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# A Review of Different Studies on Hidden Markov Models for Multi-Temporal Satellite Images: Stationarity and Non-Stationarity Issues

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**Abstract :** Due to the considerable advances in Multi-Temporal Satellite Images (MTSI), remote sensing application became more accurate. Recently, many advances in modeling MTSI are developed using various models. The purpose of this article is to present an overview of studies using Hidden Markov Model (HMM). First of all, we provide a background of using HMM and their applications in this context. A comparison of the different works is discussed, and possible areas and challenges are highlighted. Secondly, we discussed the difference on vegetation monitoring as well as urban growth. Nevertheless, most research efforts have been used only stationary data. From another point of view, in this paper, we describe a new non-stationarity HMM, that is defined with a set of parts of the time series e.g. seasonal, trend and random. In addition, a new approach giving more accurate results and improve the applicability of the HMM in modeling a non-stationary data series. In order to assess the performance of the HMM, different experiments are carried out using Moderate Resolution Imaging Spectroradiometer (MODIS) NDVI time series of the northwestern region of Tunisia and Landsat time series of tres Cantos-Madrid in Spain.

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