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CLASSIFICATION OF ROOF MATERIALS USING HYPERSPECTRAL DATA

C. Chisense

Department of Geomatics, Computer Science and Mathematics, University of Applied Sciences Stuttgart Schellingstraße 24, D-70174 Stuttgart ,Germany,

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Abstract. Mapping of surface materials in urban areas using aerial imagery is a challenging task. This is because there are numerous materials present in relatively small regions. Hyperspectral data features a fine spectral resolution and thus has a significant capability for automatic identification and mapping of urban surface materials. In this study an approach for identification of roof surface materials using hyperspectral data is presented. The study is based on an urban area in Ludwigsburg, Germany, using a HyMap data set recorded during the HyMap campaign in August, 2010. Automatisierte Liegenschaftskarte (ALK) vector data with a building layer is combined with the HyMap data to limit the analysis to roofs. A spectral library for roofs is compiled based on field and image measurements. In the roof material identification process, supervised classification methods, namely spectral angle mapper and spectral information divergence and the object oriented ECHO (extraction and classification of homogeneous objects) approach are compared. In addition to the overall shape of spectral curves, position and strength of absorptions features are used to enhance material identification. The discriminant analysis feature extraction method is applied to the HyMap data in order to identify features (band combinations) suitable for discriminating between the target classes. The identified optimal features are used to create a new data set which is later classified using the ECHO classifier. The classification results with respect to material types of roofs are presented in this study. The most important results are evaluated using orthophotos, probability maps and field visits.

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