Flood assessment in urban areas

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The primary focus of this study is an improved methodology for quantifying the flood risk. The outcome is substantial for decision-makers dealing with flood risk management for prioritisation of risk mitigation options and choosing best practice.

INTRODUCTION:

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 flood risk mitigation.

RESEARCH PROBLEM:

In Australia, flood management is of high priority since flood is a frequent natural hazard with significant financial consequences. 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.

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.

RESEARCH OBJECTIVES:

- To collect data from recent extreme events in Australia, data mining, and machine learning;
- To develop and calibrate some novel multi-parameter flood damage assessment functions;
- To establish a tree-based model to explore the effects of different parameters on the extent of damage;
- To transfer the newly derived model to a study area overseas for assessing the ability to change parameters based on building practices across the world;
- To evaluate and compare the predictive capability and the reliability of the newly derived flood loss estimation models after a temporal and spatial transfer.

The functions have been parameterized based on the most common types of buildings in Australia. Parameters include:

- ✓ Foundation height
- ✓ The number of stories
- ✓ The height of stories
- ✓ Percent of maximum damage
- ✓ The beginning elevation for damage

Importance & influence of the following factors have been explored:

Impact Parameters

- ✓ Flood depth
- ✓ Flood duration
- ✓ Flow velocity
- ✓ Water contamination
- ✓ Return period

Resistance Parameters

- ✓ Building characteristics
- ✓ Private precaution
- ✓ Early warning
- ✓ Emergency measures
- ✓ Socioeconomic factors

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