VULNERABILITY RANKING OF GEOGRAPHIC OBJECTS USING CONCEPTUAL REPRESENTATIONS

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Introduction

The existence of a risk implies the presence of either natural or man-generated phenomena, that has the probability to cause damage to a human settlement, infrastructure, workforce, etc., in such a great amount, that constitutes a disaster. In qualitative terms, the risk is the probability of the occurrence of damages and lose of geographical objects (schools, dwellings) which are found in the affected region. Intuitively we can state that geographical objects are in minor or major risk depending on the type of phenomena they may be exposed to.

Abstract

This work proposes a methodology based on semantic processing to assess the vulnerability of geographic objects in the neighborhood of vulnerable areas. The goal is to prioritize activities related to mitigation of events. The method is composed by four stages: a) Conceptualization, b) Spatial Analysis, c) Synthesis and d) Semantic Analysis. As a result is obtained a list of geographic objects sorted by its degree of vulnerability. As a case study are considered a fragment of Mexico City and usual events occur on it.

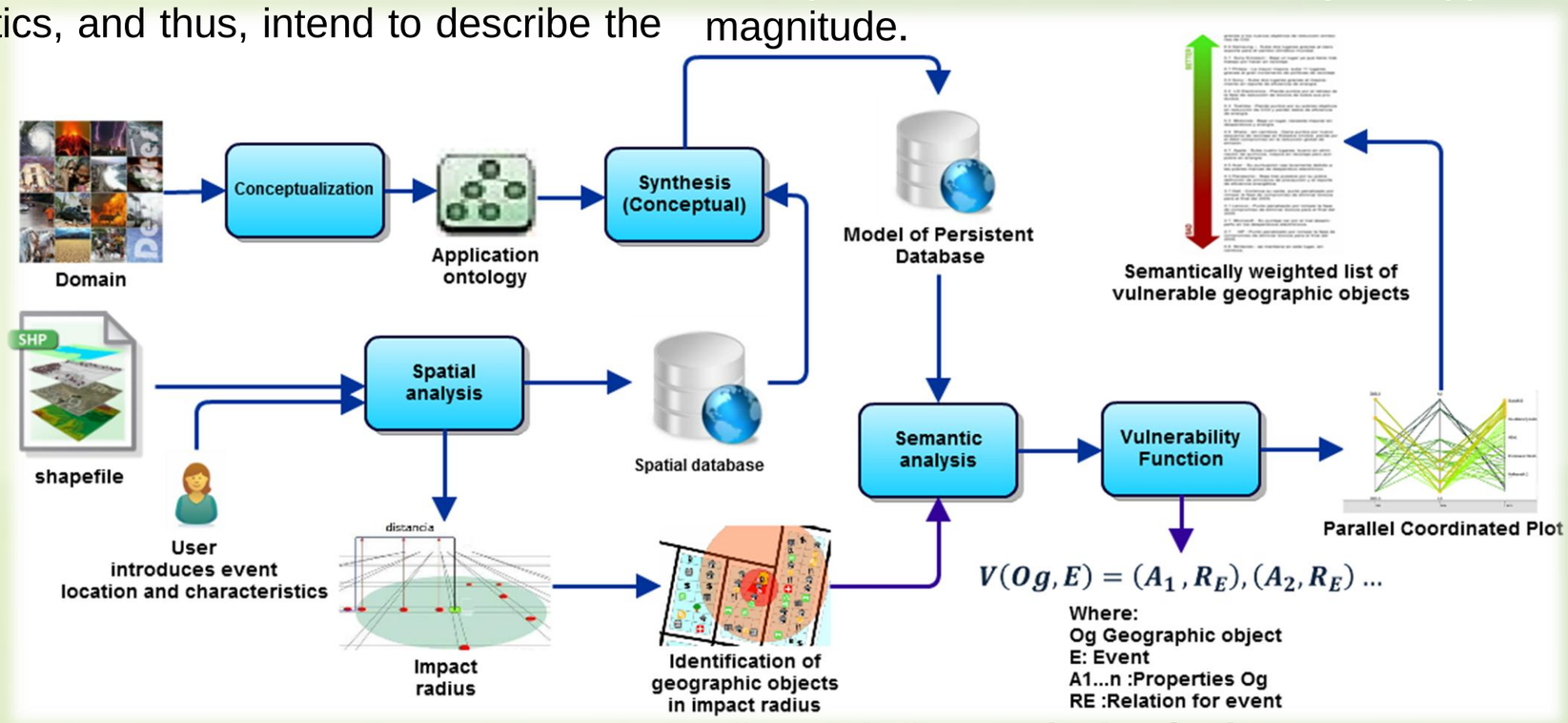
Methodology

Stage 1. Conceptualization

It is focused on the domain of interest conceptualization, describing the ranking of the objects and events, their relations and characteristics, and thus, intend to describe the domain

Stage 2. Spatial Analysis

At this stage, geographical objects located within the event's vicinity are identified. Considering the type of event and its magnitude.



Stage 3. Synthesis

The synthesis consists of obtaining a persistent database model using geographical data obtained from the previous stage and, based on the ontology, carry out an instantiation of such information

Stage 4. Semantic Analysis

In the semantic analysis, the objects are weighted based on their relation of vulnerability towards the event, these relations are defined for each object in the ontology, and later, the result is evaluated using the Parallel Coordinated Plot method in order to obtain the weighted list of geographical objects based on their vulnerability

Results

As a result, this work generates a map of the places at risk, in addition to a list of geographical objects that could be affected after the occurrence of phenomena sorted by vulnerability degree.
The proposed method to vulnerability evaluation is not focused on statistics and probabilistic analysis. Thus, it considers the semantics of the object and its relations with the quantity of people and their belongings that could be affected. This has repercussions in less human lives and goods lose, and avoids secondary effects resulting from a late assistance.

Place	Vulnerability degree	Event
Colegio Wilfrido Massieu	5.3	Fire
Gambbe Interactive	4.8	Fire
The hell rock	4.7	Fire
Wings Lindavista	4.5	Fire
Abastecedora LUMEN	3.7	Fire
Reader Digest México	3.6	Fire
Radio Shack de México	3.4	Fire
Laboratorio médico Polanco	2.9	Fire
Dunn	2.8	Fire
Los Huaraches OK	2.6	Fire
Abarrotes	2.3	Fire
Mens's Factory Lindavista	1.5	Fire

Intellig
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