

Flood Mapping Through Satellite Images Using Deep Learning for Agriculture Insurance Claim Application

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Abstract: The paper proposes a novel FloodDetectionNet model for flood area segmentation. The proposed model incorporates attention gates for semantic segmentation by utilizing advanced image segmentation techniques using a modified U-Net architecture. The attention gates focus on critical features gathered from multiple encoder layers, enhancing the accuracy of identifying flood-affected areas. The U-Net with attention structure captures high-level context as well as complex details, which are augmented by dataset modifications to increase generalization. The use of modular attention gate function, provides an effective solution to effectively segment real-world flooding images within the U-Net framework, allowing for improved flood response and prevention strategies. The proposed model has 85.5% precision and 94.4% recall, accurately segments the flood-affected areas. It has achieved 89.9% F1-score, indicating efficient flood detection and contributing to Floods are among the most devastating natural disasters, causing significant loss of life, property, and environmental damage. Rapid and accurate flood mapping is essential for effective disaster response, risk assessment, and mitigation planning.

The outcomes of this research contribute significantly to the field of remote sensing and disaster management by providing a reliable and efficient method for flood area mapping. The proposed system can support government agencies, urban planners, and emergency responders in developing informed, timely strategies for flood prevention and response.

Keywords: Flood mapping, Satellite imagery, FloodDetectionNet, Attention gates, U-Net architecture, Remote sensing, Disaster management, Image segmentation, Deep learning

