Postgraduate Seminar Series

Venue: Graduate Seminar Room
Date & Time: July19, 2024 at 2:30 PM

Speaker Information

Tanjina Helaly (Std No. 1018054005) is a part time Ph.D. studentin the department of CSE, BUET. Alongside her doctoral studies, she serves as a faculty member in the department of CSE at the University of Asia Pacific (UAP), Bangladesh. She holds a Master's degree in Computer Science from North Dakota State University, USA, and brings with her valuable industry experience. Her research focuses on advancing machine learning in healthcare, with a strong emphasis on early orthopedic disease prediction. She is currently pursuing PhD research under the guidance of Dr. Mahmuda Naznin, Professor, CSE, BUET. Tanjina will be presenting her ongoing research in this session.

Quantifying features from X-ray images to assess early stage knee osteoarthritis

Knee osteoarthritis (KOA) is a progressive degenerative joint disease and a leading cause of disability worldwide. Manual diagnosis of KOA from X-ray images is subjective and prone to inter- and intra-observer variability, making early detection challenging. While deep learning (DL)-based models offer automation, they often require large labeled datasets, lack interpretability, and do not provide quantitative feature measurements. Our study presents an automated KOA severity assessment system that integrates a pretrained DL model with image processing techniques to extract and quantify key KOA imaging biomarkers. The pipeline includes contrast limited adaptive histogram equalization (CLAHE) for contrast enhancement, DexiNed-based edge extraction, and thresholding for noise reduction. We design customized algorithms that automatically detect and quantify joint space narrowing (JSN) and osteophytes from the extracted edges. The proposed model quantitatively assesses JSN and finds the number of intercondylar osteophytes, contributing to severity classification. The system achieves accuracies of 88% for JSN detection, 80% for osteophyte identification, and 73% for KOA classification. Its key strength lies in eliminating the need for any expensive training process and, consequently, the dependency on labeled data except for validation. Additionally, it provides quantitative data that can support classification in other OA grading frameworks.