Comparison of Different Image Processing Techniques for Mapping Built-up Areas

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Abstract:

In this study, several supervised image classification techniques including the parallelepiped (PE), minimum distance (MD), mahalanobis distance (MaD), maximum likelihood (ML), spectral angle mapper (SAM), spectral information divergence (SID), binary encoding (BE), and artificial neural network (ANN) were performed to map built-up areas from Landsat 8 OLI imagery. The generated maps were statistically analyzed and compared through the calculation of overall accuracy and kappa coefficient. The results revealed higher performance of ANN comparing to other methods by achieving the overall accuracy of 97.40%. The results also indicated that the ML and MaD methods could provide reliable results for built-up area mapping with the overall accuracies of 96.61% and 96.35%, respectively. On the other hand, the PE, SAM, SID, and BE methods failed to provide reasonable results for this purpose. Overall, the results demonstrated suitability of supervised image classification techniques for built-up area mapping from Landsat OLI imagery.

Keywords:

Landsat OLI, image classification, artificial neural network.