THE USE OF SELF-ORGANIZING FEATURE MAP NETWORKS FOR THE PREDICTION OF THE CRITICAL FACTOR OF SAFETY OF AN ARTIFICIAL SLOPE

Y. Erzin[*], *M. Nikoo*[†], *M. Nikoo*[‡], *T. Cetin*[*]

Abstract: In this study, the performance of three different self organization feature map (SOFM) network models denoted as SOFM1, SOFM2, and SOFM3 having neighborhood shapes, namely, SquareKohonenful, LineKohonenful, and Diamond-Kohenenful, respectively, to predict the critical factor of safety (F_s) of a widely-used artificial slope subjected to earthquake forces was investigated and compared. For this purpose, the reported data sets by Erzin and Cetin (2012) [7], including the minimum (critical) F_s values of the artificial slope calculated by using the simplified Bishop method, were utilized in the development of the SOFM models. The results obtained from the SOFM models were compared with those obtained from the calculations. It is found that the SOFM1 model exhibits more reliable predictions than SOFM2 and SOFM3 models. Moreover, the performance indices such as the determination coefficient, variance account for, mean absolute error, root mean square error, and the scaled percent error were computed to evaluate the prediction capacity of the SOFM models developed. The study demonstrates that the SOFM1 model is able to predict the F_s value of the artificial slope, quite efficiently, and is superior to the SOFM2 and SOFM3.

Key words: *critical factor of safety, earthquake forces, pseudo-statistic approach, Self Organization Feature Map, simplified Bishop method*

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1. Introduction

Slope stability analysis is an important area in geotechnical engineering [27]. The evolution of slope stability analyses in geotechnical engineering has followed closely the developments in the soil [24]. Slope failures are complex natural experience that comprises a serious natural hazard in many countries [32]. They are responsible for

[*]Yusuf Erzin – Corresponding author, Tulin Cetin, Celal Bayar University, Faculty of Engineering, Department of Civil Engineering, 45140 Manisa, Turkey, E-mail: yusuf.erzin@cbu.edu.tr

[†]Mehdi Nikoo, Young Researchers and Elite Club, Ahvaz Branch, Islamic Azad University, Ahvaz, Iran

[‡]Mohammad Nikoo, SAMA Technical and Vocational Training college, Islamic Azad University, Ahvaz Branch, Ahvaz, Iran

