World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:11, No:02, 2017

An Adaptive Dimensionality Reduction Approach for Hyperspectral Imagery Semantic Interpretation

Authors : Akrem Sellami, Imed Riadh Farah, Basel Solaiman

Abstract : With the development of HyperSpectral Imagery (HSI) technology, the spectral resolution of HSI became denser, which resulted in large number of spectral bands, high correlation between neighboring, and high data redundancy. However, the semantic interpretation is a challenging task for HSI analysis due to the high dimensionality and the high correlation of the different spectral bands. In fact, this work presents a dimensionality reduction approach that allows to overcome the different issues improving the semantic interpretation of HSI. Therefore, in order to preserve the spatial information, the Tensor Locality Preserving Projection (TLPP) has been applied to transform the original HSI. In the second step, knowledge has been extracted based on the adjacency graph to describe the different pixels. Based on the transformation matrix using TLPP, a weighted matrix has been constructed to rank the different spectral bands based on their contribution score. Thus, the relevant bands have been adaptively selected based on the weighted matrix. The performance of the presented approach has been validated by implementing several experiments, and the obtained results demonstrate the efficiency of this approach compared to various existing dimensionality reduction techniques. Also, according to the experimental results, we can conclude that this approach can adaptively select the relevant spectral improving the semantic interpretation of HSI.

Keywords : band selection, dimensionality reduction, feature extraction, hyperspectral imagery, semantic interpretation
Conference Title : ICRSA 2017 : International Conference on Remote Sensing and Applications
Conference Location : Venice, Italy
Conference Dates : February 16-17, 2017