Geophysical Research Abstracts
Vol. 12, EGU2010-12684, 2010
EGU General Assembly 2010

Segmentation and classification of urban texture using remote sensing for catastrophe loss modelling

Keiko Saito (1,2,3), Robin Spence (2,3), Matthew Foote (3), and Rashmin Gunasekera (3)

(1) Department of Architecture, University of Cambridge, Cambridge, United Kingdom (ks269@cam.ac.uk), (2) Cambridge Architectural Research Ltd. Cambridge, United Kingdom (robin.spence@carltd.com), (3) Willis Research Network, London, United Kingdom (Gunasekerar@willis.com)

This study focuses on methods in which urban textures of cities are characterised using remotely sensed images. The ultimate goal is to improve the quality of building inventory data that is fed into catastrophe loss estimation models. The improvement in quality is achieved through the use of remotely sensed data since the resulting building inventory would be based on the physical reality, compared to the statistical methods currently employed.

The collection of building inventory data is achieved through (1) the segmentation of urban texture using optical remotely sensed data and creating templates that are representative of the segmented areas, (2) obtaining building type distribution of the template area. The assumption made here is that areas with similar urban texture will have comparative building type distribution. This assumption will be tested using images that show urban textures of cities, which includes L'aquila-Italy and Pylos-Greece. This method is appropriate when collecting data at the urban level. Additional inferences will have to be made when collecting building inventory data at a regional or national level and is beyond the scope of this study.

To validate the analysis, for L'aquila, data on the building inventory will be obtained through Google Street View where the façades of the buildings of most parts of the town can be viewed online. For Pylos, the structure survey for approximately 900 buildings that was carried out for project SEAHELLARC will be used. The ground data will also be used to ascertain the building type distribution within the template area.

The segmentation method employs wavelet analysis, specifically Gabor filter, to segment the image into areas with similar textures. Both supervised and unsupervised methods will be employed on the case study sites mentioned above. The main focus of the study is (1) to assess the performance of the unsupervised segmentation method, particularly the relationship between the window size used and the segmentation result, (2) to assess the performance of the supervised method and investigate the optimal window size. A cross comparison of the templates used for the two cities will be made, to consider the possibility of whether a template created for one city can be applied to another, for supervised classification.

Although the segmentation is based on the physical reality as captured by the satellite image, there will be some intra-class variation in the actual composition of the building types within areas that have been labelled as similar. The uncertainty that arises as a result of this will be quantified for the two case study sites. The uncertainties will also have implications on the loss estimation result.

Buildings will be classified based on parameters for earthquake vulnerabilities; however the same methodology has the potential to be used for other natural or climate change induced hazards, by adjusting the parameters used for the building type classification.