ABSTRACT

The increasing crime rate in Indonesia is one of the main challenges facing the country. Data from GITOC (2024) places Indonesia as the second country with the highest crime rate in Southeast Asia. This reinforces the importance of handling crime cases. One of the obstacles to solving criminal cases is the difficulty of detecting suspects' lies during case investigations. This can hamper the legal process, lead to wrongful convictions, and waste a lot of time and resources. Commonly used methods such as psychological interrogation and polygraphs have limitations in accuracy, efficiency, and cost. In addition, reliance on experts to conduct these methods leads to vulnerability to bias and inconsistency in judgment. This research develops BooYa, a web-based deep learning model with real-time video input for lie detection through facial microexpression analysis. The model was trained using CNN and BiLSTM algorithms on 1044 lie and truthfulness videos with a total of 62,640 frames as datasets. Temporal relationships between frames were sequentially analyzed and classified as lies or truthfulness. The dataset was obtained through recording interviews on 170 subjects with an age range of 12-45 years. The results showed that the training accuracy rate reached 98.6% and the test accuracy rate reached 98%. Further evaluation of the Confusion Matrix shows good performance with 88.89% accuracy, 89.04% precision, 86.67% sensitivity, and 87.84% F1 score. Validation results by forensic psychologists showed a value of 94.29%, confirming the validity of the model predictions in the scientific and practical context of forensic psychology. Based on the results of this study, BooYa is proven to be an easily accessible, fast, and accurate criminal case investigation tool to reduce the crime rate in Indonesia.

Keywords: Lie detection, facial micro-expressions, deep learning, machine learning, criminal investigation.