Refined Prototypical Contrastive Learning for Few-Shot Hyperspectral Image Classification

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Abstract Recently, prototypical network-based few-shot learning (FSL) has been introduced for small-sample hyperspectral image (HSI) classification and has shown good performance. However, existing prototypical-based FSL methods have two problems: prototype instability and domain shift between training and testing datasets. To solve these problems, we propose a refined prototypical contrastive learning network for FSL (RPCL-FSL) in this article, which incorporates supervised contrastive learning (CL) and FSL into an end-to-end network to perform small-sample HSI classification. To stabilize and refine the prototypes, RPCL-FSL impo[illegible] triple constraints on prototypes of the support set, i.e., CL-, self-calibration (SC)-, and cross-calibration (CC)-based constraints. The CL module imposes an internal

constraint on the prototypes aiming to directly improve the prototypes using support set samples in the CL framework, and the SC and CC modules impose external constraints on the prototypes by using the prediction loss of support set samples and the query set prototypes, respectively. To alleviate a domain shift in the FSL, a fusion training strategy is designed to reduce the feature differences between training and testing datasets. Experimental results on three HSI datasets demonstrate that the proposed RPCL-FSL outperforms existing state-of-the-art deep learning and FSL methods.

Keywords

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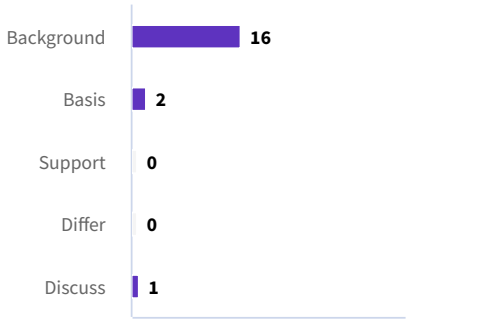

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