

BUILDING INVENTORY COMPILATION USING REMOTE SENSING TECHNOLOGY

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One of the major concerns in emergency management is having access to accurate database of existing structures. Compiling a comprehensive database of critical infrastructures is a priority which provides a baseline for scenario testing simulations as well as determining the actual extent of damage and associated losses due to an event. In order to perform an effective vulnerability assessment, loss estimation, relief planning and assess insurance liability, we need to have an effective and efficient methods of compiling and updating building inventory databases. This is not only essential in the developing regions of the world, but is also important for urban centers and metropolitans of developed nations.

Building inventories are a primary input for vulnerability exposure and loss estimation models, such as the FEMA program HAZUS. They are also used as planning tools prior to an event and as a response tool once an event has occurred. Current methods of inventory development (e.g, based on tax assessors files, sanborn maps) are often expensive, incomplete, not standardized and frequently not available in electronic format.

In recent years high resolution imagery from satellites and aerial photography have become increasingly more available. The objective of this research is to develop algorithms for feature extraction using remotely sensed data (satellite data or airborne data) -in forms of optical or radar images- to provide an alternative method for inventory-data acquisition.

Information compiled from remotely sensed data that are considered in this research are: building location (longitude, latitude); building height; number of stories; footprint area of buildings; building irregularities (both in plan and height); roof material; cladding material and occupancy type (use).

IfSAR (Interferometer Synthetic Aperture Radar) data are being utilized for the purpose of building height information; LIDAR (Light Detection and Ranging) are used to develop the digital surface model (DSM). Number of stories in each building can be calculated by dividing the total building's height by an average story-height determined locally for each region. As the resolution of imagery increases, other features, such identification of window locations can be used to develop more accurate information on the number of stories as well as to identify stories that are unusually high and pose potential problem. To obtain the footprint area of buildings we combine optical and radar data to detect individual buildings and by knowing the resolution of images and number of pixels corresponding to each building we can estimate the square footage of buildings. Roof material and cladding material can be classified by looking at their spectral signature and comparing them to reference signatures that we have in our database for different construction materials.