ABSTRACT

SS-MLA: A Novel Solution for Multi-Label Classification of Remotely Sensed Images

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Multi-label classification of remotely sensed images is a very important research area. It has many applications from tracking urban growth to military surveillance. Many algorithms and methods are proposed for multi-label annotation of remotely sensed images. In this thesis, two approaches are provided. The first one is a CNN-based straightforward model to show that in small datasets sophisticated methods have no advantage over simpler ones. The second one is a competitive Vector-Quantized Temporal Associative Memory (VQTAM) based method called Semi-Supervised Multi-Label Annotizer (SS-MLA) for multi-label annotation of remotely sensed images. The first method is compared with SS-MLA along with other state-of-the-art methods from the literature according to their F1-Scores on four different remotely sensed datasets with SS-MLA. The experiment results show that SS-MLA, as a new approach, achieves better results than half of the comparisons as well as the proposed straightforward method. For all the implementations of the algorithms and methods, Tensorflow-GPU 2.4.0 and Numpy 1.19.5 frameworks are used in a Python 3.8 environment.

Keywords: VQTAM, multi-label, semi-supervised, deep learning, remote sensing.