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Remote sensing techniques applied to seismic vulnerability assessment

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Advances in remote sensing and photogrammetry techniques have increased the degree of accuracy and resolution in the record of the earth's surface. This has expanded the range of possible applications of these data. In this research, we have used these data to document the construction characteristics of the urban environment of Lorca, Spain. An exposure database has been created with the gathered information to be used in seismic vulnerability assessment. To this end, we have used data from photogrammetric flights at different periods, using both orthorectified images in the visible and infrared spectrum. Furthermore, the analysis is completed using LiDAR data. From the combination of these data, it has been possible to delineate the building footprints and characterize the constructions with attributes such as the approximate date of construction, area, type of roof and even building materials. To carry out the calculation, we have developed different algorithms to compare images from different times, segment images, classify LiDAR data, and use the infrared data in order to remove vegetation or to compute roof surfaces with height value, tilt and spectral fingerprint. In addition, the accuracy of our results has been validated with ground truth data.
Keywords: LiDAR, remote sensing, seismic vulnerability, Lorca