ABSTRAK

Stroke dikenal sebagai penyakit yang memiliki angka kematian dan kecacatan yang cukup tinggi sehinggga diperlukan metode diagnosis yang cepat dan akurat. Penelitian ini bertujuan mengklasifikasikan penyakit stroke menggunakan pendekatan *Deep Learning* berbasis *multimodal data*, yaitu kombinasi data *Electroencephalography* (*EEG*) dan *Magnetic Resonance Imaging* (*MRI*). Metode *Artificial Neural Network* (*ANN*) digunakan untuk memproses data *EEG*, sedangkan *Convolutional Neural Network* (*CNN*) dengan arsitektur *MobileNetV2* diterapkan pada pengolahan citra *MRI*. Kedua data kemudian digabungkan menggunakan metode *feature-level fusion* untuk menghasilkan model klasifikasi *multimodal data*. Penilaian performa model dilakukan dengan memanfaatkan *accuracy*, *precision*, *recall*, *F1-score*, *confusion matrix*, dan *ROC curve*. Dari hasil pengujian yang telah dilakukan, model *EEG* memperoleh nilai akurasi mencapai 93% dengan *training accuracy* sekitar 95% dan *validation accuracy* sekitar 91%, sedangkan model *MRI* memperoleh akurasi sebesar 92% dengan *training accuracy* mencapai 98% dan *validation accuracy* sekitar 94%. Sementara itu, model *multimodal data* memperoleh performa terbaik dengan akurasi sebesar 97% *training accuracy* sekitar 96% dan *validation accuracy* sekitar 93% lebih tinggi dibandingkan model *EEG* dan *MRI* secara terpisah. Selama proses pelatihan dan pengujian, model *multimodal data* memiliki kestabilan yang lebih baik dibandingkan dengan model lainnya. Berdasarkan hasil tersebut, penggabungan data *EEG* dan *MRI* mampu meningkatkan akurasi klasifikasi stroke sehingga berpotensi membantu proses diagnosis medis secara lebih cepat dan efisien.

Kata Kunci: Stroke, *Deep Learning*, *EEG, MRI*, *Convolutional Neural Network* (*CNN*)

ABSTRACT

Stroke is known as a disease that has a high mortality and disability rate, so a fast and accurate diagnosis method is needed. This study aims to classify stroke using a multimodal data-based Deep Learning approach, namely a combination of Electroencephalography (EEG) and Magnetic Resonance Imaging (MRI) data. The Artificial Neural Network (ANN) method is used to process EEG data, while the Convolutional Neural Network (CNN) with MobileNetV2 architecture is applied to MRI image processing. Both datasets are then combined using the feature-level fusion method to produce a multimodal data classification model. Model performance assessment is carried out by utilizing accuracy, precision, recall, F1-score, confusion matrix, and ROC curve. From the test results that have been carried out, the EEG model obtained an accuracy value of 93% with a training accuracy of around 95% and a validation accuracy of around 91%, while the MRI model obtained an accuracy of 92% with a training accuracy of 98% and a validation accuracy of around 94%. Meanwhile, the multimodal data model achieved the best performance, with an accuracy of 97%, training accuracy of around 96%, and validation accuracy of around 93%, higher than the EEG and MRI models used separately. During the training and testing process, the multimodal data model had better stability compared to the other models. Based on these results, combining EEG and MRI data can improve stroke classification accuracy, potentially facilitating faster and more efficient medical diagnosis.

Keywords: Stroke, Deep Learning, EEG, MRI, Convolutional Neural Network (CNN)