

## ABSTRACT

Intracranial hemorrhage (ICH) is a medical emergency that requires rapid and accurate treatment to save patients' lives. Manual detection of ICH from head CT images is often time-consuming and prone to errors due to human factors, especially in emergency conditions with high workloads. Therefore, an automated technology-based system is needed to expedite and enhance the accuracy of ICH diagnosis.

This study aims to develop an automatic classification system for intracranial hemorrhage using a deep learning model based on Convolutional Neural Networks (CNN). The model was trained using the RSNA dataset, which consists of thousands of head CT images with five ICH label types and negative labels. The development process includes image preprocessing, model training with a CNN architecture using a transfer learning approach, and performance evaluation using metrics such as accuracy, Area Under the Curve (AUC) for ROC and Precision-Recall (PR), as well as other metrics like sensitivity and specificity. This system is expected to provide an effective and efficient solution for the automated detection of intracranial hemorrhage.

The evaluation results show that the developed model achieved an accuracy of 95.99% in detecting ICH. Moreover, the model recorded an AUC-ROC of 0.9683 and an AUC-PR of 0.9156, demonstrating excellent performance in multi-label classification. With its high performance, the proposed system is capable of providing rapid and accurate diagnoses, supporting medical professionals in decision-making, especially in emergency conditions that require immediate action.

Keywords: intracranial hemorrhage, image classification, CNN, deep learning, automated detection