

Chapter 8

Analysis of Different Image Processing Techniques for Classification and Detection of Cancer Cells

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ABSTRACT

This chapter gives an analysis of various methodologies for detecting cancer cells through image processing techniques. The challenges during such detections are over-segmentation and computational complexities. Therefore, the algorithms dealing with such problems are analyzed in this chapter. In these algorithms, a watershed and setting up threshold are helpful to overcome segmentation issues. A support vector machine is discussed to detect subtypes of pneumoconiosis for disjointing segments of lungs. For finding lung cancer cells, a segmentation weighted fuzzy probabilistic-based clustering has been used. Multiple variants of thresholding along with classifiers are proposed to detect lungs and liver cancer. Other than that, noise-removal, feature extraction and watershed are used to detect breast cancer. For leukemia, a bimodal thresholding over enhanced images of cytoplasm and nuclei regions has been discussed. kNN classifier, k-mean clustering, and feed-forward neural networks have also been discussed. Results from these techniques vary from 60%-100% depending on the proposed methodology.

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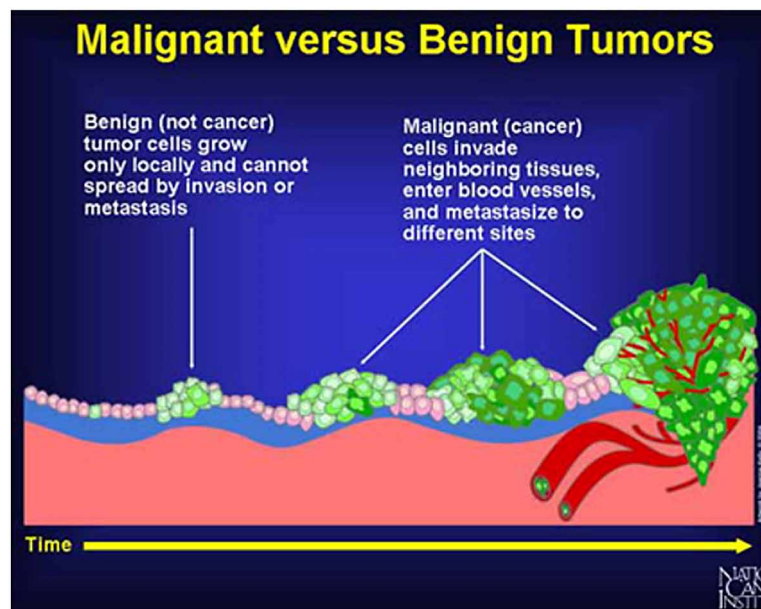
1. INTRODUCTION

Cancer cells have the power to affect the other healthy cells and the blood vessels surrounding these cancerous cells. This area forms an environment known as microenvironment. The cancerous cells may invade the other cells and spread to influence the other faraway body parts. These cancerous cells form a mass that increases in size to form tumors, lumps or masses. The detection of masses of cancer cells can be detected by using different techniques. Depending on the nature of their invasion, cancer is categorized as malignant or benign as shown in Figure 1.

Benign tumor does not invade or spread to other body parts though its size can be increased. After the removal of this type of tumor it does not affect again but malignant tumor can come back to affect the other body parts. Benign tumor is not life threatening, however, malignant tumor is fatal if it reaches to brain. Malignant tumor invades other surrounding parts but small part of the originally located tumor dislodge and enters into the circulatory system or lymphatic system where it goes to the distant body parts to make them cancerous. Cancer cells use the immune system for their growth and can mask themselves from immune cell and hence immune system becomes unable to remove cancer cells from the body.

There are different types of cancer and their categorization depends on the organ or tissue where it is present and types of cells. Leukemia is the cancer of blood or blood forming cells. Lymphoma is the cancer of lymphatic system. Carcinoma is the cancer of lining that surrounds the skin, digestive tract and lungs. Sarcoma is the cancer of mesodermal cells such as bone, vessels and blood. Melanoma is the cancer of melanocytes containing melanin pigment. Some other cancers include breast cancer, brain and spinal cord cancer etc (Geetha & Selvi, 2015). Lung cancer involves the cancer of trachea, bronchi and lung tissue involving alveoli. Smoking, exposure to radon gas, silica and asbestos, air pollution, lung diseases such as tuberculosis and family history are the main causes of the lung cancer. Lung cancer

Figure 1. Benign VS malignant tumor



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