**Pushing Boundaries in Hyperspectral Image Classification: A Comparative Analysis of CTMixer, SF-SMF, and MAEST**

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***ABSTRACT***

With advancements in remote sensing (RS) and deep learning (DL), interest in classifying materials on and below the Earth's surface has grown significantly. Hyperspectral (HS) images, which are data cubes containing spatial-spectral information, capture data across various electromagnetic wavelengths. Recent transformer-based architectures for classifying these images have achieved notable accuracy. However, variations in datasets and parameters, such as the number of layers and learning rate, require deeper investigation into their differences and computational efficiency. This study compares three architectures: Convolution Transformer Mixer (CTMixer), SpectralFormer enhanced by the Spectrum Motion Feature (SF-SMF), and Masked Auto Encoding Spectral-spatial Transformer (MAEST), using the Indian Pines, Pavia University, and Houston 2013 datasets. Indian Pines, mainly covering crops and natural vegetation, presents a challenging classification task due to limited samples. Preliminary results show that MAEST, even with optimal parameters, has lower accuracy and kappa than CTMixer and SF-SMF. Future work includes the Pavia University and Houston 2013 datasets. Pavia University, featuring roads, buildings, and trees, is used for urban land cover classification. Houston 2013, with its diverse land cover types, is widely used in hyperspectral image research. Parameters such as learning rate, epochs, and patch size will be standardized for all methods. Computational speed and performance will be compared, and classification results will be visualized to highlight differences in boundary sharpness and smoothness.

**Keywords:** Deep Learning, Hyperspectral Image Classification, Transformer