DATASET FUSION AND ALGORITHM INTEGRATION IN THE CHARACTERIZATION OF URBAN SPRAWL ALONG TRUNK TRANSPORT CORRIDORS IN THE GAUTENG GLOBAL CITY REGION

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Abstract

This paper explores how algorithms can effectively be applied on high-resolution (e.g. Quickbird) images and more recent hyperspectral images (e.g. AVIRIS) in the analysis and characterization of urban sprawl. Fusion of such datasets [1]; [2] provides a platform for robust and more accurate classification of urban environments, as the strengths of both datasets are combined to improve the accuracy of results. Multi-temporal image sets are interpreted to detect and quantify changes in the degree of spatial concentration (density), level of dispersion and patterns of urban landscape development along selected major transport routes in the Gauteng Global City Region, as an indicator of changes in urban sprawl [4]. Map density values are computed by dividing number of *built-up area* pixels to the total number of pixels in a kernel. This when applied to classified satellite imagery converts land cover classes to building density classes. Density classes were further grouped as low, medium and high density. To extract the building footprints, the Decision Boundary Feature Extraction (DBFE) was used to discriminate between buildings and roads/pavements [3]. This study thus shows that algorithms and techniques suited for multisource urban classification analysis give more accurate result in urban sprawl studies than single datasets. Placement of trunk transport infrastructure - freeways, busways and heavy or light rail - has a dominant formative influence on the structure of subsequent urban development in the City Region. This study contributes to methodology by illustrating how the fusion of multiple remote sensing datasets and integration techniques can improve accuracy in the analysis of temporal-spatial urban sprawl in the context of developing city regions.

References

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