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IMPROVED BAYESIAN UPDATING OF LAND-COVER (IBULC) ALGORITHM

Abstract

Recent time series based land cover classification updating algorithms have shown improvements in mapping land cover changes and thus provided better insights in to the sources of land cover changes. One class of such algorithms uses Bayesian statistics for example Bayesian Updating of Land-Cover (BULC) algorithm. BULC algorithm uses current and previous land-cover maps as events for the computation of prior and posterior probabilities and claims rapid response to land cover change and high noise removal ability. In this research, we evaluate the performance of the BULC algorithm in rapidly changing snow-covered complex terrain. Building on land-cover maps having median accuracy of 90.51%, the BULC algorithm created 15 sequenced land-cover maps having a median accuracy of 85.16%. The large decrement in the BULC overall accuracy is observed for events having agreement less than 85% between consecutive pairs of input maps. In order to improve overall accuracy for each event regardless of the magnitude of agreement between consecutive pairs of input classifications, we present an Improved version of the Bayesian Updating of Land-Cover (IBULC) algorithm. The major advancement in the IBULC algorithm is the use of current, past, and future events for the computation of prior and posterior probabilities of the current event. The IBULC algorithm resulted median accuracy of 94.17% for the same set of input land-cover maps. Furthermore, IBULC is found less sensitive to magnitude of land cover change and is more precise and suitable for mapping land cover changes.