عنوان مقاله:

Tehran’s seismic vulnerability assessment using integration of induced-OWA operator and multilayer neural network

محل انتشار:

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خلاصه مقاله:

Tehran, capital of Iran, as a highly populated city, surrounded with numerous known and unknown faults exposing the city to destructive earthquakes. Unsupervised urban expansion, non-standard construction, and old building are major parameters that make the city more vulnerable against expected earthquakes that confirms the need for an effective disaster management paradigm. Prediction of time and intensity of the earthquake currently exceeds knowledge and technology, but estimation of probable damages of the earthquake can be regarded as an alternative solution to enable the planners to apply seismic vulnerability reduction measures. However, determining the seismic vulnerability involves various criteria and also experts to make judgment about the problem. In this order, this paper proposes a new approach for seismic vulnerability classification of Tehran based on integration of artificial neural network and induced-OWA method. In this regard, about 30 experts asked to determine degree of vulnerability for 50 randomly selected samples among more than 3000 zones in Tehran by numbers 1,2,3,4, and 5, corresponded with very low vulnerability, low vulnerability, medium vulnerability, high vulnerability and very high vulnerability, respectively. In this paper, three possible scenarios considered for the tehran, including North Tehran fault activation, Mosha fault activation and Rey fault activation. Intensity of earthquake in MMI, building parameters including material and the number of floors of building, standards used in the construction process and surface topography assumed to be the most important parameters affecting the vulnerability of Tehran against earthquake. In this model, OWA operator used to combine these judgments to reduce the uncertainty arising from the inconsistency in different experts’ judgments, making the model more reliable. For urban zones of Tehran, mentioned parameters has been formed and fed to the designed multilayer neural network approximator containing 10 neurons in one hidden layer, supported by Levenberg-Marquardt backpropagation training algorithm, and then results illustrated and discussed.

کلمات کلیدی:

seismic vulnerability assessment, artificial neural network, Levenberg -Marquardt back-propagatio, risk reduction