Beauty Tech LED Mask Integration: KANO-TOPSIS Driven Analysis of Twelve AI Models forAdvanced Skin Disease Classification

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Abstract:

This study proposes a novel approach to enhance the functionality of AI-based intelligent LED mask products, aiming to increase consumer acceptance in the beauty device market. By employing a market-pull analysis methodology, we identify the functional requirements preferred by consumers for LED masks while simultaneously exploring improvements through the integration of AI technology. Specifically, we utilize an integrated analytical approach that combines the KANO model and the TOPSIS model to evaluate the quality elements prioritized by consumers and to derive a ranking based on the importance of each function. The results reveal that consumers place the highest emphasis on features such as skin condition analysis, personalized user experience, and display functionality.

Consequently, We propose key features necessary for the successful adoption of intelligent LED masks in the beauty device market, particularly emphasizing the inclusion of a skin cancer diagnostic feature. This addition could facilitate entry into the medical sector and enhance the product's innovative potential. To better understand consumer preferences, we conducted an empirical analysis using the HAM10000 dataset, training and evaluating twelve models: Xception, ResNet50, ResNet50V2, ConvNeXtTiny, ConvNeXtSmall, ConvNeXtBase, EfficientNetV2S, EfficientNetV2M, EfficientNetV2L, InceptionV3, MobileNet, and MobileNetV2. Among these, EfficientNetV2S stood out as the highest performer, achieving an impressive accuracy of 91.45%.

Our proposed methodology involves integrating these advanced AI capabilities into the LED mask. This study not only emphasizes the potential for LED masks to be recognized as innovative devices with strong acceptance in both beauty and medical markets, but it also underscores the essential role of AI-driven skin cancer diagnostic features in fostering this acceptance. Ultimately, our findings advocate for the strategic incorporation of features that align with consumer needs, ensuring the successful market integration of intelligent LED masks.

Keywords:

Beauty tech, HAM 10000, KANO Model Analysis, LED Mask, TOPSIS Model Analysis.