$$S = 1 - \frac{3\min(R,G,B)}{R+G+B}$$

and

$$I = \frac{R+G+B}{3}$$

The color circle of Figure 2 illustrates the relationship between hue, saturation and R, G, and B values. As this figure shows, hue is expressed as an angle and saturation is expressed as a length. In practice, it is common to represent both hue and saturation with values between 0 and 255.

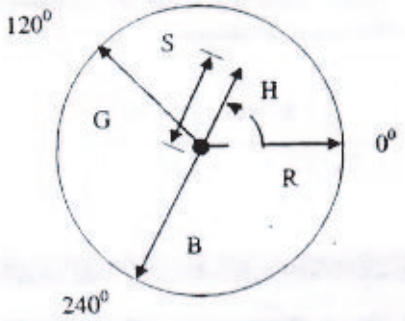

Figure 2: The color circle

In order to represent the spatial distribution of color in an image, Color-WISE relies on a fixed image-partitioning scheme. This is in contrast with several proposals in the literature[7] suggesting color-based segmentation to characterize the spatial distribution of color information. Although the color-based segmentation approach provides a more flexible representation and hence more powerful queries, we believe that these advantages are outweighed by the simplicity of the fixed partitioning approach. In the fixed partitioning scheme, each image is divided into $M*N$ overlapping blocks as shown in Figure 3. The overlapping blocks allow a certain amount of "fuzzy-ness" to be incorporated in the spatial distribution of color information, which helps in obtaining a better performance. To provide for partial-image queries, a masking bit is associated with each block. The default value for this bit for every block is one. Only during partial-image queries, some of the mask bits are set to zero.

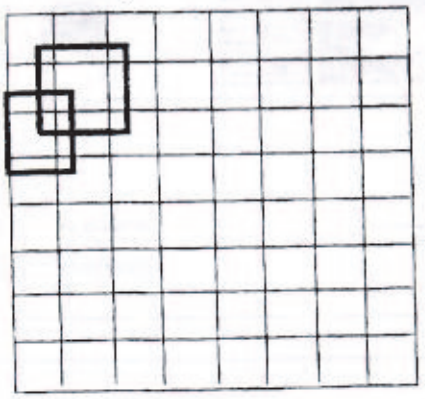

Figure 3: The fixed partitioning of Color-WISE