Abstract

The Landsat programe offers a long-term time series for monitoring landscape changes. However, change detection is often affected by differences between mission sensors and the difficulty of collecting training data, which may be completely missing for certain older time periods. Relative radiometric normalization (RRN) may offer a suitable way to minimizing these obstacles. This thesis explores the potential of using RRN to classify satellite images for which no training data is available. The main objective is to verify whether a normalized image can be classified using the training data from a reference image. In this work, images from the Landsat 5 mission (year 2000, target image) and the Landsat 9 mission (year 2023, reference image) were processed. RRN methods based on the selection of pseudo-invariant features (PIF) were applied in this work. Five PIF selection methods were tested: SID, SAM, EMD, MAD and IR-MAD. Analysis of the normalization quality showed that MAD and IR-MAD methods are suitable candidates for testing the classification of the normalized images. Before classifying the normalized images, the reference and target images were first classified using the training data from 2000 and 2023, respectively. The classification of the normalized images achieved overall accuracies of 86% (MAD) and 84% (IR-MAD). However, the classification results showed that croplands were frequently misclassified as built-up areas and grasslands. The results of this work demonstrate the potential of using RRN for classification. Since RRN is highly dependent on PIF selection as well as atmospheric, geometric and phenological conditions, these influences require futher investigation.

Keywords

Remote sensing, Landsat, relative radiometric normalisation, IRMAD, PIF, regression, classification, Google Earth Engine, Python