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A Comprehensive Study and Evaluation on Image Fashion Features Extraction

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Abstract : Clothing fashion represents a human's aesthetic appreciation towards everyday outfits and appetite for fashion, and it reflects the development of status in society, humanity, and economics. However, modelling fashion by machine is extremely challenging because fashion is too abstract to be efficiently described by machines. Even human beings can hardly reach a consensus about fashion. In this paper, we are dedicated to answering a fundamental fashion-related problem: what image feature best describes clothing fashion? To address this issue, we have designed and evaluated various image features, ranging from traditional low-level hand-crafted features to mid-level style awareness features to various current popular deep neural network-based features, which have shown state-of-the-art performance in various vision tasks. In summary, we tested the following 9 feature representations: color, texture, shape, style, convolutional neural networks (CNNs), CNNs with distance metric learning (CNNs&DML), AutoEncoder, CNNs with multiple layer combination (CNNs&MLC) and CNNs with dynamic feature clustering (CNNs&DFC). Finally, we validated the performance of these features on two publicly available datasets. Quantitative and qualitative experimental results on both intra-domain and inter-domain fashion clothing image retrieval showed that deep learning based feature representations far outweigh traditional hand-crafted feature representation. Additionally, among all deep learning based methods, CNNs with explicit feature clustering performs best, which shows feature clustering is essential for discriminative fashion feature representation.

Keywords : convolutional neural network, feature representation, image processing, machine modelling
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