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Tumor Detection In MRI Breast Image Using Deep Learning

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ABSTRACT
Breast cancer is a common health problem in women, with one out of eight women dying from breast cancer. Many women ignore the need for breast cancer diagnosis as the treatment is not secure due to the exposure of radioactive rays. The breast cancer screening techniques suffer from non-invasive, unsafe radiations, and specificity of diagnosis of tumor in the breast. The deep learning techniques are widely used in medical imaging. This paper aims to provide a detailed survey dealing with the screening techniques for breast cancer with pros and cons. The applicability of deep learning techniques in breast cancer detection is studied. The performance measures and datasets for breast cancer are also investigated. The future research directions associated with breast cancer are studied. The primary aim is to provide a comprehensive study inthis field and to help motivate the innovative researchers.

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I. INTRODUCTION

1.1 PROCESS INTRODUCTION

Breast cancer is the most common cancer and can affect both women and men. An abnormal growth of breast cells leads to breast cancer, and as these cells continue to multiply at a faster ratethan healthy cells, they accumulate and form a mass. Breast cancer is classified based on the cellsin the breast that eventually become cancerous. There are many types of breast cancer. The first type is ductal carcinoma in situ (DCIS), a non-invasive cancer present in the lining of the breast milk duct. The second type is invasive ductal carcinoma, which is the most common type and makes up about 70–80% of all breast cancers. The third type is inflammatory breast cancer, a formof invasive breast cancer in which cancer cells block lymph vessels, which causes the breast to look inflamed. It is rare and is responsible for about 1% to 5% of all breast cancers. The fourth type is triple-negative breast cancer, an aggressive form of invasive breast cancer in which the cancer cells lack estrogen receptors (ER) or progesterone receptors (PR) and do not produce humanepidermal growth factor receptor 2 (HER2). About 15% of all breast cancers are of this type. Othertypes of breast cancer are less common and make up around 1% of all breast cancers. There are several ways to detect breast cancer. In this paper we detect breast cancer using deep learning.

Deep Learning Methods

The term deep learning refers to a sub-field of machine learning in which several processing layers are employed to extract data features relevant to a given task. Using multiple layers of neural network architectures and a large amount of labeled data, modelsare trained and can make classifications based on images, texts or sounds.To detect breast cancer, different deep learning tasks can be applied: Image classification is the probability that the input is a particular class. It involves defininga set of target classes (e.g., cancerous, healthy) and using labeled images to train a model to recognize them. Raw pixel data are the input to early computer vision models. Object detection refers to locating and presenting the abnormal areas of an image, such astumor. A bounding box is drawn around one or more objects in an image to localize them.

II. LITERATURE REVIEW

In 2014 Vasu Kalaria,One of the gravest health problem has been lung cancer in the world in the present scenario. Automatic detection of lung cancer has provided acutting-edge in the field of medical technology.This is because identifying cancer cells in lungs has been a tedious task as scarce or probably no symptoms are obtained in the premature stage of the disease. This project was undertaken to contribute in the field by using different techniques to identify and optimize the occurrence of cancer cells in lungs.

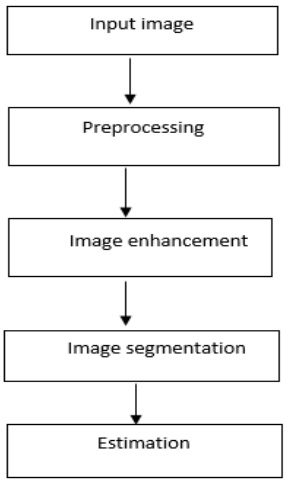
In 2012 N.Gopinath,Medical Image Processing is one of the most challenging and emerging topics in today's researchfield. Processing of Magnetic Resonance Imaging (MRI) is one of the parts in this field. In recent years, multispectral MRI has emerged as an alternative to Ultrasound (US) image modality for clear identification of cancer in Breast, Prostate and Liver etc,. In order to analyze a disease, Physicians consider MR imaging modality is the most efficient one for identification of cancer present in various organs. Therefore, analysis on MR imaging is required for efficient disease diagnosis. This paper describes the proposed strategy to detect and extraction of Prostate cancer cells from patient's MRI scan image of the Prostate organ. This proposed method incorporate with some noise removal functions, segmentation and morphological functions which are considered to be the basic concepts of Image Processing.

Eko supriyanto, The conventional Pap smear has been undeniably responsible in reducing the number of incidence and mortality of cervical cancer. However, few concerns have arisen such as the shortage of skilled and experienced pathologists and the increasing workload as a result of more individuals having gained access to preventive health care which eventually will make the reviewing procedure becomes time consuming and highly prone to human errors. In orderto solve this problem, an automated detection system of cervical cancer cells has been developed. The detection of cervical cancer cells is based on the morphology of the cells and level set operations. Test result shows, that by using color intensity classification the system isable to differentiate between normal and cancerous cells. This system will hopefully help the pathologist to reduce the work-load and minimize human error while maintaining and improving the accuracy of the system.

In 2012 S. Muthu Lakshmi MCA, This paper presents a supervised method for blood vessel detection in digital retinal image.The use of digital images for eye disease diagnosis could be used for early detection of Diabetic Retinopathy (DR). This method of blood vessel detection uses feature based pixel classification. Membership value of these feature based image is also used to segment the blood vessel. This method uses the DRIVE database.

In 2010 P. C. Siddalingaswamy, Automatic segmentation of the vasculature in retinal images is important in the detection of diabetic retinopathy that affects the morphology of the blood vessel tree. In this paper, a hybrid method for efficient segmentation of multiple oriented blood vessels in colour retinal images is proposed. Initially, the appearance of the blood vessel s are enhanced and back-ground noise is suppressed with the set of real component of a complex Gabor filters. Then the vessel pixels are detected in the vessel enhanced image using entropic thresholding based on gray level co- occurrence matrix as it takes into account the spatial distribution of gray levels and preserving thespatial structures. The performance of the method is illustrated on two sets of retinal images frompublicly available DRIVE (Digital Retinal Images for Vessel Extraction) and Hoover's databases.For DRIVE database, the blood vessels are detected with sensitivity of 86.47±3.6 (Mean±SD) andspecificity of 96±1.01.

III. METHODOLOGY



3.1 INPUT IMAGE

The first stage of any vision system is the image acquisition stage. Image acquisition is the digitization and storage of an image. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks required today. First Capture the Input Image from source file by using uigetfile and imread function. However, if the image has not been acquired satisfactorily then the intended tasks may not be achievable, even with the aid of some form of image enhancement.

3.2 PRE-PROCESSING

Gray conversion

In photography and computing, a grayscale or greyscale digital image is an image in which the value of each pixel is a single sample, that is, it carries only intensity information.Images of this sort, also known as black-and-white, are composed exclusively of shades of gray, varying from black at the weakest intensity to white at the strongest.

LAB conversion

A Lab color space is a color-opponent space with dimensions L for lightness and aand b for the color-opponent dimensions, based on nonlinearly compressed (e.g. CIE XYZ) coordinates. The terminology originates from the three dimensions of the Hunter 1948 color space, which are L, a, and b. However, nowadays Lab is usually an informal abbreviation for the L*a*b*representation of the CIE 1976 color space (or CIELAB, described below), where the asterisks/stars are used to distinguish the CIE version from Hunter's original version.

Image Resize

In computer graphics and digital imaging, scaling refers to the resizing of a digitalimage. In video technology, the magnification of digital material is known as up scaling or resolution enhancement. When scaling a vector graphic image, the graphic primitives which make up the image can be scaled using geometric transformations, without any loss of image quality. When scaling a raster graphics image, a new image with a higher or lowernumber of pixels must be generated. In the case of decreasing the pixel number (scaling down) this usually results in a visible quality loss. From the standpoint of digital signal processing, the scaling ofraster graphics is a two-dimensional example of sample rate conversion, theconversion of a discrete signal from a sampling rate (in this case the local samplingrate) to another.

3.3 Image Enhancement

Image enhancement techniques can be divided into two broad categories:

1. Spatial domain methods, which operate directly on pixels, and
2. Frequency domain methods, which operate on the Fourier transform of an image.

Unfortunately, there is no general theory for determining what `good' image enhancement is when it comes to human perception. If it looks good, it is good! However, when image enhancement techniques are used as pre-processing tools for other image processing techniques, then quantitative measures can determine which techniques are most appropriate.

3.4 SEGMENTATION

In segmentation process we segment only the tumor cells from the MRI imagedataset for the breast images. Segmentation is the extraction of the exact part of the tumor so only we segmentthe tumor cells from the MRI image.

3.5 Estimations

Sensitivity and specificity are statistical measures of the performance of a binary classification test, also known in statistics as classification function: Sensitivity (also called the true positive rate, the recall, or probability of detection in some fields) measures the proportion of positives that are correctly identified assuch (e.g., the percentage of sick people who are correctly identified as having thecondition). Specificity (also called the true negative rate) measures the proportion of negativesthat are correctly identified as such (e.g., the percentage of healthy people who arecorrectly identified as not having the condition).

IV. Result and Discussion

This is the corresponding output for proposed system as shown as below

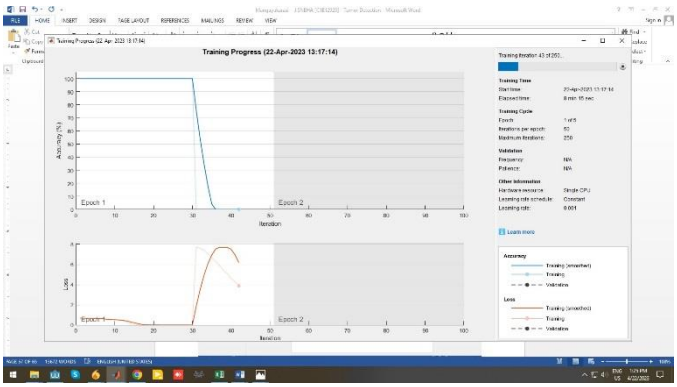


Fig1

Table 1: Performance

	Performance Matrices
Accuracy	96.3000
Sensitivity	94.8000
Specificity	93.3000
Precision	97.3000
Recall	94.8000
F-Score	96.0337

V. CONCLUSION

In this paper, we proposed a breast tumor detection in the MRI images using the deep learning. Here we preprocess it and segmentation also done in automatic so only the manual segmentation is avoided and also using the deep learning for the proper classification of the breast tumor in MRI images and also minimize the segmentation timing and preprocessing timing. In our process we use the iteration for the classification if it has a tumor or not. By the use of iteration we get the exact classification result finally by the influence of the deep learning we easily split up the tumorcells from the MRI images of the breast.

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