

Demand Forecasting of Agricultural-products Cold-chain Logistics in Anhui Province Based on Pca-woa-bp

Xuesen Zhang

Anhui University of Science and Technology, China

Abstract

The forecasting accuracy of a conventional back-propagation (BP) neural network is highly sensitive to the random initialization of its weights and thresholds, which makes it prone to local optima and sub-optimal predictions. To address this limitation, principal component analysis (PCA) is first used to extract the principal components from a wide range of influencing factors; these components then serve as the network's input variables. Next, the whale optimization algorithm (WOA) is employed to optimize the BP network's weights and thresholds, thereby mitigating its tendency to become trapped in local optima. Finally, the combined PCA-WOA-BP model is applied to an empirical study of cold-chain logistics demand for agricultural products in Anhui Province. The results indicate that the WOA-BP neural-network model outperforms the standard BP model, providing higher prediction accuracy and a more responsive reflection of demand trends.

Keywords: Whale Optimization Algorithm; Bp Neural Network; Agricultural Products; Coldchain-Chain Logistics Demand Forecasting