ABSTRACT

Texture Analysis plays an important role in many tasks ranging from remote sensing to medical image analysis. The main difficulty of texture analysis in the past was the lack of adequate tools to characterize different scales of textures.

In the recent years, methods based on moments, single and multi resolution have received a lot of attention and the feature representation and capability are well established. However, there are only few works reported for colour texture representation and analysis. The main reason was either due to the lack of proper definition or the existence of various colour models. Based on this motivation, this research work aims to propose suitable texture analysis methods for colour texture analysis.

Monochrome texture image analysis has been shown by texture spectrum scheme proposed by He and Li Wang. In their approach, any small texture unit has been quantified for texture description locally by texture number and globally by texture spectrum. Texture number is obtained by simple comparison of gray levels between central pixel and the neighborhood pixels. They have not considered about the levels of comparison i.e only greater than or less than or equal conditions are applied. But in reality, there may be high difference between simple larger and far larger. The idea of quantifying this magnitude of larger itself, using fuzzy logic scheme is
proposed. With the proposed scheme, instead of three levels (Base3) comparison, five levels (Base5) and seven levels (Base7) are introduced.

The idea of Fuzzy Texture numbers and Fuzzy Texture Spectrum for color images has been presented as texture features. The results of the proposed features have been compared with the existing scheme. The global descriptors for the color texture images have been presented for a number of color images collected from Brodatz textural album.

Texture classification problems are discussed in detail and our proposed texture features are used for texture classification and the corresponding experimental results are presented both for supervised and unsupervised models. It is observed that the proposed texture features are suitable as colour texture descriptors, for both regular and random type textures, which lead to better classification.

Conventional edge detection operators such as Roberts, Prewitts, Sobel or LoG are not suitable in finding the edges present between different textured regions of color texture images. The micro edges present between small primitives are contradictionally be represented as edges. To avoid this problem, the texture features are superimposed with any one of the existing edge detection operators and the results have been shown successful. The proposed method of texture edge detection produces a better edge profile for target images composed of different color textures producing segmentation of images into different regions.
Finally, the usage of the proposed texture features in Medical images have been applied

i) for the classification of tumor and non-tumor tissues and

ii) classifying components of human brain by segmenting the colour brain images.

The results obtained are compared with Fuzzy C Means Segmentation, K-means algorithm and earlier texture number scheme. Our proposed schemes are successful and are comparable with other schemes.