FLOOD DAMAGE ASSESSMENT IN URBAN AREAS

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STATISTICAL ANALYSES SHOW THE CONSIDERABLE IMPACTS OF FLOOD RISK COMPARED TO OTHER TYPES OF NATURAL HAZARDS. ALSO, IN RECENT DECADES, IT HAS BEEN INCREASING EXPONENTIALLY. THE PRIMARY FOCUS OF THIS STUDY IS AN IMPROVED METHODOLOGY FOR QUANTIFYING THE FLOOD RISK.

INTRODUCTION:

In Australia, floods are the most costly of all natural disaster types. While much effort has gone into emergency management and flood mapping, flood damage models are still crude, and understanding of the damage process is largely unknown.

Flood damage assessment is an important component of flood risk management since inaccurate damage estimation leads to wasted effort, money, and resources for the organisations involved in risk mitigation.

RESEARCH AIMS:

This research will focus on quantifying the flood risks and performing a flood damage assessment for a case study area within Australia. With this knowledge, mitigation of the risks could occur for the future flood scenarios.

The outcome of this research will be substantial for disaster management decision-makers and insurance companies.

RESEARCH OBJECTIVES:

- Collect data from recent extreme events in Australia, data mining, and machine learning;
- Develop and calibrate some novel multi-parameter flood damage assessment functions (FLFArs and FLFAcs);
- Develop tree-based models to explore the effects of different parameters on the extent of damage;
- Results comparison, model validation, and uncertainty evaluation;

MULTI-PARAMETER FUNCTIONS (FLFA):

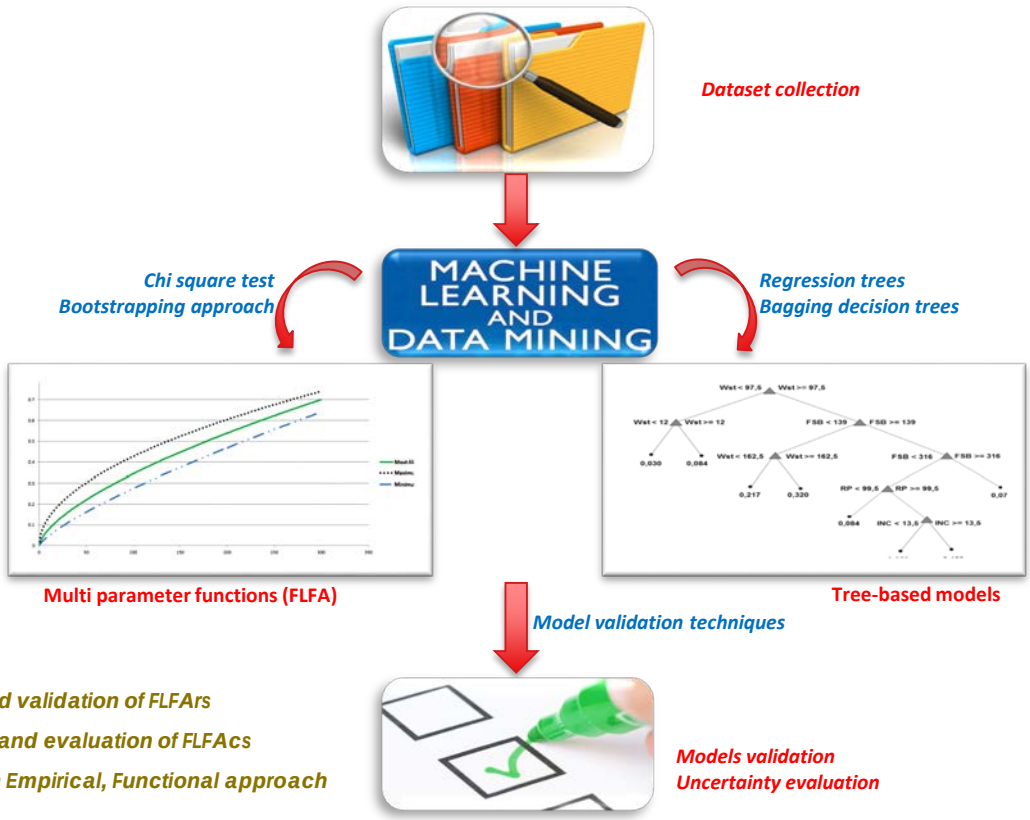
The newly derived functions have been parameterized and discussed based on the most common types of buildings in Australia. Parameters include foundation height, ground elevation, percent of damage below ground, the number of stories, the height of stories, percent of maximum damage, and the beginning elevation for damage. The advantages of this approach include the ability to change parameters based on building practices across Australia.

Two journal papers have been published on this work. The first paper describes the newly derived model used for residential building structures (FLFArs) while the second one focuses on Australian commercial building structures (FLFAcs).

TREE-BASED MODELS:

Flood damage, in a complicated framework, is dependent on variety factors which can be classified into impact parameters (*e.g. flood depth, flood duration, flow velocity, water contamination and return period*) and resistance parameters (*e.g. building characteristics, private precaution, early warning, emergency measures, flood experience and socioeconomic parameters*).

Interaction, importance or influence of these parameters are largely unknown. In this study, they have been explored by tree-based modelling statistical analyses. One journal paper has been prepared and submitted for peer-review.



FOR FURTHER INFORMATION, PLEASE SEE:

- *R. Hasanzadeh Nafari et al. (2016): Calibration and validation of FLFArs*
- *R. Hasanzadeh Nafari et al. (2016): Development and evaluation of FLFAcs*
- *Lehman, W. and Hasanzadeh Nafari, R. (2016): An Empirical, Functional approach to Depth Damages*