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URBANIZATION GROWTH DETECTION OF DUBAI CITY USING GIS AND REMOTE SENSING
TECHNIQUES

Abstract

Urbanization is a spatial temporal process that has a significant role in economic, social, and environmental structures, as well as policy and decision-making criteria. Temporal Analysis for urban growth using spatial and non-spatial data is considered as one of the major issues for urban development, planning, and management procedures. Dubai is one of the modern, well-known cities, and it is rapidly developing financially and socially. Furthermore, its population growth has reached one hundred times larger since 1950. Consequently, its urban fabric extended to more than four hundred times, which created urgent need to analyze, measure, and model urban growth. Integrated technologies of remote sensing, Geographic Information System (GIS), and AI, facilitate the detection, modelling, and assessment of urban growth and its relation to population distribution and land use change. The purpose of this study is to use high and medium-resolution remote sensing images that integrate DS-1, DS-2, and Sentinel images in order to examine the urbanization of Dubai city for the last decade (2009-2019), along with its impact on Land Cover Land Use (LCLU) and transportation towards smart city aspects. The proposed methodology consists of four main categories. First, supervised classification algorithm along with change detection methods in GIS, will be used to classify Sentinel images into four categories as follows: agriculture, urban, water, and desert. Second, segmentation and extraction of buildings and roads, from high-resolution DS-1 and DS-2 images, will be implemented based on CNN architecture. Third, classified data will be compared with information from Open Street Maps (OSM), and LCLU data to generate complete and precise LCLU dataset. Finally, statistical analysis for LCLU percentages will be investigated to address Dubai's growth towards compact or sprawl city.