

Aerial Scene Classification Using Transfer Learning

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Abstract

Aerial scene classification is an important computer vision task that involves automatically identifying and categorizing different types of scenes from remotely sensed aerial images. It has significant applications in urban planning, environmental monitoring, land-use analysis, disaster management, agriculture, and geographical information systems. However, accurate classification of aerial scenes is challenging because of variations in image scale, orientation, illumination, spatial resolution, and the visual similarity between different scene categories. This study explores the application of transfer learning for efficient and accurate aerial scene classification. Instead of training a deep neural network from scratch, pretrained convolutional neural network architectures are utilized as feature extractors and subsequently fine-tuned for the target aerial image dataset. The proposed approach leverages the learned visual representations of established deep learning models while adapting their higher-level features to the specific characteristics of aerial scenes. Data preprocessing and augmentation techniques can be employed to improve model generalization and reduce the risk of overfitting. The performance of the transfer-learning-based models can be evaluated using accuracy, precision, recall, F1-score, and confusion matrices. The approach is expected to reduce training time and computational requirements while maintaining competitive classification performance, particularly when the available labelled aerial imagery is limited. Overall, transfer learning provides a practical and scalable solution for aerial scene classification and offers considerable potential for developing intelligent remote-sensing applications.

Keywords: Aerial Scene Classification, Transfer Learning, Deep Learning, Convolutional Neural Networks, Remote Sensing, Image Classification, Computer Vision, Feature Extraction, Image Augmentation, Land-Use Classification.

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