Enhanced Aerial Scene Classification Through ConvNeXt Architectures and Channel Attention

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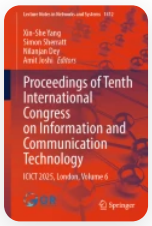

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Abstract

This work explores the integration of a Channel Attention (CA) module into the ConvNeXt architecture to improve performance in scene classification tasks. Using the UC Merced

dataset, experiments were conducted with two data splits: 50% and 20% for training. Models were trained for up to 20 epochs, limiting the training process to assess which models could extract the most relevant features efficiently under constrained conditions. The ConvNeXt architecture was modified by incorporating a Squeeze-and-Excitation block, aiming to enhance the importance of each feature channel. ConvNeXt models with CA showed strong results, achieving the highest performance in the experiments conducted. ConvNeXt large with CA reached 90% accuracy and 89.75% F1-score with 50% of the training data, while ConvNeXt base with CA achieved 77.14% accuracy and 75.23% F1-score when trained with only 20% of the data. These models consistently outperformed their standard counterparts, as well as other architectures like ResNet and Swin Transformer, achieving improvements of up to 9.60% in accuracy, highlighting the effectiveness of CA in boosting performance, particularly in scenarios with limited data.

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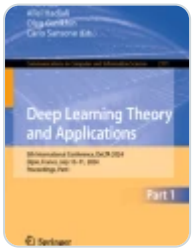

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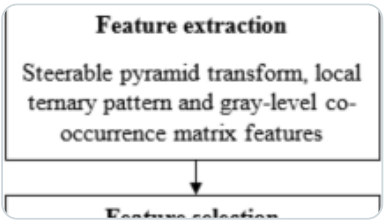

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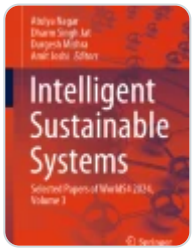

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Notes

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