Subpixel Change Detection on Multi-temporal Remote Sensing Images Based on Textural, Spectral and Abundance Features

Chia-Chin Hsieh
National Cheng Kung University, Tainwan

Department of Computer Science and Information Engineering
National Cheng Kung University, Tainan 701, Taiwan, R.O.C.
E-mail: pfhsieh@mail.ncku.edu.tw

Abstract:

Change detection has become an interesting topic for in diverse applications, such as remote sensing, medical diagnosis and video surveillance. Its goal is to find the significantly changed areas between multiple images of the same scene taken at different times. In order to utilize remote sensing data to monitor surface changes over time, it is necessary to develop and test methods for deriving quantitative information on surface components which typically occur as mixtures at the sub-pixel scale. We proposed a system based on textural, spectral and abundance features for subpixel change detection.

In our previous work, we have combined spectral and spatial information and incorporated the global histogram equalization procedure into the change detection. To further monitor the change of an object size in subpixel scale, we found that the pixels on the boundary that are mixtures of more than one distinct material carry useful information. We thus propose the incorporation of abundance features into change detection. We apply Independent component analysis(ICA) which recently been proposed as a tool to unmix hyperspectral data for abundance analysis.

In this paper, we have developed a system of change identification for monitoring the change of landslides based on FORMORSAT images. We used one change identification procedure following four change detection tests. In our case, object of interest are often much larger than a pixel, so neighboring pixels are more likely to come from the same class and form a homogeneous region. Therefore, our change identification is based on the Adaptive Bayesian contextual classifier which uses spectral and spatial information is more suitable than a pixel-wise classifier. Our experimental results have demonstrated the feasibility of abundance feature.