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A MULTI-SCALE SVM-BASED APPROACH TO DERIVE URBAN LANDUSE / LANDCOVER FROM MULTISPECTRAL IMAGES

F. Bachofer [a] *, R. Hagensieker [b] and V. Hochschild [a]

[a] University of Tuebingen, Department of Geography, Geoinformatics Group, 72070 Tuebingen, Germany – Felix.Bachofer@uni-tuebingen.de, Volker.Hochschild@uni-tuebingen.de
[b] Freie Universitaet Berlin, Institute of Geographical Sciences, 12249 Berlin, Germany – Ron.Hagensieker@fu-berlin.de

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ABSTRACT:

Dynamically changing urban agglomerations in developing and emerging countries suffer from social and environmental challenges, due to a growth population and socioeconomic developments. As a basis for the planning of supply and disposal infrastructure, frequent information on qualitative and quantitative changes in settlement structure is necessary. High resolution multispectral imagery allows the identification of relevant ground objects. Since the spectral resolution of satellite images as well as digital surface models (DSM) are mostly limited, effective classification methods are required which include contextual information.
The aim of the proposed study is the generation of a robust classification approach for heterogeneous urban environments. Therefore an object oriented approach was chosen. For the resulting image segments, spectral and geometrical parameters from multiple scales were extracted considering the hierarchical structure. For WorldView-2 images (8 spectral bands) of each of the case cities DaNang (Vietnam) and Kigali (Rwanda) image objects carrying a combination of 101 spectral, geometrical and multi-sale features were extracted. From these features the most significant for the discrimination of the training samples were identified applying recursive feature elimination (RFE). These features were utilized as input variables for a Support Vector Machine (SVM) model with an rbf-kernel (radial basis function). 17 target classes could be distinguished with accuracies up to 89 %. The vertical contextual information achieved by the multi-scale approach allows to incorporate interrelations between single object properties und bigger urban structures and thus can improve classification results significantly.

* Corresponding author. This is useful to know for communication with the appropriate person in cases with more than one author.