

## **Intelligent Garment Size Recommendation for Heterogeneous Body Types Based on Anthropometric Data**

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### **ABSTRACT**

A concise and factual abstract, 11pt Times New Roman is required. The abstract should state briefly the purpose of the research, the key results and major conclusions. It must be able to stand alone, references should be avoided. Non-standard or uncommon abbreviations should be avoided.

Garment size mismatch is a prevalent problem in the large-scale distribution of functional clothing, primarily attributed to individual variations in body shape. Conventional sizing methods assume uniform indicator weights for all individuals and employ discrete body type boundaries, thereby neglecting the differential importance of anthropometric indicators across body type groups. This study aimed to develop an intelligent sizing recommendation method that addresses body type heterogeneity. Anthropometric data from 6,068 adults (4,082 males and 1,986 females) were collected and analysed. A hierarchical entropy weighting approach combined with soft body type classification was proposed. Fuzzy C-means clustering was first applied to identify body type groups and compute individual membership degrees across clusters, enabling soft classification that accommodates boundary individuals. The entropy weight method was then employed to determine indicator weights separately for each body type group. Personalised weight vectors were subsequently constructed through membership-weighted fusion, which were integrated into the technique for order preference by similarity to ideal solution for size recommendation. The effectiveness of the proposed method was evaluated through comparison with conventional approaches. Based on the findings, an intelligent sizing recommendation platform was developed, enabling users to obtain automated garment size suggestions by inputting their body measurements. The proposed framework provides an objective and reproducible solution for functional clothing size matching, with potential applications in clothing distribution.

**Keywords:** functional clothing; size recommendation; body type classification; anthropometry