ABSTRACT

IOT-BASED REAL-TIME FLOOD PREDICTION SYSTEM USING SVM ON THE PAYUNG MAS CIPUTAT RIVER

High-intensity rainfall poses a significant challenge in disaster risk management in Indonesia. The Meteorology, Climatology, and Geophysics Agency (BMKG) predicts medium to high rainfall intensity during specific periods in 2024, particularly from February to April and June to August, which may increase the risk of flooding. For instance, South Tangerang experienced 30 flood incidents in 2023, according to data from the Regional Disaster Management Agency (BPBD) of South Tangerang City. To address this issue, a flood prediction system has been developed based on the Internet of Things (IoT) using NodeMCU ESP32 and relevant sensors. The system collects data from ultrasonic sensors to monitor water levels, flow meters to detect water flow speed, and tipping bucket rain gauges to measure rainfall intensity The data collected by the sensors is processed using a prediction model based on Support Vector Machine (SVM), which was trained with 3,550 data points collected during the period from September 1, 2024, to December 31, 2024. To ensure a balanced data distribution, the dataset was enhanced using the Synthetic Minority Oversampling Technique (SMOTE), increasing the total data to 5,659 entries. The prediction model achieved an accuracy of 98% on the training data and 95% on the testing data. Flood prediction results are delivered to users through Telegram via a chatbot feature, enabling effective and easily accessible early warnings. Additionally, sensor data and prediction results are stored in a database to serve as learning data for future applications. This system is designed to operate automatically, requiring no manual intervention. Its implementation is expected to enhance community preparedness in responding to potential floods by providing accurate and efficient information dissemination.

Keywords*: Flood, Prediction, IoT, SVM, Machine learning, Telegram, SMOTE*