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**MASS MODELING OF POMEGRANATE FRUITS: ARTIFICIAL NEURAL  
NETWORKS METHOD**

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**ABSTRACT** Pomegranate fruit (*Punica granatum* L.) is one of the major fruit produced in Iran. Sorting of pomegranate fruit is an essential routine operation in fruit marketing. Accurate weighting of fruits in different sorts at fast speed is a key problem in many industrial processes. It may be easier and faster to develop a grading system working on the basis of size. The size of fruits can be correlated to fruit mass and may be used for the measurement of the mass of fruits. Determining the mass-size relationship using mathematical (regression) models has been the main focus of the published researches. This paper discusses the development of an artificial neural networks (ANN) model for the automated prediction of pomegranate fruit mass based on 7 dimensional characteristics (minor diameter, major diameter, intermediate diameter, volume, and three projected areas), which acted as the input data to the ANNs. The ANN models had just one output neuron, mass. In this paper, image processing technique was used for automated measurement of fruits dimensions. The ANN models were designed to have 1, 2, 3, ..., or 7 input neurons.. It was concluded that the ANN model consisting of fruit volume as input parameter was the best model ( $R^2 = 0.992$ , RMSE = 0.0011) for prediction of pomegranate fruit mass. The ANN model with all 7 dimensional parameters as input was also acceptable ( $R^2 = 0.989$ , RMSE = 0.0016). Although the later model performed well, it is not useful in real applications. The prediction performance of ANN models was better than mathematical models obtained in this study as well as obtained before by other researchers for mass-size modeling of pomegranate fruits.

**Keywords:** Pomegranate, mass, size, modeling, neural networks, image processing.