Estimating Anthropometric Dimensions for Saudi Males Using Artificial Neural Networks

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Abstract : Anthropometric dimensions are considered one of the important factors when designing human-machine systems. In this study, the estimation of anthropometric dimensions has been improved by using Artificial Neural Network (ANN) model that is able to predict the anthropometric measurements of Saudi males in Riyadh City. A total of 1427 Saudi males aged 6 to 60 years participated in measuring 20 anthropometric dimensions. These anthropometric measurements are considered important for designing the work and life applications in Saudi Arabia. The data were collected during eight months from different locations in Riyadh City. Five of these dimensions were used as predictors variables (inputs) of the model, and the remaining 15 dimensions were set to be the measured variables (Model's outcomes). The hidden layers 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 able to estimate the body dimensions of Saudi male population in Riyadh City. The network's mean absolute percentage error (MAPE) and the root mean squared error (RMSE) were found to be 0.0348 and 3.225, respectively. These results were found less, and then better, than the errors found in the literature. Finally, the accuracy of the developed neural network was evaluated by comparing the predicted outcomes with regression model. The ANN model showed higher coefficient of determination ($R2$) between the predicted and actual dimensions than the regression model.

Keywords : artificial neural network, anthropometric measurements, back-propagation

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