Developing an ANN Model to Predict Anthropometric Dimensions Based on Real Anthropometric Database

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Abstract : Applying the anthropometric dimensions is considered one of the important factors when designing any human-machine system. In this study, the estimation of anthropometric dimensions has been improved by developing artificial neural network that aims to predict the anthropometric measurements of the male in Saudi Arabia. A total of 1427 Saudi males from age 6 to 60 participated in measuring twenty anthropometric dimensions. These anthropometric measurements are important for designing the majority of work and life applications in Saudi Arabia. The data were collected during 8 months from different locations in Riyadh City. Five of these dimensions were used as predictors variables (inputs) of the model, and the remaining fifteen dimensions were set to be the measured variables (outcomes). The hidden layers have been varied during the structuring stage, and the best performance was achieved with the network structure 6-25-15. The results showed that the developed Neural Network model was significantly able to predict the body dimensions for the population of Saudi Arabia. The network mean absolute percentage error (MAPE) and the root mean squared error (RMSE) were found 0.0348 and 3.225 respectively. The accuracy of the developed neural network was evaluated by compare the predicted outcomes with a multiple regression model. The ANN model performed better and resulted excellent correlation coefficients between the predicted and actual dimensions.

Keywords : artificial neural network, anthropometric measurements, backpropagation, real anthropometric database
Conference Title : ICIEAIS 2015 : International Conference on Industrial, Engineering and Applied Intelligent Systems
Conference Location : Paris, France
Conference Dates : January 23-24, 2015