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A Comparison of Object Based Classification for Building Class Performance Using Orthophotos

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Natural hazard is a natural phenomenon, which causes huge loss of lives, heavily infrastucture damages and great financial losses every year all around the world. Among the natural hazards, earthquake is the most crucial one that effect the people and nature adversely. More than a million earthquakes occur which is equal to two earthquakes per minute around the world according to the statistical data. Turkey is home to major earthquakes due to its tectonic structure. On October 23th 2011, a great earthquake occured in the eastern part of Turkey in Van Province. The epicenter of the earthquake was 38.75 N 43.36 E. 604 people died, 4152 people injured and about 4000 buildings seriously damaged and collapsed after this earthquake. Earthquake-induced building damage detection is a very important step after earthquakes since earthquake-induced building damage is one of the most critical threats to cities and countries in terms of the area of damage, rate of collapsed buildings, the damage grade near the epicenters and also building damage types for all constructions.
The motivation of this paper is to detect and extract the collapsed and uncollapsed residential buildings and debris areas with object based image analysis based on pre and post earthquake orthophoto data. In this study, conventional pixel-based classification algorithm was not used in classifying orthophotos due to aerial images were ineffective to create land use/land cover map especially in complicated urban areas. Orthophotos are the aerial photograph which is generally applied in geospatial data establishment and update. Two different orthophotos were used in which the former was obtaied from General directorate of land registry and cadastre and the latter was obtained from General Command of Mapping. In this research, two different land surfaces were selected as homogenous and heterogeneous case study areas. The first phase of application was multi-resolution segmentation which was applied and optimum parameters were selected to obtain the objects in each area after testing different color/shape and compactness/smoothness values. In the second phase, two different classification approaches, namely “supervised” and “unsupervised” approaches were applied and their classification performances were compared. Promising results were obtained with both pre- and post earthquake orthophoto based classification. Six land cover types such as; vegetation, road, agricultural land, mixed area, buildings and as well as debris were successfully extracted. Object-Based Image Analysis (OBIA) was performed using e-Cognition software.