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PROJECT SRO
A COMPREHENSIVE COMPUTER SYSTEM FOR SEISMIC RISK ANALISYS AND ASSESMENT USING OBJECT ORIENTED PHILOSOPHY

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ABSTRACT

A new seismic risk assessment philosophy and analysis procedure based on Object-Oriented Programming (OOP) are presented. This idea for programming, commonly applied for computer systems development, is here used a theoretical framework for the project. Within the framework of the system, any item subjected to a seismic risk, defined in terms of its vulnerability functions and its spatial location in a seismic hazard domain, can be totally defined by a Seismic Risk Object (SRO). The SRO theory was formulated in the most general terms such that different hazard estimation, vulnerability, evaluation , and risk analysis models could be used with no alteration of the structure of the basic computer system. With this technique it is possible to handle enormous amounts of data for different models. Models can share databases interacting with each other, allowing the user to switch and compare algorithms without modifying the structure of the models. Models are handled by a computer system called Seismic Risk Object Kernel (SRO-K). SRO-K, or simply Kernel, has a powerful graphic interface, *i. e.* the communication between user and computer is based on maps. These maps are generated according to commands executed by the user employing some features of GIS (Geographical Information System) Technology. The possibility of applying logical and geographical filters to SRO could be very useful to simulate effects of a great number of earthquakes,recorded or calculated, over areas of interest to generate emergency procedures or planning regulations.

The theoretical model can apply an additive operator among SRO to generate a new object composed by higher-recursivity objects. The resulting seismic risk value will be the same if mathematical integration of different objects is performed or if a new object is used, since the same algorithm could be applied in both cases. The recursive composition of SRO is the most important feature of the theory because increases dramatically the speed of risk evaluation and the generation of expected damage maps. This permits to effectively reduce the universe of solutions by exploring the most significative recursivity levels. A lot of information is aggregated in a single object through the use of the additive operator. Specifically, the addition of individual vulnerability functions generates consistent objects. The above mentioned features are very important for the development of early estimation system and emergency policies. SRO theory was developed focusing on seismic risk topics. However, the same concepts can be effectively applied to any other risk evaluation context by simply changing the meaning of functions involved.

KEYWORDS
seismic; hazard; risk; Object Oriented Programming; GIS