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A NEW SCHEME FOR GENERATING INITIAL PALETTES OF COLOR QUANTIZED IMAGES

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Abstract. *In this paper, a new scheme for generating an initial palette with K colors is proposed. First, the $N(N > K)$ initial colors are obtained based on 3D histogram computation. Second, the genetic algorithms are employed to generate the initial palette by selecting K colors from the N initial colors. Finally, the initial palette serves as the input of the K-means algorithm in order to obtain the quantized image. The experimental results reveal the feasibility of the proposed approach.*
Keywords: Color image quantization, Genetic algorithms, Initial palette generation

1. **Introduction.** Color quantization is one of the basic digital image processing techniques. Color image quantization can reduce not only the storage requirements but also the transfer time of the image. Recently, the multimedia applications have begun to be widely used on the Internet. However, the issue of bandwidth still limits their popularization. Hence, color quantization is especially important when we consider transferring image files over the Internet. Another practical reason for quantization is related to output hardware with a limited number of colors. In general, the color quantization process has two steps. The first step is to select an appropriate palette, and the second is to obtain a reconstructed image by replacing the original color elements with the palette color elements. The quality of the reconstructed image mainly depends on the first step of the color quantization.

Many algorithms have been proposed for color quantization. The median cut algorithm (MCA) [1] is often used in image applications because of its simplicity. MCA divides the color space repeatedly along the median into rectangular boxes until the desired number of colors is obtained. Hsieh *et al.* [2] proposed an adaptive clustering algorithm for color image quantization. In their approach, a superimposed 3D histogram is calculated first. Then, the sorted histogram list is fed into an adaptive clustering algorithm to extract the palette colors in the image. Finally, a destined pixel-mapping algorithm is applied to classify pixels into their corresponding palette colors. Bing *et al.* [3] proposed an algorithm for color quantization, which considers both color layers and essential details by assigning weights to pixel numbers and color distances. Li *et al.* [4] presented an adaptive color quantization algorithm based on perceptive information carried by image edges. In their method, a few colors can be selected automatically to protect the semantic regions and represent the original image. Wang *et al.* [5] proposed a new SOM algorithm for color quantization which is able to adapt different sizes of training samples. This size-adaptive capability is achieved by modulating the sweep size of the neighborhood function with the size of the training data. Kanjanawanishkul *et al.* [6] proposed a new adaptive approach to color quantization. It can significantly reduce time consumption during the process