

A Convolutional Neural Network-Based Model for Lassa fever Virus Prediction Using Patient Blood Smear Image

Authors : A. M. John-Otumu, M. M. Rahman, M. C. Onuoha, E. P. Ojonugwa

Abstract : A Convolutional Neural Network (CNN) model for predicting Lassa fever was built using Python 3.8.0 programming language, alongside Keras 2.2.4 and TensorFlow 2.6.1 libraries as the development environment in order to reduce the current high risk of Lassa fever in West Africa, particularly in Nigeria. The study was prompted by some major flaws in existing conventional laboratory equipment for diagnosing Lassa fever (RT-PCR), as well as flaws in AI-based techniques that have been used for probing and prognosis of Lassa fever based on literature. There were 15,679 blood smear microscopic image datasets collected in total. The proposed model was trained on 70% of the dataset and tested on 30% of the microscopic images in avoid overfitting. A 3x3x3 convolution filter was also used in the proposed system to extract features from microscopic images. The proposed CNN-based model had a recall value of 96%, a precision value of 93%, an F1 score of 95%, and an accuracy of 94% in predicting and accurately classifying the images into clean or infected samples. Based on empirical evidence from the results of the literature consulted, the proposed model outperformed other existing AI-based techniques evaluated. If properly deployed, the model will assist physicians, medical laboratory scientists, and patients in making accurate diagnoses for Lassa fever cases, allowing the mortality rate due to the Lassa fever virus to be reduced through sound decision-making.

Keywords : artificial intelligence, ANN, blood smear, CNN, deep learning, Lassa fever

Conference Title : ICAICS 2022 : International Conference on Artificial Intelligence and Cognitive Science

Conference Location : Ottawa, Canada

Conference Dates : July 12-13, 2022