ABSTRACT

Texture emerged as a powerful visual primitive to succinctly describe image content. Texture characterization analysis and classification is widely studied over the last three decades in a variety of applications, Image processing, pattern recognition, multispectral scanner images obtained from aircraft or satellite platforms for microscopic images of cell cultures or tissue samples, medical imaging, remote sensing, industrial inspection and texture based image retrieval etc... That’s why the research on texture classification and analysis has received considerable attention in recent years.

Two fundamental issues in texture analysis and classification are how to characterize textures using derived features. Many texture classification problems in the literature usually require the computation of a large amount of texture features in order to characterize their associated patterns. This implies that texture classifiers frequently combine big sets of features without taking to account their relevance and redundancy. To address this, the present thesis derived various texture analysis and classification descriptors by reducing the dimensionality of a feature set for preserving the most relevant features and by removing unnecessary features that do not contribute to increase the quality of the available information.

One of the disadvantage with the texture analysis and classification methods using Texture unit (TU) is they derive a large range of numbers from 0 to 6561. This makes them difficult to integrate with Gray Level Co-
occurrence Matrix (GLCM). To overcome this, the present thesis derived a new descriptor called Left Right Texture Unit Matrix (LRTUM) that reduces the size of the TU matrix from 6561 to 79 and integrates this with GLCM for a precise and rotationally invariant classification and analysis. Thus it reduces the overall complexity. A little work is reported in literature to integrate Statistical and Structural approaches for classification of textures. To address this, the present thesis derived a new texture feature descriptor called Integrated Logical Compact Local Binary Pattern with OR operator on Textons (ILCLBP-T) for texture classification. The novelty of the proposed approach is it integrates the features of textons, and LBP for texture analysis and reduces the texture unit size from 0:6560 to 0:15 and achieves much better rotation invariant classification than conventional LBP.

To derive a new local classification descriptor, to be resistant in the presence of noise and illumination changes, and to provide rotational and pose invariant shape patterns for a precise age classification Morphological Primitive Patterns with grain components (MPP-g) are evaluated on Local Directional Pattern (LDP). Many texture classification algorithms fail in properly representing object boundaries, texture structures, and further fail in providing most of the semantic information of the image. To address this and to precisely represent the spatial correlation of color and texture orientation, the present thesis integrated the advantages of co-occurrence matrix and histogram by computing different features with limited number of selected pixels with a new descriptor called Texton and Texture Orientation Co-occurrence Matrix (T&TO-CM). The proposed T&TO-CM
can also detect and overcome the problems related to the saltation of color, color edge stripe and acuity of an image, which is not possible by TCM.

By extracting local features the global information will be missing and vice versa. The LBP compares the central pixel value with the neighboring values. This comparison in LBP is very sensitive to noise fail in properly detect large-scale textural structures due to their small spatial support and a major contrast between the central pixel and its surroundings are easily resulted. To overcome this, the present thesis derived significant LBP (SLBP) with significant local features. For a precise, accurate texture analysis and classification with both local and global rotationally invariant features of the texture the present study derived significant global local LBP (SGLLLBP) by using variance on SLLBP.