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Leveraging AI for Automated Structural Stability Risk Assessment in Historical Centers

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This research investigates the assessment of structural stability risks in buildings during natural disasters, with a particular focus on earthquakes, within historical centers. The objective is to create an accessible platform that can predictively create damage maps for blocks of buildings and large structures, enabling the prediction of damage and its impact on Cultural Heritage (CH) stability. The project seeks to generate risk maps for CH, emphasizing predictive damage mapping before natural disaster events occur under a variety of event scenarios. Methodologies have been devised to discern efficient and automated tools for harmonizing data, criteria, and indicators, thereby monitoring the influence of environmental changes on CH assets, encompassing structural stability and deterioration processes. This involves the integration of ground data (e.g., geotechnical and geological information), site-scale monitoring, satellite data (InSAR), and risk forecasting models (seismic models) to produce user-driven products like deformation maps, vulnerability assessments, and damage maps. Using AI-assisted models, the platform aims to enable ongoing inspection and monitoring of Cultural Heritage (CH) buildings for updating the vulnerability assessment.