

# **Advanced Deep Learning Frameworks for Intelligent Medical Image Analysis: Enhancing Diagnostic Accuracy and Clinical Decision Support**

## **Research Objective**

This research aims to develop and validate novel deep learning architectures for automated analysis of medical images, addressing critical challenges in diagnostic accuracy, data efficiency, and model interpretability. The work will focus on creating robust algorithms capable of detecting and classifying pathological features across multiple imaging modalities, including CT, MRI, and X-ray.

By integrating attention mechanisms, transfer learning, and explainable AI techniques, this research seeks to bridge the gap between algorithmic performance and clinical applicability. The expected outcomes include improved diagnostic precision, reduced interpretation time for radiologists, and the development of trustworthy AI systems that can be deployed in real-world healthcare settings.

This work will contribute to both the theoretical advancement of computer vision methodologies and the practical enhancement of patient care through intelligent imaging systems. The research will address key challenges including limited annotated datasets, model generalization across diverse patient populations, and the critical need for transparent and explainable AI decisions in clinical contexts.