

Identifying the Structural Components of Old Buildings from Floor Plans

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Abstract : The top three risk factors that have contributed to building collapses during past earthquake events in Taiwan are: "irregular floor plans or elevations," "insufficient columns in single-bay buildings," and the "weak-story problem." Fortunately, these unsound structural characteristics can be directly identified from the floor plans. However, due to the vast number of old buildings, conducting manual inspections to identify these compromised structural features in all existing structures would be time-consuming and prone to human errors. This study aims to develop an algorithm that utilizes artificial intelligence techniques to automatically pinpoint the structural components within a building's floor plans. The obtained spatial information will be utilized to construct a digital structural model of the building. This information, particularly regarding the distribution of columns in the floor plan, can then be used to conduct preliminary seismic assessments of the building. The study employs various image processing and pattern recognition techniques to enhance detection efficiency and accuracy. The study enables a large-scale evaluation of structural vulnerability for numerous old buildings, providing ample time to arrange for structural retrofitting in those buildings that are at risk of significant damage or collapse during earthquakes.

Keywords : structural vulnerability detection, object recognition, seismic capacity assessment, old buildings, artificial intelligence

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