ABSTRACT

Breast cancer is the most common female cancer and the second leading cause of cancer death among women and it continues to be a significant public health problem in the world. It is proved that early stages of breast cancer are well treatable. The estimated sensitivity of radiologists in breast cancer screening is only about 75%, but the performance would be improved if they were prompted with the possible locations of abnormalities. Breast cancer CAD (computer aided diagnosis) systems can provide such help and they are important and necessary for breast cancer control. CAD mammography might compete with or substitute the human double reading. This system is composed of feature extraction, segmentation and classification modules in cascaded form. Micro-calcifications and masses are the two most important indicators of malignancy and their automated detection is very valuable for early breast cancer diagnosis.

This thesis deals with the detection and classifications of masses and micro-calcifications in mammographic images. The segmentation is carried out separately for masses and micro-calcifications. Mass segmentation of mammograms with entropy thresholding and Ostu’s method are compared. Other approaches such as marker control watershed and level set are also compared for mass segmentation. In addition, micro-calcifications based segmentation is performed using Foveal adaptation segmentation algorithm and local background subtraction technique. Texture and shape based features are extracted from images for masses and micro-calcifications respectively. The rough set theory is used for feature selection and finally classification results are presented using SVM and neural network classifiers.

Brain tumors are also the second fastest growing cause of cancer death among humans. Early detection and correct treatment based on accurate diagnosis are important steps to improve disease outcome. Currently, magnetic resonance imaging (MRI) is an important tool to identify the location, size and type of brain tumor. A tissue usually becomes dense when diseased. Masses are examined for location, shape, density, size and definition of margins. Higher density is usually an indicator of malignancy, while lucent-centered lesions are usually benign. Cancerous lesions generally have a more irregular shape than benign lesions. Most benign masses are circumscribed, compact and roughly elliptical. Malignant lesions usually have a blurred boundary and an irregular appearance. All of these lacunas concerned with manual
segmentation make a computer aided segmentation tool most desirable. In the last 20 years, several techniques have been developed by researchers to identify anatomical brain structures/brain tumors. But most of them have their own limitations. So, none of them has gained wide popularity in the field of image segmentation. In the proposed research brain tumor segmentation is carried out by level set, marker controlled watershed and modified gradient region growing techniques and results are compared with expert radiologist manual segmentation. Also volume measurement is performed with seeded region growing and level set evaluation methods for 3D MRI tumor and validated with the help of manual segmentation results.