math Methods for Engineering • Information Theory