ARTISTE2025
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Special Session Title:

Artificial Intelligence Approaches for Seismic Risk Assessment and Mitigation of Structures

Organizers

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Abstract

The significant seismic events that have affected Italy in recent decades have unequivocally demonstrated that the financial burden associated with the reconstruction and restoration of extensive territories exceeds the capacity of governmental resources. Furthermore, the interruption of urban functionality during reconstruction phases exerts profound societal impacts, including population decline and the fragmentation of the social fabric. To address the consequences of such catastrophic events, the only effective strategy is prevention, achieved through a systematic reduction of seismic risk. This approach may be conceived as a widespread incentive for the reinforcement and retrofitting of buildings and infrastructure, with the aim of reducing seismic risk to acceptable thresholds. Nevertheless, the large-scale reduction of seismic risk would still entail substantial financial costs, extended downtime, and a considerable consumption of raw materials, leading to significant adverse environmental impacts.). This evidence forms the basis for the proposed special session, which is aligned with the objectives of the Nationally Relevant Research Project PRIN 2022 AI-SUST (https://www.prin2022aisust.it/) and seeks to gather innovative proposals from the international community to address this challenge by harnessing the latest advancements in Artificial Intelligence (AI). In particular, this special session aims to provide a forum for discussing how, and to what extent, AI techniques can contribute to enhancing the resilience of our communities by supporting the development of rational strategies for the accurate assessment of seismic risk and its effective reduction. Contents of interest include, but are not limited to, the following topics:

- seismic risk assessment of existing structures supported by AI techniques;
- machine learning–assisted identification and experimental characterization of existing structures, both in their as-built condition (to optimize the design of seismic retrofitting interventions) and after retrofitting (for the a posteriori assessment of intervention effectiveness);
- optimal design of seismic retrofitting interventions using Computational Intelligence algorithms;
- strategies for the assessment and reduction of seismic risk at large territorial scales through AI-based methods.