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Dear Hassan Masoudi,

This is to certify that below abstract has been presented during **13th International Congress on Mechanization and Energy in Agriculture & International Workshop on Precision Agriculture**.

Title	**:** Comparing the Performance of Regression and ANN Modeling in Orange Mass and Volume Estimation
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ABSTRACTS

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Comparing the Performance of Regression and ANN Modeling in Orange Mass and Volume Estimation

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Machine vision is a new method for grading of agricultural products. Basically, machine vision systems are capable to grade fruits based on their color and geometric characteristics such as dimensions. So, finding the relationship between geometric characteristics and the mass or volume of the products is essential for using machine vision grading systems. Various models and algorithms can be used to determine these relationships. Linear regression has been used to predict the physical properties of agricultural products and grading them according to different parameters. Artificial neural network (ANN) as a fast and nondestructive method can be used for prediction of agricultural products properties and grading of them based on different parameters. The purpose of this research was to find the best model for using in a machine vision system for orange fruit grading based on its mass or volume. So, at first physical characteristics value for 100 samples of oranges (Dezful local variety) include three dimensions, mass, volume and projected-area were measured using classical methods, then two linear regression (F(h,w,t), F(A)) and two artificial neural network (ANN(h,w,t), ANN(A)) models were used to determine relationships between the mass or volume of orange and its dimensions or projected-area. Analysis of variance of the F(h,w,t) model showed that there is a significant relationship at 1% level between the mass or volume of oranges and three dimensions. R2 values indicated that the proposed equations can justify 95.97 % and 98.01 % of changes in the mass or volume of orange, respectively. In the F(A) model, the R2 values of mass and volume were 95.75 % and 93.40 % respectively. Comparing two regression models showed that the performance of F(h,w,t) model was better than F(A) model. Statistical comparisons of the predicted data by neural network models and the actual data of the orange mass and volume showed that there is not any significant difference between them. Comparing the performance of two ANN models showed that the ANN(h,w,t) model is superior to the ANN(A) model. Comparing the performance of all models showed that the artificial neural network models are more accurate than regression models.

Keywords: Orange fruit, geometric parameters, mass and volume modeling, linear regression, artificial neural network