

# Content-Based Image Retrieval Using Combined Color and Texture Features Extracted by Multi-resolution Multi-direction Filtering

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## Abstract

In this paper, we present a new texture image retrieval method which combines color and texture features extracted from images by a set of multi-resolution multi-direction (MRMD) filters. The MRMD filter set chosen is simple and can be separable to low and high frequency information, and provides efficient multi-resolution and multi-direction analysis. The color space used is HSV color space separable to hue, saturation, and value components, which are easily analyzed as showing characteristics similar to the human visual system. This experiment is conducted by comparing precision vs. recall of retrieval and feature vector dimensions. Images for experiments include Corel DB and VisTex DB; Corel\_MR DB and VisTex\_MR DB, which are transformed from the aforementioned two DBs to have multi-resolution images; and Corel\_MD DB and VisTex\_MD DB, transformed from the two DBs to have multi-direction images. According to the experimental results, the proposed method improves upon the existing methods in aspects of precision and recall of retrieval, and also reduces feature vector dimensions.

## Keywords

Color and Texture Feature, Content-Based Image Retrieval, HSV Color Space, Multi-resolution Multi-direction Filtering

## 1. Introduction

Image data, as visual data, are essential means to provide major information to users. As such image data are massive, an effective image retrieval system is needed, which is able to provide accurate information to users. Current image retrieval technologies have been focused on content-based image retrieval which is able to define visual information objectively and process it automatically. Most of them have been developed to combine features of color, texture, shape, etc.

Color is used to identify objects effectively, and similarity between images is determined by the difference of colors in each pixel. Color features include the color histogram which has global color information from the image [1,2], the color correlogram which has spatial color information from the image [3,4], the CSD (color structure descriptor) which has localized color information from the color histogram, and the SCD (scalable color descriptor) which has scalable information from the color

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