AN ARTIFICIAL NEURAL NETWORK TO PREDICT EARTHQUAKE IN SOME PARTS OF HORMOZGAN PROVINCE

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ABSTRACT

In this paper a new earthquake prediction system is presented. This method based on the application of artificial neural networks (Adeli and Panakkat, 2009), has been used to predict earthquake s in three regions (Bandar Abbas zone, Minab zone, Hajiabad zone) in Hormozgan Province. For the three Hormozgan Province's seismic regions examined, with epicenters placed on meshes with dimensions $0.5° × 0.5°$. Although several works claim to provide earthquake prediction, an earthquake prediction must provide, according to (Allen, 1982), the following information:

1. A specific location or area. 2. A specific span of time. 3. A specific magnitude range. 4. A specific probability of occurrence.

That is, an earthquake prediction should state when, where, how big, and how probable the predicted event is and why the prediction is made (Dimer de Oliveira 2012) and (Marzocchi and Zechar 2011). Unfortunately, no general useful method to predict earthquakes has been found yet. This study exposes the results obtained when the proposed ANN's were applied to the sets representing the three seismicity Hormozgan Province analyzed. These sets can be downloaded from the Site of University of Tehran (IRSC, 2007). First, the type of predictions performed by the ANN is introduced. Then, the results for every area are summarized in terms of the quality parameters described in full paper. The prototypes predict an earthquake every time the probability of an earthquake of magnitude larger than a threshold is sufficiently high. The threshold values have been adjusted with the aim of obtaining as few false positives as possible. The accuracy of the method has been assessed in retrospective experiments by means of statistical tests and compared with well-known machine learning classifiers. The high success rate achieved supports the suitability of applying soft computing in this field and poses new challenges to be addressed.

INTRODUCTION

Hormozgan Province in Southern Iran (Fig.1) has several major faults (Fig.2). These faults have caused more than 880 earthquakes from 1930 to 2007 (Fig.3). The most significant event with magnitude of 7 occurred in Hormozgan province in 1977. The majority of the earthquakes occur either near plate