Introduction

- Local color occurrence descriptor (LCOD) from local neighborhood information is proposed for image retrieval.
- To reduce the dimension, color is quantized into few shades.
- The occurrence of each quantized color shade in local neighborhood is encoded to form the descriptor.
- LCOD is tested over natural as well as color texture databases including rotation, scale, and illumination cases.

Color Quantization

The color quantization technique is illustrated in Fig.1. The Red, Green and Blue channels of the image are having the values in the range 0 to 255. After quantization, it becomes one channel with the values in the range of 1 to 64.

![Color quantization technique](image)

**Fig.1. Color quantization technique.**

Descriptor Construction

The computation of the local color occurrence binary pattern \( \Phi \) for a given pixel is illustrated in Fig. 2 using an example local neighborhood having values from 1 to 5. The \( \Phi \) pattern for the middle pixel (i.e. \( \Phi_{3,3} \)) having shade value 3 (highlighted in green in Fig. 2) is computed by considering the value of \( D = 2 \) and \( D = 1 \). The number of shades is considered as 5 in this example.

The final LCOD descriptor is computed by aggregating the binary patterns over whole image as follows,

\[
des(z) = \sum_{m=0}^{m=n} \sum_{k=1}^{k=q^1} \Phi_{m,k}^{D}(z) \quad \forall z = [1, k \times q^1] \quad (1)
\]

where \( m \cdot n \) is the dimension of the image, \( q^1 \) is the number of quantized colour shade, and \( k \) is the number of bit required to encode \((2D+1)^2\).

Databases

5. Corel-rotated database - angles 0, 90, 180, and 270 degrees, 10 categories, 4000 images.
6. Corel-scale database - scales of 0.5, 0.75, 1, 1.25, and 1.5, 10 categories, 5000 images.
7. Corel-illumination database - monotonic intensity change by -60, -30, 0, 30, and 60 in all channels, 10 categories, 5000 images.

Experimental Results

The image retrieval results in terms of precision are shown in Fig.3 and Fig. 4.

![Comparison of proposed LCOD descriptor with SEH and CDH](image)

**Fig.3. Comparison of proposed LCOD descriptor with SEH [4] and CDH [5] over (a) Corel-1k, (b) Corel-10k, (c) MIT-VisTex and (d) STex databases using average retrieval precision (ARP) plot.**

![Comparison of proposed LCOD descriptor with SEH and CDH](image)

**Fig.4. Comparison of proposed LCOD descriptor with SEH and CDH over Corel-rotated, Corel-scale and Corel-illumination databases.**

References