Proposed Research Area:
Healthcare Data Analytics and Explainable Artificial Intelligence (XAI)

Proposed Research Topic:
Explainable AI (XAI) Models for Early Prediction and Management of Diabetes Using Multi-Modal Healthcare Data

Statement of Purpose: My research interest lies in the intersection of Healthcare Data Analytics and Explainable Artificial Intelligence (XAI), with a specific focus on developing interpretable predictive models for the early detection and personalized management of diabetes. The increasing prevalence of diabetes, especially in developing countries like India, calls for timely and trustworthy AI-driven solutions. While machine learning models have shown potential in healthcare, their lack of transparency limits clinical adoption. To address this, I propose to build explainable AI models that integrate multi-modal healthcare data—including electronic health records, lab results, wearable device outputs, and lifestyle parameters—to accurately predict diabetes risk, progression, and management outcomes. These models will not only deliver high predictive performance but also provide clinician-friendly explanations, identify key risk factors, and support personalized interventions. This research aims to contribute toward bridging the gap between AI and clinical decision-making, aligning with the broader vision of precision medicine and promoting responsible, ethical AI adoption in healthcare.

Objectives:
1. To collect, preprocess, and integrate multi-modal healthcare data—including electronic health records (EHRs), laboratory test results, wearable device data, and lifestyle information—relevant to diabetes prediction and management.

2. To develop machine learning and deep learning models capable of accurately predicting the onset and progression of diabetes using the integrated multi-modal data.

3. To incorporate Explainable AI (XAI) techniques into the predictive models to provide transparent, interpretable insights that highlight key features influencing clinical decisions.

4. To evaluate the performance, interpretability, and clinical relevance of the proposed models through comparative analysis and validation using real-world diabetes datasets, enabling personalized and actionable healthcare recommendations.