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Paper Title:	Estimation of Human Postural Models Using Artificial Neural Networks under Normal and Overweight Conditions
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Abstract

The study of human postural control has been a continuous area of research due to the complexity of postural mechanisms, which are not fully understood. Existing models of human postural control provide partial explanations but often face limitations such as lack of generalization. This study aims to investigate postural models for two weight groups-normal weight (NW) and overweight (OW)-across three balance conditions: eyes-opened (EO), eyes-closed (EC), and single stance (SS). Using data collected from 11 participants, simulations were conducted using two time series models: the Autoregressive (AR) model and the Non-linear Autoregressive Moving Average (NARMA) model. Additionally, Artificial Neural Networks (ANNs) were employed to determine the optimal model orders. The results reveal different postural control mechanisms for each weight group. In stable conditions (EO), NARMA(4,1) and NARMA(8,10) models yielded center of pressure (COP) estimations with Mean Squared Errors (MSE) of 7.20×10^{-5} and 2.03×10^{-4} for NW and OW groups, respectively. The findings indicate that OW individuals require different mechanisms to maintain balance, with a higher reliance on previous COP information.