Postgraduate Seminar Series

Venue: Graduate Seminar Room
Date & Time: August 09, 2025 at 2:30 PM

Speaker Information

Sayma Alam Suha (Std No. 0423054009) is a part time PhD student in the department of CSE, BUET. Alongside her doctoral studies, she serves as a faculty member in the department of CSE at Bangladesh University of Professionals (BUP), Bangladesh. She earned a Master's degree in Management of Technology from the Institute of Appropriate Technology at BUET, as well as a Master of Science in Computer Science and Engineering from the Military Institute of Science and Technology (MIST), where she also completed her undergraduate education. Her research focuses on developing advanced deep learning and machine learning models integrated with explainable AI (XAI) to enable early and accurate prediction of various health conditions, supporting informed decision-making in maternal, fetal, and broader healthcare contexts. She is currently doing her postgraduate thesis under the supervision of Dr. Rifat Shahriyar. Suha will be speaking about her ongoing research in this talk.

Hybrid Deep Feature Extraction and Ensemble Learning for Fetal Brain MRI Plane Identification: Investigating Data Augmentation Efficacy

Precise classification of fetal brain planes is a crucial step in prenatal diagnosis, as each plane offers distinct anatomical information necessary for the physicians to accurately diagnose neurological abnormalities and the formulation of timely intervention strategies. However, manual identification of fetal brain planes through observing Magnetic Resonance Imaging (MRI) is time-consuming, expertise-dependent, and susceptible to variability, particularly in resource-constrained settings. Thus, in this study, a hybrid deep learning framework is proposed, combining a fine-tuned pre-trained model for feature extraction with a stacked ensemble of machine learning models to classify fetal MRI planes (axial, coronal, and sagittal). Multiple deep learning architectures were developed and evaluated through a systematic experimental framework. The models are trained and evaluated on a dataset of 52,561 images from 741 patients, in which the proposed model with ConvNext pre-trained model and XGBoost as the meta learner variation achieved an accuracy of 95.51% without data augmentation, outperforming conventional CNN and other pre-trained architectures. Moreover, ablation studies comparing augmented versus non-augmented training data revealed that the inherent variability within the large fetal MRI dataset provided sufficient diversity for robust model training; thus, data augmentation in this study reduced model performance across all architectures. Therefore, this work highlights the potential of hybrid deep learning-ensemble frameworks to advance automated fetal brain assessment, particularly in clinical environments, providing a scalable solution to enhance diagnostic accessibility in resource-limited settings.