

***Flood Prone Area Prediction System Using LSTM and Random Forest Methods  
Based on Satellite Imagery with Google Earth Engine***

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**ABSTRACT**

*Floods are one of the most frequent natural disasters in Indonesia. These disasters have significant impacts on various aspects, ranging from social, economic, to environmental. Therefore, an early warning system capable of providing accurate predictions is needed as a preventive mitigation effort. This study aims to develop a flood-prone area prediction system implemented on a website called "Smart Mitigation" using Long Short-Term Memory (LSTM) and Random Forest machine learning models. The data used in this platform is non-linear, fluctuating, and temporally dependent. The data processing process includes preprocessing, feature engineering, and data augmentation to address data imbalance. The developed model is then integrated into the application as a key feature in supporting disaster mitigation. The results show that the machine learning approach is capable of providing good prediction performance and can be utilized as a decision support system in flood mitigation. This model achieved an accuracy of 96.67%, a precision of 100%, a recall of 83.33%, an F1-score of 0.9091, and the highest ROC-AUC of 0.9792. This system is expected to improve community preparedness and assist relevant parties in taking preventive measures before a disaster occurs.*

***Keywords:*** *Flood Prediction, Random Forest, LSTM, Machine Learning, Early Warning System*