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Big Data in Land Change Science: Challenges and Implications of Advanced Technologies

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Big Data in Land Change Science: Challenges and Implications of Advanced Technologies

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Abstract: Big data has received a lot of attentions during last decade. Dealing with big data is a complex task as it is challenging to analyse, store, model and make sense of big data. Using big data in land change science (LCS) is a new area of research. One of the main challenges in LCS is using big data for model calibration effectively. In this study, we propose using clustering technique, based on k -means approach, to handle big land-use data and overcome the limitation of model calibration. With clustering, data are partitioned into smaller subsets and are then analysed separately very similar to parallel processing. We evaluated the proposed approach using well-established goodness-of-fit metrics (e.g., accuracy measure). We compared the results obtained by applying k -means clustering ($k = 5$) and not applying ($k = 1$). Each configuration replicated 20 times to account for the randomness in the partitioning for training and testing datasets. The experiments were based on land-use data in southern east of Wisconsin in USA. Results showed great fit with an overall accuracy of 92.5% and 95.96%, for $k=5$ and $k=1$, respectively.

Keywords: Big data; clustering; k -means; land change science; model performance.