Paper ID: 62489
student

IAF EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Data Management Systems (4)

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COMPARISON OF MACHINE LEARNING CLASSIFIERS FOR LAND COVER CHANGE USING GOOGLE EARTH ENGINE WITH LANDSAT5, LANDSAT8 AND SENTINEL2 IN VIENTIANE CAPITAL, LAO PDR

Abstract

Increasing urbanization causes a variety of environmental changes, not only in regional but in the global scale, especially in developing countries. The developing countries like Lao PDR have very few data on environment and urban management and face many difficulties due to poor data management. Nowadays, using the integration of geographic information system (GIS) and remote sensing provides us with an effective result in determining the land use/land cover pattern changes as well as providing valuable information needed for planning and researching. Thus, the information such as rate of growing, pattern, and urban expansion model is required by the city planners to accurately determine in order to give direction to city planning and policy management for better urbanization. The research focuses on its dynamic pattern changing of urban development for three decades between 1989 and 2019. To quantitatively assess the change rate in land cover and measure the direction of the urban expansion over the period time in the study area, an innovation and advanced technology must be utilized. A new approach has been introduced for detecting and monitoring urban expansion by using the Big Data platform via the Google Earth Engine (GEE) cloud computing. Also, the machine learning algorithms have been recommended for this research, such as Random Forest (RF), Classification and Regression Tree (CART), Continuous Naïve Bayes (CNB), GMO Max Entropy (GMO Maxent), and Minimum Distance (MD). The different classifiers will be used to compare the performance of those machine learning algorithms and determine the adequate performance of the classifiers. Analyzing and monitoring urban areas is an essential factor for town or city planning. In this research, we conduct GEE combining with multiple sources of satellite optical images time-series from three main satellites, Landsat 5 and Landsat 8 from the partnership of the National Aeronautics and Space Administration (NASA) and the U.S. Geological Survey (USGS), and Sentinel-2, Which has been developed and is being operated by European Space Agency (ESA), These three satellites will be used for accuracy assessments and feature extraction for urban expansion and land cover changes during the 30-year in Vientiane Capital, Lao PDR.