World Academy of Science, Engineering and Technology
International Journal of Marine and Environmental Sciences
Vol:12, No:02, 2018

Best-Performing Color Space for Land-Sea Segmentation Using Wavelet Transform Color-Texture Features and Fusion of over Segmentation

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Abstract : Color and texture are the two most determinant elements for perception and recognition of the objects in an image. For this reason, color and texture analysis find a large field of application, for example in image classification and segmentation. But, the pioneering work in texture analysis was conducted on grayscale images, thus discarding color information. Many grey-level texture descriptors have been proposed and successfully used in numerous domains for image classification: face recognition, industrial inspections, food science medical imaging among others. Taking into account color in the definition of these descriptors makes it possible to better characterize images. Color texture is thus the subject of recent work, and the analysis of color texture images is increasingly attracting interest in the scientific community. In optical remote sensing systems, sensors measure separately different parts of the electromagnetic spectrum; the visible ones and even those that are invisible to the human eye. The amounts of light reflected by the earth in spectral bands are then transformed into grayscale images. The primary natural colors Red (R) Green (G) and Blue (B) are then used in mixtures of different spectral bands in order to produce RGB images. Thus, good color texture discrimination can be achieved using RGB under controlled illumination conditions. Some previous works investigate the effect of using different color space for color texture classification. However, the selection of the best performing color space in land-sea segmentation is an open question. Its resolution may bring considerable improvements in certain applications like coastline detection, where the detection result is strongly dependent on the performance of the land-sea segmentation. The aim of this paper is to present the results of a study conducted on different color spaces in order to show the best-performing color space for land-sea segmentation. In this sense, an experimental analysis is carried out using five different color spaces (RGB, XYZ, Lab, HSV, YCbCr). For each color space, the Haar wavelet decomposition is used to extract different color texture features. These color texture features are then used for Fusion of Over Segmentation (FOOS) based classification; this allows segmentation of the land part from the sea one. By analyzing the different results of this study, the HSV color space is found as the best classification performance while using color and texture features; which is perfectly coherent with the results presented in the literature.

Keywords : classification, coastline, color, sea-land segmentation
Conference Title : ICWRCOE 2018 : International Conference on Water Resources, Coastal and Ocean Engineering
Conference Location : Kuala Lumpur, Malaysia
Conference Dates : February 12-13, 2018