# PREDICTION OF THE EARTHQUAKE MOMENT MAGNITUDE BY USE OF THE MULTILAYER PERCEPTRON NEURAL NETWORK

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## ABSTRACT

Because of the major disadvantages of previous methods for calculating the magnitude of the earthquakes, the neural network as a new method is examined. In this paper a kind of neural network named Multilayer Perceptron (MLP) is used to predict moment magnitude of earthquakes. MLP neural network consist of three main layers; input layer, hidden layer and output layer. Since the best network configurations such as the best number of hidden nodes and the most appropriate training method cannot be determined in advance, and also, overtraining is possible, 32 models of network are evaluated to determine the best prediction model. By comparing the results of the current method with the real data, it can be concluded that MLP neural network has high ability in predicting the moment magnitude of earthquakes and it's a very good choice for this purpose.

## INTRODUCTION

Since ancient times, in the wake of natural events and disasters, man has always been looking for ways to prevent or control these events. The earthquake is one of these natural disasters which cause heavy losses of life and property, when it occurs. Time, location and magnitude of the earthquake are three parameters that must be a good estimate of their amounts in order to control and minimize its losses. Hence, scientists and researchers have done attempts, including many successful and unsuccessful ones, to find a relationship between these three parameters, or make a good estimation of them.

These efforts have resulted in developing a number of theoretical and empirical equations. However, applicability of equations developed for calculating the magnitude of earthquakes is affected by a lot of parameters. Most of these parameters need to be measured and entered in the equations accurately, while, in many areas, due to the lack of required equipment, these parameters mostly are measured approximately and with low precision or even sometimes assumed. Also, some parameters of the equations such as physical and functional characteristics of faults are difficult to measure. For example, geodetic strain rate of reverse faults