AN EFFECTIVE
COLOR QUANTIZATION METHOD
USING COLOR IMPORTANCE-BASED
SELF-ORGANIZING MAPS

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Abstract: Color quantization is an important process for image processing and various applications. Up to now, many color quantization methods have been proposed. The self-organizing maps (SOM) method is one of the most effective color quantization methods, which gives excellent color quantization results. However, it is slow, so it is not suitable for real-time applications. In this paper, we present a color importance–based SOM color quantization method. The proposed method dynamically adjusts the learning rate and the radius of the neighborhood using color importance. This makes the proposed method faster than the conventional SOM-based color quantization method. We compare the proposed method to 10 well-known color quantization methods to evaluate performance. The methods are compared by measuring mean absolute error (MAE), mean square error (MSE), and processing time. The experimental results show that the proposed method is effective and excellent for color quantization. Not only does the proposed method provide the best results compared to the other methods, but it uses only 67.18% of the processing time of the conventional SOM method.

1. Introduction

The purpose of color quantization is to represent the many colors in the original image with a reduced number of distinct colors and with minimal distortion. True-color images contain thousands of colors and can contain up to 16,777,216 colors. More colors representing an image can make a better output to look at.

However, more colors can be a problem for most image-processing applications. For example, colors can be used for object detection, object extraction, and to compare features. In image-processing, a single object represented with one color is an ideal case, but unfortunately, even if it is a single object, it is represented with many colors, which becomes a serious problem.

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