Machine Learning (CS404D)

Course Project

"Development of an AI based diagnostic system for the Detection of Esophageal Varices from Endoscopic Images"

Abstract:

Esophageal varices (EV), dilated veins in the esophagus resulting from portal hypertension, are a critical complication of chronic liver disease, affecting approximately 50% of cirrhotic patients. The condition poses significant risks, with up to 20% mortality following a rupture and bleeding episodes occurring in nearly half of the patients. Key factors like large variceal size, red colour signs, advanced liver disease, and elevated portal pressure increase the likelihood of bleeding. Early detection of esophageal varices is crucial for timely interventions, effective management, and reducing mortality. Traditional assessment relies on visual evaluation of endoscopic images by experienced endoscopists, a subjective and inconsistent process.

To address these limitations, this project aims to develop a machine learning (ML)-based diagnostic system leveraging deep learning techniques, particularly convolutional neural networks (CNNs), for the automated detection of esophageal varices from endoscopic images. By analysing medical images with high accuracy, the system seeks to enhance consistency and support clinicians in making informed decisions. Key objectives include the design of a robust ML model for variceal detection, classification of varices, and validation of the system's efficacy through prospective testing in hospital or field settings. This automated system promises to improve diagnostic speed and accuracy, ultimately aiding in reducing the burden of this life-threatening condition.

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