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Establishing the Level of Breast Cancer Malignancy Using Sample K-Means Clustering Method to Improve Effectiveness of Drug

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Abnormal growth of breast tissue cells is known as the main causative factor for the onset of breast cancer. Determining the stage of the malignancy level of the disease largely depends on the outcomes of the assessment which are done by an oncologist [1]. In this article, the researchers have sought to design a software that can help improve the effectiveness of the assessment of the breast cancer as well as assist in determining the genomics of data to improve treatment [2]. The software usually analyzes the size of the cancerous tissues to establish the stage of the cancer [3]. The study involves several steps for instance the capturing the mammogram image, establishing the Region of Interest (ROI), then utilizing the region growing segmentation technique to assess part with suspected cancer, and lastly utilizing a sample k-means clustering method to classify the stage of the cancer by looking at the mammogram image [4]. On the basis of the thirty three abnormal or malignant sample images captured from the MIAS, a mini mammography database, the suggested approach can successfully analyze a malignant group to identify the severity of the breast cancer [5].

Cancer diseases usually led to changes in body cells causing them to grow uncontrollably. Majority of such cancer cells ultimately end up forming masses or a lump which medical term is referred to as a tumor [6]. Besides, the different types of cancer are usually named after the body part where the tumor is found, for instance, when a person has tumors on the breast tissue, they are positively diagnosed with breast cancer [7]. The tissues comprises of the mammary glands or lobules which are responsible for production of milk as well as the ducts that usually link the nipple and the lobules [8]. Other parts of the breast include the lymphatic, connective, and fatty tissue. Furthermore, breast cancer is regarded as the prevalent causative factor of cancer deaths among women globally [9]. In the future, the trend is expected to increase with more positive diagnosis cases expected to be reported as well as in situ breast cancer and high mortality rates as a result of the disease [10]. Detecting and diagnosis breast cancer during its initial stages greatly improves the probability of a patient surviving the deadly disease since it allows for early treatment in addition to high chances of full recovery without the risk of a relapse [11].

Currently, early detection of breast cancer is done through the use of advanced radiological methods such as screening mammography [12]. The technique involves performing X-ray assessment of an asymptomatic woman's breast [13]. The radiological procedure is regarded as to be highly effective since it can positively detect almost 80% to 90% of the disease [14]. Detection of abnormalities or masses (tumors) at an early phase is relatively likely when the physician uses a mammography [15]. The radiologists usually uses numerous stages to process the breast image they include using mammography to take or capture the image [16]. Other subsequent steps include pre-processing and segmenting the image, extracting and selecting the features, and lastly, performing classification [17]. An oncologist can easily perform diagnosis of poorly defined and perceived masses or lumps while using the digital mammography [18]. In the medical field, the disease is regarded as a silent cancer since there are no observable symptoms which the patient suffers. In most cases, the breast cancer is usually detected when the condition progresses to the level of high stage of malignancy [19]. Determining the stage of cancer progression is critical since it helps to define the condition of cancer especially its severity of its impact on other bodily organs, areas where is has significantly spread, its actual size, as well where it is located [20]. It is universally agreed that there are four stages of breast cancer and detecting such levels of malignancy is usually hard as several factors need to be taken into consideration [21].

Therefore, the researchers wanted to suggest a technique that can help to effectively establish the level of malignancy of the breast cancer on the basis of the size of cancer tumor as captured on the mammogram image [22]. Additionally, they propose a sample k-means clustering method to detect the stage of malignancy of the breast cancer [23]. In past studies, scientists used the segmentation with region growing as well as Region of Interest (ROI) with the Otsu method [24]. In addition, used the MIAS database to obtain three clusters of malignant patients to test thirty three mammograms [26]. The findings reveal that the technique can effectively and efficiently detect the breast cancer stage on the basis of the part with the suspected tumor.

Fig. 1. Proposed method

Proposed method (Source: Markou Markos, Sameer Singh (2003) Novelty Detection: A Review—Part 1: Statistical Approaches. Signal Processing 83: 2481 2497.)

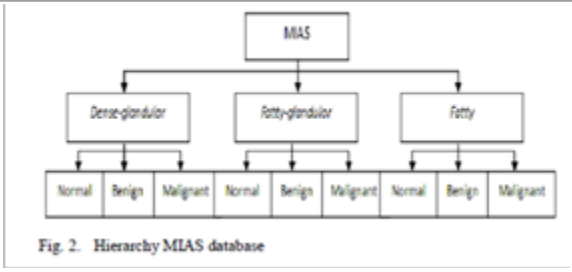

Fig. 2. Hierarchy MIAS database

Figure 2: Hierarchy MIAS database (Source: Maitra, Indra Kanta, Sanjay Nag, and Samir Kumar Bandyopadhyay. "Identification of Abnormal Masses in Digital Mammography Images." International Journal of Computer Graphics 2, no. 1 (2011): 17-30.)

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