

Towards Automated Image-Based Detection of Non-Structural Elements.

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Decades of Similar Damage

San Fernando Earthquake 1971

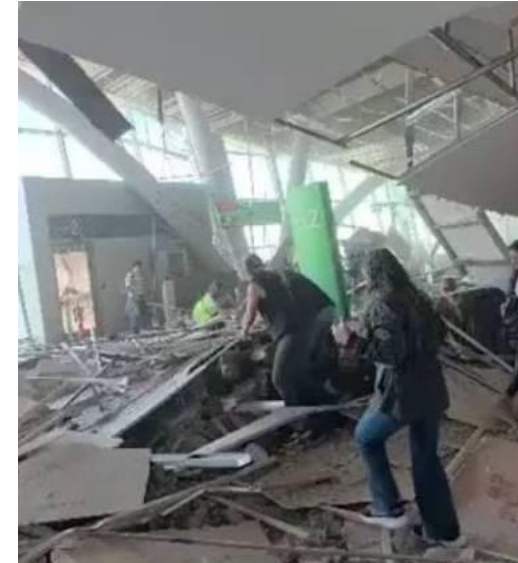
Manual assessment



Lew et al. (1971)

Colombia Earthquake August 2026

Manual assessment



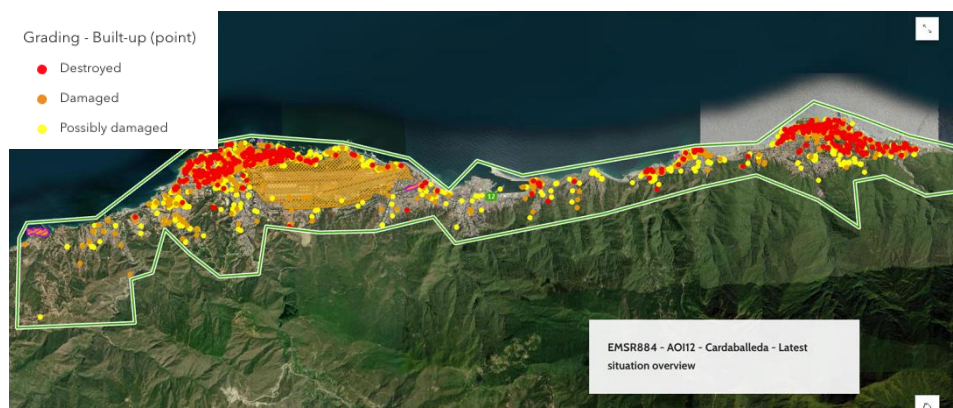
Gallego (2026)

55 years of similar damage. Still assessed manually.

Still assessed manually

- After an earthquake, assessing damage to non-structural elements across thousands of buildings is done manually.

Slow

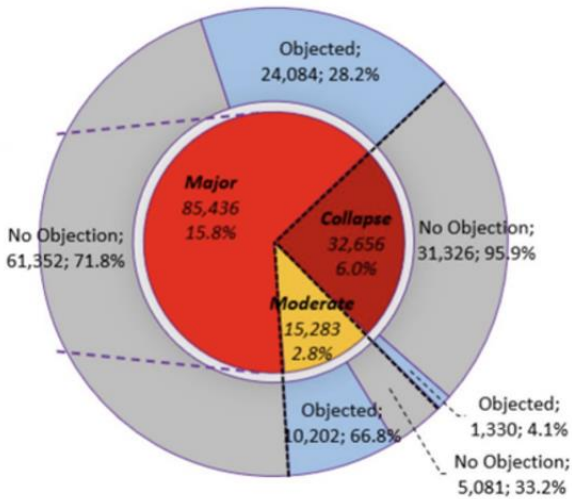


Overall damage in Caraballeda. ArcGIS StoryMaps (2026)

Dangerous

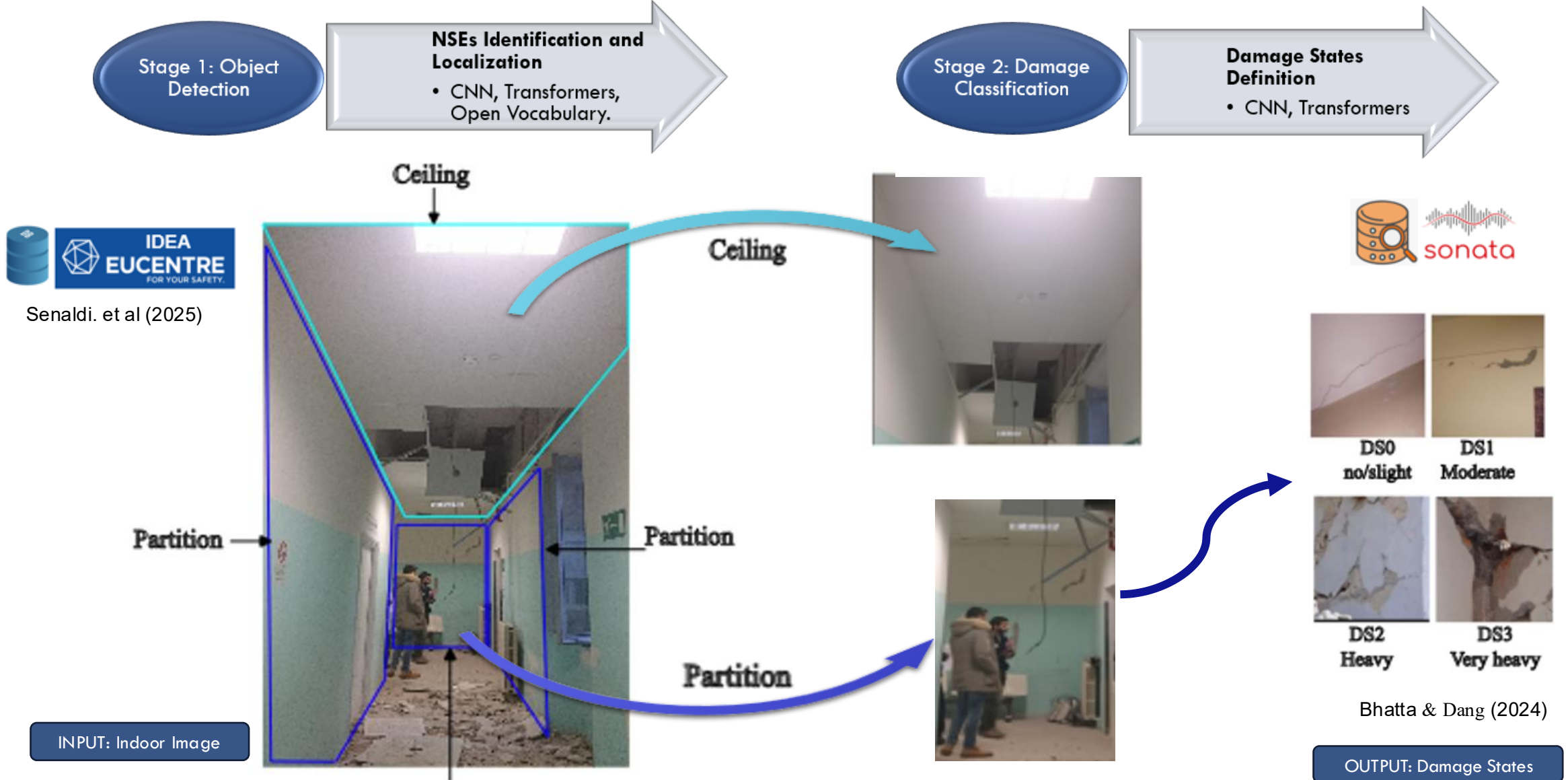


Subjective



Damages assessment result in Turkey Earthquakes. Demir (2025)

Automated two-stage damage detection pipeline.



Results Stage 1: Object Detection

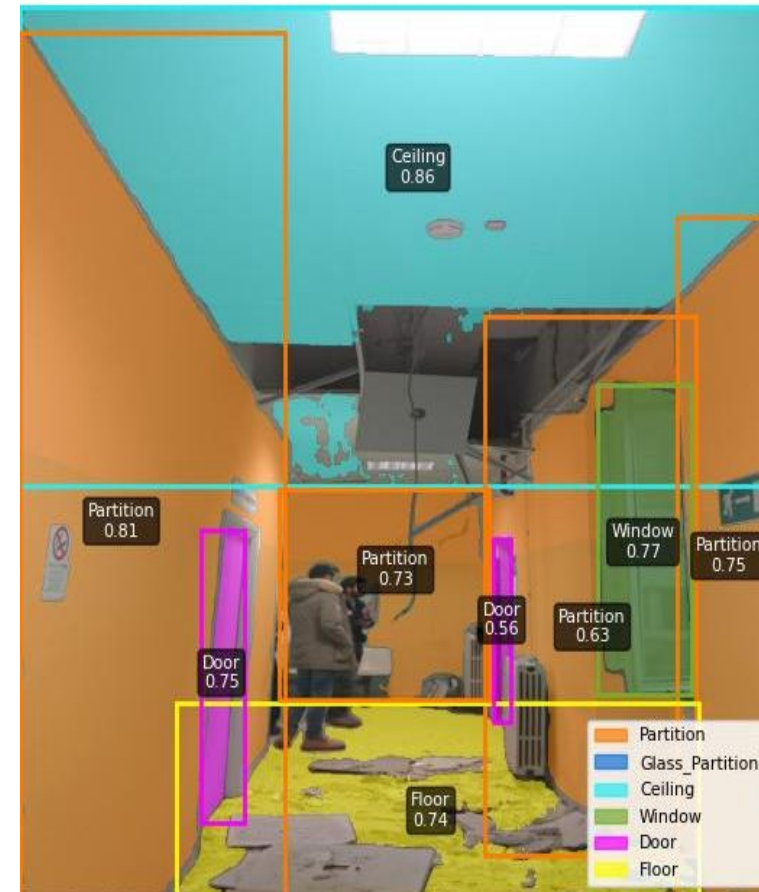
YOLO (CNN)

Redmon et al. (2016)



SAM 3.1 (OPEN-VOCABULARY)

9 detections Carion et al. (2026)



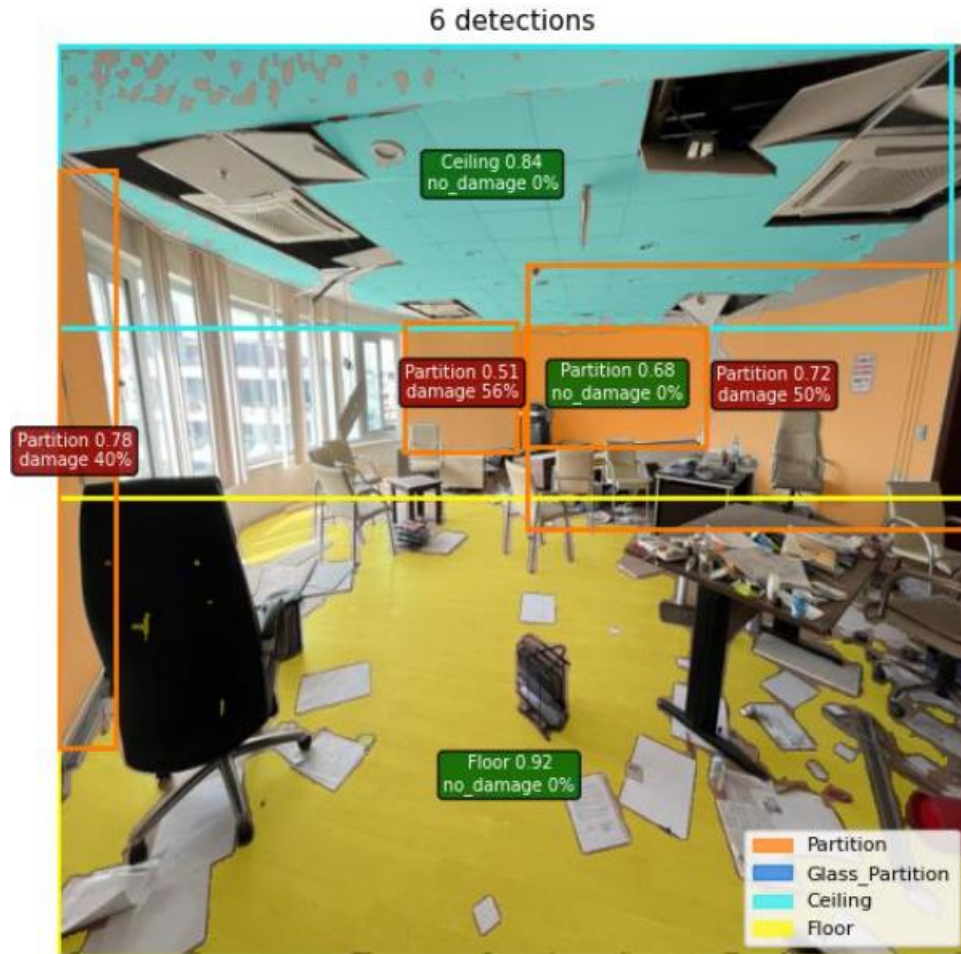
Results Stage 1



Stage 2: A first look at damage classification

YOLO (Crack segmentation dataset)

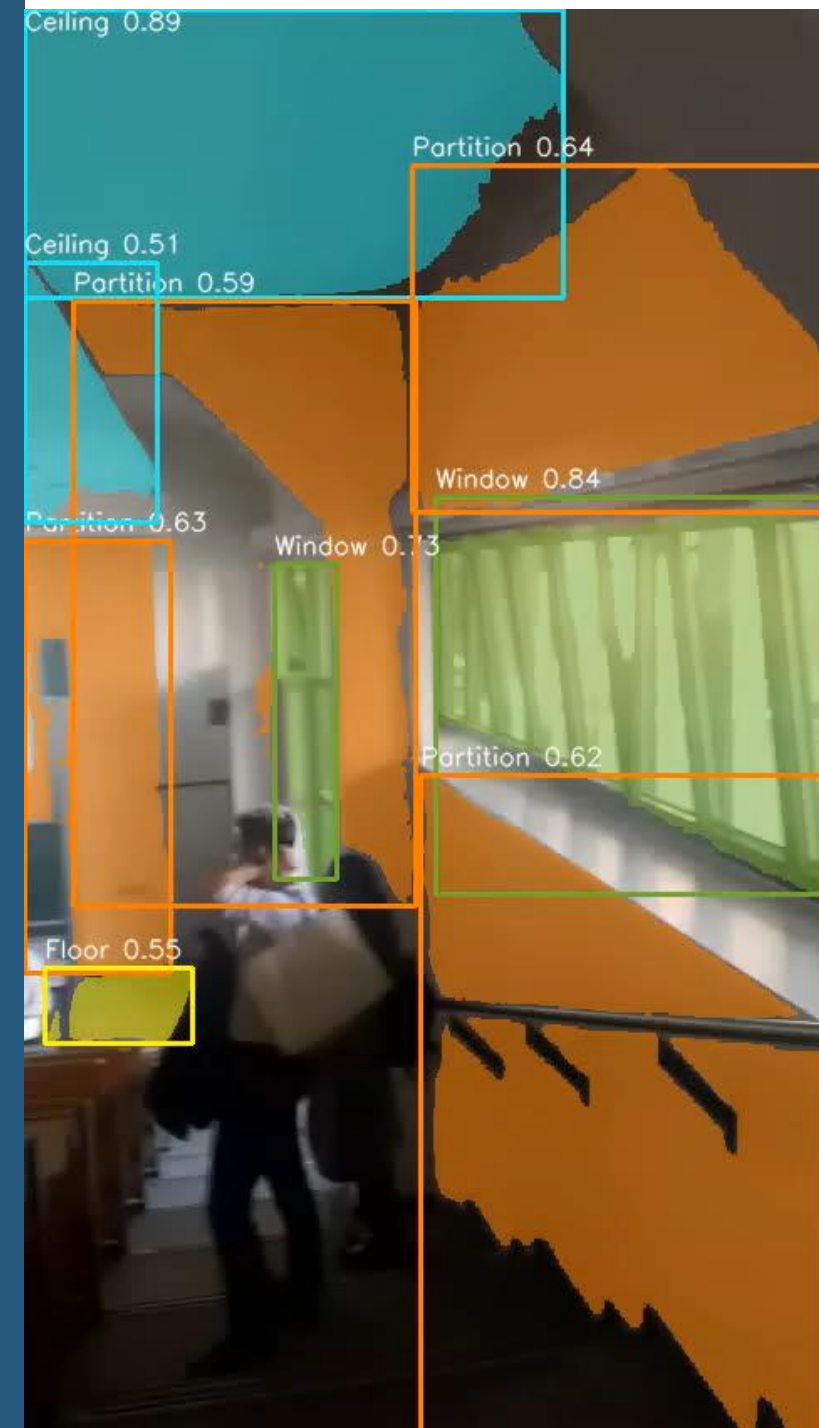
Redmon et al. (2016)



EXPERIMENTAL CAMPAING



Milanesi et al. (2026)



Schematic layout of the SONATA real-time monitoring dashboard. Shahnazaryan (2026)

Outlook

- AI detection of NSE damage feeds directly into fragility curve updating and loss estimation carried out by the broader team.
- Automated assessment can significantly reduce inspection time compared to manual surveys across thousands of buildings.
- The speed and scale of deployment depends directly on the image acquisition strategy in chaotic post-earthquake scenarios. This remains an open and critical question.



Mauricio Guamán, Marco Todaro, Volkan Ozsarac, Davit Shahnazaryan, Daniele Sivori, Gerard J. O'Reilly. (2026) "Towards Automated Image-Based Detection of Non-Structural Elements.", 18th European Conference on Earthquake Engineering, Berlin Germany.

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