An Automated Flood Detection Mapping Based on RADARSAT-2 Satellite Image through Ensemble Classification Approaches

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SUMMARY

Floods are considered as one of the most destructive natural disasters, globally. Preparation of an actuate flood inventory map is the basic step in flood disaster management. Flood detection is yet significantly complex process due to the presence of cloud coverage in the tropical areas. Moreover, the most available techniques are expensive and time-consuming. Therefore, in the present study an efficient approach is presented to identify the flooded areas by means of TerraSAR-X imagery. The proposed framework initially employs a TerraSAR-X satellite image captured within a flood occurrence to map the flooded areas. Both TerraSAR-X and Landsat image images were classified based on object-oriented technique which is a rule-based method. Image segmentation prior to classification was executed to distinguish the boundaries of various dimensions and scales of objects. The Taguchi method was applied to optimize the segmentation parameters. After the completion of segmentation, the rules were defined and the images were classified. The Landsat image was categorized into three classes of vegetation, urban and water bodies, while the TerraSAR-X image was only classified into one class of water. Finally, the results of classification were estimated through a confusion matrix. The overall accuracy results derived from the classified maps, based on Landsat imagery and TerraSAR-X, were 93.04 and 86.18, respectively. As a result, the location of flooded areas were determined and mapped by subtracting the two classes of water bodies from these images. In this research, the combination of techniques and the optimization approach were applied as a pioneering approach for flood detection. The flood inventory map which was obtained by using the proposed approach is showing the efficiency of the methodology which can be applied by other researchers and decision makers to construct the flood inventory maps.

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