Aula Prática 7

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1. **Color descriptors – HSI histogram.** Create a 256 coefficient descriptor that consists of the histogram of the color values of each pixel.
   - Convert the image into HSI color space.
   - Quantize each color parameter as follows:
     - **i.** *Hue* – 16 values (4 bits)
     - **ii.** *Saturation* – 4 values (2 bits)
     - **iii.** *Intensity* – 4 values (2 bits)
   - Combine these 3 values into a single *byte* as follows:
     hue << 4 || saturation << 2 || intensity
   - Create the histogram for the whole image
   - [Optional] Visualize the histogram in such a way that each bar corresponds to the color of its respective bin.
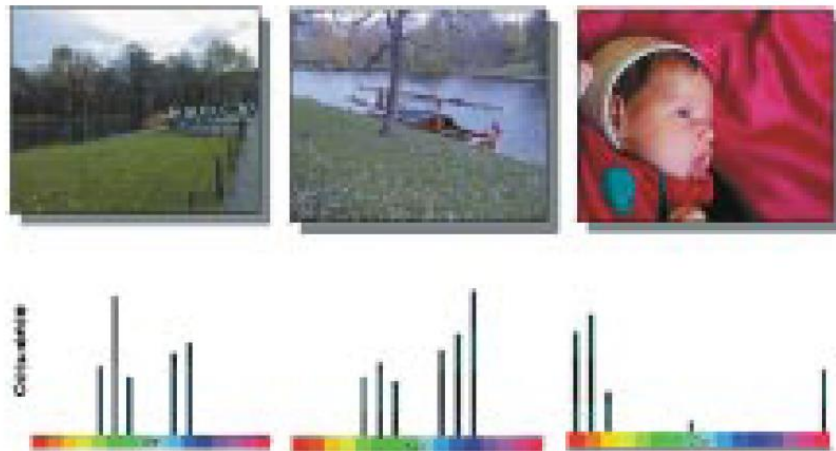
Figura 1 – Histograma

Fig. 2. Three color images and their MPEG-7 histogram color distribution, depicted using a simplified color histogram. Based on the color distribution, the two left images would be recognized as more similar compared to the one on the right.

2. **Texture descriptors – Local Binary Patterns.** Create a 256 coefficient descriptor that consists of a histogram of texture binary patterns for each pixel.
   - Idea: Compare the *intensity* value of a pixel with its 8 neighbors.
   - Start on the upper left corner.
   - The result of the comparison is 1 if the value of the neighbor is larger or equal to the pixel value. Otherwise the result is 0.
   - Combine all the results into a single byte (using *bit-shifting*), thus creating a *binary pattern* for each pixel.
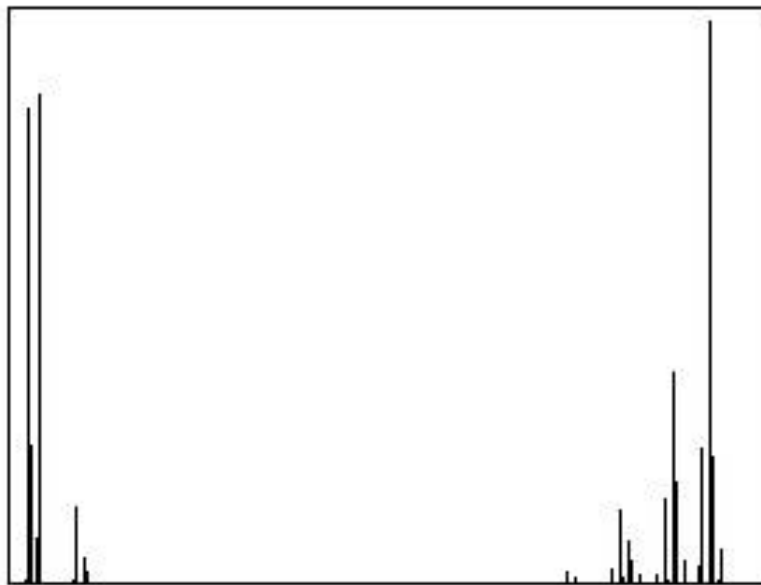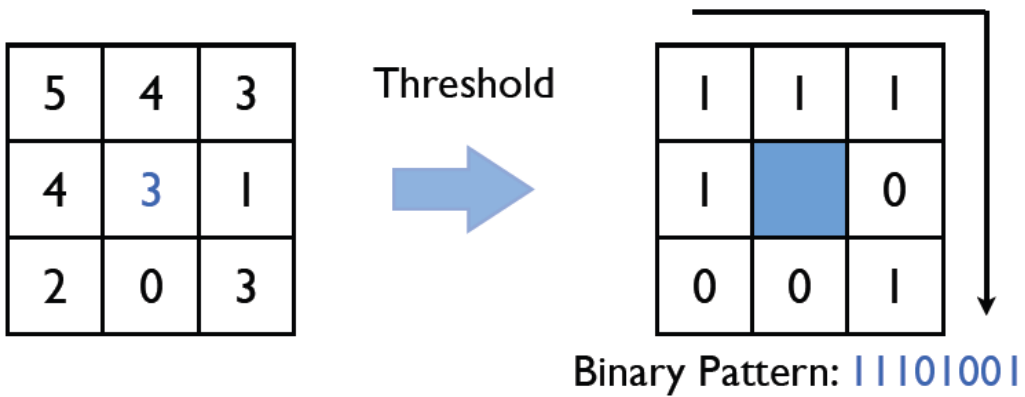   - Create the histogram of the occurrences of each *binary pattern* for the whole image.

Threshold

Binary Pattern: 11101001

Figure 3 –HSI histograma of the image 'lena.jpg'