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Pan-sharpening as an effective method to improve classification accuracy of roofing materials

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In urban environment the presence of hazardous roofing material is a serious threat for both the inhabitants and the environment. Since they provide danger from several aspects: they can be flammable but also can cause cancer like asbestos roof types. A possible way for the mapping of roofing materials is the remote sensing since it can provide high resolution datasets from a secure distance. However, the identification precision of these materials are not always reliable and this research area still needs more improvements. Our aim was to provide an analysis on the classification accuracy of roofing materials using a WorldView-2 satellite imagery covering a selected area of Debrecen, the second biggest city of Hungary. We investigated the Discriminant Function Analysis (DFA) and Random Forest classifications with different class numbers while we also applied a pan-sharpening on the imagery to reveal its possible role in the classification accuracy. Our results showed that the both classifiers effectively identified the roofing materials by the involved classes having the overall accuracy values higher than 85%. RF classifier provided the best results in case of three and six classes, while DFA also showed effective classification in case of three classes. Linear DFA was found to be the worse in case of accuracy however this value generally was around 85%. It was possible to identify the harmful asbestos material using all the classifiers, therefore, we suggest that this roof mapping method can be used by the local management authorities and cadastral plans.

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