An Abstract
On

Multimodal DeepLearning model Integrates CNN & Transformer for Predicting Chemotherapy-induced Cardiotoxicity

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ABSTRACT

Chemotherapy-Induced Cardiotoxicity (CIC) is a significant and often overlooked complication of cancer treatments such as Doxorubicin and Trastuzumab. These drugs, while highly effective against tumors, can gradually impair heart function, sometimes leading to long-term or irreversible cardiac damage. Traditional monitoring methods like periodic ECGs or echocardiograms usually detect abnormalities only after noticeable decline has already occurred, reducing the chances for timely intervention. As a result, many patients face increased risks of heart failure, reduced survival rates, and interruptions in their cancer therapy.

This project proposes a multimodal deep learning system capable of predicting CIC risk early by integrating ECG images with clinical and chemotherapy-related data. ECG images are processed through convolutional neural networks to capture subtle electrical changes in heart activity, while structured patient data is analyzed using Transformer models to understand temporal patterns and treatment-related risks. By fusing insights from both data types, the system generates a personalized cardiotoxicity risk score—classified as Low, Medium, or High—that can guide oncologists in adjusting chemotherapy dosage, scheduling cycles more safely, and monitoring vulnerable patients closely. This AI-driven approach enhances prediction accuracy, supports personalized decision-making, and aims to reduce future cardiac complications in cancer patients.

PROJECT GUIDE

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