

SAFENET – Seismic risk Assessment For transportation NETWORKS

Summary

Transportation networks are fundamental for the development of the economy of each country, and assume a pivotal role after destructive earthquakes, not only during emergencies but also in the recovery and reconstruction phases. Understanding disaster risk and building resilient infrastructure is therefore of critical importance, as highlighted by the Sendai Framework for Disaster Risk Reduction and the United Nations 17 Sustainable Development Goals.

In this project we propose to develop a novel framework to tackle some of the main challenges in network analysis, employing state-of-the-art machine learning techniques and big data. These methods will be integrated into a dynamic platform to assess the impact of earthquakes on transportation networks and in the surrounding building stock. The development of the platform will follow an open-source philosophy, and will be co-designed with relevant national and international stakeholders to ensure that the outcomes are usable and useful for risk reduction activities. The developed methods and platform will be built upon openly accessible seismic risk

analysis and traffic simulation tools to avoid duplication of efforts, and involve well-established communities around these resources. The characterization of the elements comprising the transportation network and the building stock will benefit from the rise of artificial intelligence methods, in combination with open data from OpenStreetMap. The population dynamics will be modelled using big data from mobile towers, which can be used as a proxy for population density at different times of the day or throughout the year. To demonstrate the applicability and usefulness of this platform, two case studies will be explored considering the district of Lisbon (for a risk evaluation at the urban scale) and the Southern region of Portugal (regional level). This project has the support of relevant national stakeholders that will steer the development of the tools and case studies, and international experts from the Humanitarian OpenStreetMap Team and the SimCenter artificial intelligence group in California (Berkeley and Stanford University), that will ensure the scientific quality and credibility of the outcomes.

Project Reference

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Leading Institution

FEUP – Faculty of Engineering of the University of Porto (Portugal)

Partners

FECFP – Fundação Ensino e Cultura Fernando Pessoa (Portugal), IST – Instituto Superior Técnico (Portugal)

CERIS Principal Investigator

Luís Guerreiro
(luis.guerreiro@tecnico.ulisboa.pt)

CERIS Research Team

Carlos Sousa Oliveira,
Mónica Amaral Ferreira

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247 712.17€

CERIS

69 144.06€

Project Website

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