Analysis of Cancer Affected Areas in Terms of Medical Field

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Abstract:
The latest technical trends and related evolution in the field of medical imaging taken into consideration and effectively done Analysis and Computation of Lungs Cancer Detection Matlab.The vision behind the selection of this project that the cancer get easily get detected in pre treatment so that the diagnosis can be possible up to complete removal of the disease. Recently, image processing techniques are widely used in several medical areas for image improvement in earlier detection and treatment stages, where the time factor is very important to discover the abnormality issues in target images, especially in various cancer tumors such as lung cancer, breast cancer, etc. Image quality and accuracy is the core factors of this research, image quality assessment as well as improvement are depending on the enhancement stage where low pre-processing techniques is used based on Gabor filter within Gaussian rules. Following the segmentation principles, an enhanced region of the object of interest that is used as a basic foundation of feature extraction is obtained. Relying on general features, a normality comparison is made. In this research, the main detected features for accurate images comparison are pixels percentage and mask-labelling.

I. INTRODUCTION

Cancer known as a malignant tumor or malignant neoplasm is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body. Not all tumors are cancerous; benign tumors do not spread to other parts of the body. In this project collect cancer images and load those images into mat lab for cancer detection. Here used features extraction, morphological operations an filtering. This technique helps to detects cancer and helps us for diagnosis solution. This project can be use Medical Imaging and Cancer Research Center.

II. DELAY BASED APPROACH

To study about cancer parameters, types and their distribution in the body in terms of medical field. To study image processing toolbox in Matlab, for identification and analysis of image processing concepts i.e. image filtering, image segmentation and features extraction which will helpful to detect cancer parameter during processing. Cancer image need to load into Matlab and then need to perform filtering process to reduce error from the cancer image so as to obtain and track exact location of cancer into that particular filtered image. Processing on cancer image in accordance with the effective technique for detection of cancer using multiple image processing technique i.e. image features extraction, image segmentation, image enhancement etc. Analysis of error in the cancer affected areas, normality and abnormality.
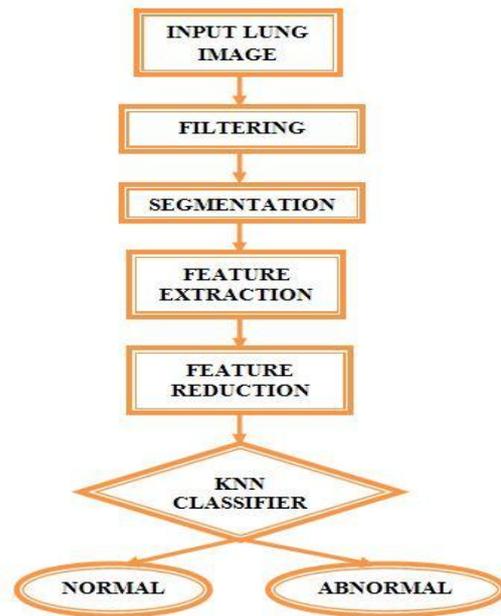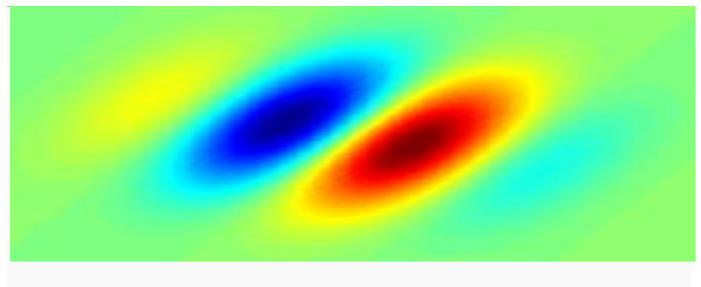

Figure.1. Input Lung Image

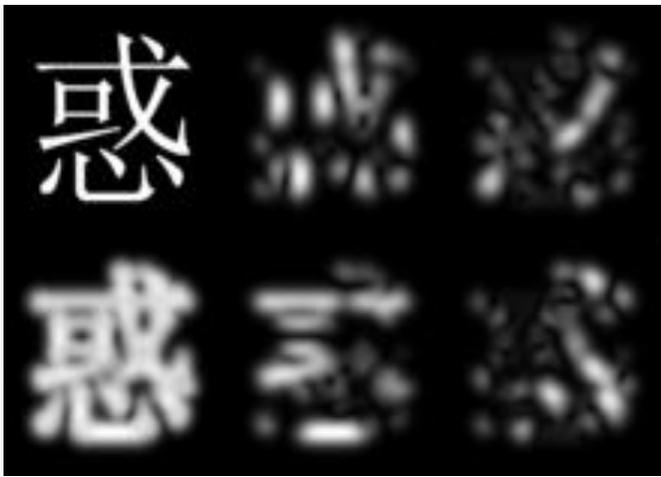## III. PROPOSED METHEDOLOGY

Gabor filter

Figure.2. Gabor Filter

In image processing, a **Gabor filter**, named after Dennis Gabor, is a linear filter used for edge detection. Frequency and orientation representations of Gabor filters are similar to those of the human visual system. They have been found to be particularly appropriate for **texture representation and discrimination**. The Gabor space is very useful in image processing applications such as optical character recognition, iris recognition and fingerprint recognition. Relations between activations for a specific spatial location are very distinctive between objects in an image. Furthermore, important activations can be extracted from the Gabor space in order to create a sparse object representation. In the spatial domain, a 2D Gabor filter is a Gaussian kernel function modulated by a sinusoidal plane wave. Simple cells in the visual cortex of mammalian brains can be modeled by Gabor functions. Thus, image analysis with Gabor filters is thought to be similar to perception in the human visual system. Its impulse response is defined by a sinusoidal wave (a plane wave for 2D Gabor filters) multiplied by a Gaussian function. Because of the multiplication -convolution property (Convolution theorem), the Fourier transform of a Gabor filter's impulse response is the convolution of the Fourier transform of the harmonic function and the Fourier transform of the Gaussian function. The filter has a real and an imaginary component representing orthogonal directions. The two components may be formed into a complex number or used individually. A set of Gabor filters with different frequencies and orientations may be helpful for extracting useful features from an image. A wide variety of texture feature extraction methods have been proposed in the literature. Among them, multichannel filtering techniques based on Gabor filters have received considerable attention. The texture feature extraction stage of this work is based on the optimized multichannel Gabor wavelet filters. The next paragraphs give a brief overview about them. Gabor filters are biologically motivated convolution kernels that have enjoyed wide usage in a myriad of applications in the field of computer vision and image processing. In order to extract local spatial textural micro-patterns in mammogram ROIs, Gabor filters can be tuned with different orientations and scales (see Fig. 5.1), and thus provide powerful statistics which could be very useful for breast cancer detection. Gabor filters have been widely used in pattern analysis applications. For example, it has been used to study the directionality distribution inside the porous spongy trabecular bone in the spine.] Complex

$$g(x, y; \lambda, \theta, \psi, \sigma, \gamma) = \exp\left(-\frac{x'^2 + \gamma^2 y'^2}{2\sigma^2}\right) \exp\left(i\left(2\pi\frac{x'}{\lambda} + \psi\right)\right)$$

Real

$$g(x, y; \lambda, \theta, \psi, \sigma, \gamma) = \exp\left(-\frac{x'^2 + \gamma^2 y'^2}{2\sigma^2}\right) \cos\left(2\pi\frac{x'}{\lambda} + \psi\right)$$

Imaginary

$$g(x, y; \lambda, \theta, \psi, \sigma, \gamma) = \exp\left(-\frac{x'^2 + \gamma^2 y'^2}{2\sigma^2}\right) \sin\left(2\pi\frac{x'}{\lambda} + \psi\right)$$

Where
$$x' = x\cos\theta + y\sin\theta$$
And
$$y' = -x\sin\theta + y\cos\theta$$

In this equation, λ represents the wavelength of the sinusoidal factor, θ represents the orientation of the normal to the parallel stripes of a Gabor function, ψ is the phase offset, σ is the sigma/standard deviation of the Gaussian envelope and γ is the spatial aspect ratio, and specifies the ellipticity of the support of the Gabor function. Feature extraction a set of Gabor filters with different frequencies and orientations may be helpful for extracting useful features from an image. Gabor filters have been widely used in pattern analysis applications. [5] For example, it has been used to study the directionality distribution inside the porous spongy trabecular bone in the spine.[6]

Figure.3. Demonstration of a Gabor

Demonstration of a Gabor filter applied to Chinese OCR. Four orientations are shown on the right 0°, 45°, 90° and 135°. The original character picture and the superposition of all four orientations are shown on the left. Gabor filters are directly related to Gabor wavelets, since they can be designed for a number of dilations and rotations. However, in general, expansion is not applied for Gabor wavelets, since this requires computation of bi-orthogonal wavelets, which may be very time-consuming.

Therefore, usually, a filter bank consisting of Gabor filters with various scales and rotations is created. The filters are convolved with the signal, resulting in a so-called Gabor space. This process is closely related to processes in the primary visual cortex.[7]Jones and Palmer showed that the real part of the complex Gabor function is a good fit to the receptive field weight functions found in simple cells in a cat's striate cortex. [8] The Gabor space is very useful in image processing applications such as optical character recognition, iris recognition and finger print recognition. Relations between activations for a specific spatial location are very distinctive between objects in an image. Furthermore, important activations can be extracted from the Gabor space in order to create a sparse object representation.

GABOR FILTERING FUNCTION:

A wide variety of texture feature extraction methods have been proposed in the literature. Among them, multichannel filtering techniques based on Gabor filters have received considerable attention. The texture feature extraction stage of this work is based on the optimized multichannel Gabor wavelet filters. The next paragraphs give a brief overview about them. Gabor filters are biologically motivated convolution kernels that have enjoyed wide usage in a myriad of applications in the field of computer vision and image processing. In order to extract local spatial textural micro-patterns in mammogram ROIs, Gabor filters can be tuned with different orientations and scales (see Fig. 5.1), and thus provide powerful statistics which could be very useful for breast cancer detection. A two-dimensional Gabor filter defined as a Gaussian kernel modulated by an oriented complex sinusoidal wave can be described as follows [36]:

$$g(x,y) = \frac{1}{2\pi\sigma_x\sigma_y} \exp^{-\frac{1}{2}\left(\frac{\tilde{x}^2}{\sigma_{\tilde{x}}^2} + \frac{\tilde{y}^2}{\sigma_{\tilde{y}}^2}\right)} \exp^{2\pi j W\tilde{x}}, \qquad (5.5)$$

$$\tilde{x} = x \cdot \cos\theta + y \cdot \sin\theta \quad \text{and} \quad \tilde{y} = -x \cdot \sin\theta + y \cdot \cos\theta. \qquad (5.6)$$

where σ_x and σ_y are the scaling parameters of the filter and describe the neighborhood of a pixel where weighted summation takes place, W is the central frequency of the complex sinusoidal and $\theta \in [0, \pi)$ is the orientation of the normal to the parallel stripes of the Gabor function.
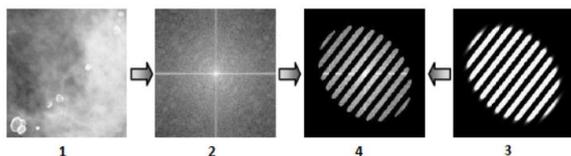

FIGURE 5.1: (1) mini-MIAS Database mammogram, (2) The result of Fast Fourier transform (FFT), (3) A Gabor Filter, (4) The result of Gabor filtering.

IV. SIMULATION RESULT

1. As cancer image loaded into Matlab which is captured from a particular camera so converted results from color image to grayscale image.
2. The grayscale image loaded into Matlab in accordance with original image which is error image so outcome which is used filtering process and related results.
3. This filtered output applied for further image processing techniques which will be helpful to

compute cancer these results in terms of parameters and their results.
4. Final abnormality and normality outcome matrix along with error findings.

V. CONCLUSION:

We can use real time cancer detection and respective diagnosis measure which will helps to clear cancer parameters permanently. This system can be update upto at real time analysis and accordingly in this project here used advance algorithm for cancer tracking and detection so it is easier send this image for medical diagnosis. We can see cancer expansion on the display and make for research and study module.

VI. REFERANCES

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