**B V RAJU INSTITUTE OF TECHNOLOGY**

**Department of Artificial Intelligence & Data Science**

**FLOOD DETECTION WITH SATELLITE IMAGES**

**USING DEEP LEARNING**

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**Abstract:**

Flood detection plays a crucial role in disaster management by enabling timely responses to mitigate damage. Traditional flood detection models often struggle with high computational complexity, segmentation inaccuracies, and adaptability to diverse datasets. This study proposes an advanced flood  detection system using a U-Net with Attention Mechanisms for segmentation and K eras-Tuner for  hyper parameter optimization. The proposed model eliminates the need for clustering-based  segmentation and instead relies on U-Net’s built-in feature extraction and classification capabilities. Additionally, it incorporates data augmentation techniques such as rotation, flipping, zooming, and shifting to improve generalization. The system provides real-time, high-accuracy flood mapping with reduced computational costs, making it highly efficient for large-scale deployment.

**Existing System:**

The existing system utilizes a Hybrid Deep Learning Model (CNN + ResNet) for flood detection. It employs a Combined Harris Hawks Shuffled Shepherd Optimization (CHHSSO) algorithm for optimizing CNN and Res Net weights. Segmentation is performed using K-Means clustering with a cubic chaotic map, and feature extraction relies on vegetation indices (NDVI, DVI, MTVI, SAVI, GVI). The system is trained on Sentinel-2 & Landsat 8 satellite images, providing a binary classification of flood-prone and non-flood-prone areas.

**Drawbacks/Limitations:**

* High computational complexity due to CNN + Res Net architecture.
* CHHSSO optimization is resource-intensive, increasing processing time.
* K-Means segmentation lacks precision, leading to potential miss classifications.
* Limited adaptability, as the model depends on fixed vegetation indices.
* Longer training time due to complex optimization techniques.

**Proposed System:**

We propose a flood detection model using U-Net with Attention Mechanisms to enhance segmentation accuracy and efficiency. The system leverages K eras-Tuner for automated hyper parameter tuning, eliminating the need for manual weight optimization. Unlike the existing system, this model does not rely on K-Means clustering or predefined vegetation indices, making it more adaptable to diverse datasets. U-Net's built-in segmentation capabilities allow for precise flood region mapping. The model also incorporates real-time processing capabilities, ensuring faster response times with reduced computational overhead. Data augmentation further enhances model robustness, ensuring reliable performance across different environmental conditions.

**GUIDE                                                                            Student  Details:**

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