World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:12, No:10, 2018

Enhanced Image Representation for Deep Belief Network Classification of Hyperspectral Images

Authors : Khitem Amiri, Mohamed Farah

Abstract : Image classification is a challenging task and is gaining lots of interest since it helps us to understand the content of images. Recently Deep Learning (DL) based methods gave very interesting results on several benchmarks. For Hyperspectral images (HSI), the application of DL techniques is still challenging due to the scarcity of labeled data and to the curse of dimensionality. Among other approaches, Deep Belief Network (DBN) based approaches gave a fair classification accuracy. In this paper, we address the problem of the curse of dimensionality by reducing the number of bands and replacing the HSI channels by the channels representing radiometric indices. Therefore, instead of using all the HSI bands, we compute the radiometric indices such as NDVI (Normalized Difference Vegetation Index), NDWI (Normalized Difference Water Index), etc, and we use the combination of these indices as input for the Deep Belief Network (DBN) based classification model. Thus, we keep almost all the pertinent spectral information while reducing considerably the size of the image. In order to test our image representation, we applied our method on several HSI datasets including the Indian pines dataset, Jasper Ridge data and it gave comparable results to the state of the art methods while reducing considerably the time of training and testing.

Keywords : hyperspectral images, deep belief network, radiometric indices, image classification
Conference Title : ICIAP 2018 : International Conference on Image Analysis and Processing
Conference Location : Paris, France
Conference Dates : October 29-30, 2018