Detector for Tonsillitis Using Sobel Edge Detection and Gabor Filter

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Abstract—*Tumors, Tonsillitis, andmuchmorediseasescanbedetectedintheearlystagesandcan be healed. For this a new idea for efficient Gabor filter design with efficient noise reduction, less power consumption and reduced memory usage is proposed in this paper. The filter design is befitting for detecting the infancy of disease using textural properties of anatomical structures. analysis of image finds application in an expansive range, namely tumor detection, security purpose by keeping an eye on captured images, diagnosis of infancy diseases in various parts of the body, and so on. Image segmentation plays a significant role in the analysis of the image to make a better form of an input image for its analysis in the next phase. Segmentation is a crucial element in image analysis to maintain less processing time and to arise proper meaning in the presence of large puzzlement and noises in the image. The significant challenge in image fragmentation is to attain quicker estimation and a cheap rate without disturbing the basic attribute of the image.*

Keywords—*Tonsillitis Disease Detection, Gabor Filter, LabView Ni Vision, Image Acquisition, color extraction*

I. INTRODUCTION

Detection of tonsillitis in its early stage is necessary to cure easily. In this paper this will be possible by edge detection technique using gabor filter. Edge detection is an important tool in the field of image processing, Disease like tonsillitis, tumor, fracture and many more can be detect and cured in its early stage, by detecting the edges of that disease, so edge detection having always given first attention in the field of image processing. In this tonsillitis detection module is design in LabVIEW. The algorithm used is SOBEL operator and for best ridges and fast processing log gabor filter is used. It is used in various applications as medical image processing, object detection etc. LabView NI Vision assistant is used for better performance and for simplified design, by using NI Vision Assistant different image pre-processing can be done Edge of an Image is One of the most fundamental and significant futures. The purpose of edge detection is to discover the information about the shapes and the reflectance or transmittance in an image. It is one of the fundamental steps in image processing, image analysis, image pattern recognition, and computer vision, as well as in human vision. The correctness and reliability of its results affect directly the comprehension machine system made for objective world. This firstly describes the characteristics of edges, the properties of traditional detectors and the methodology of common edge detection and then analysing the results of MATLAB is commonly used to realize the hybrid programming so as to expand the scientific computing ability of LabVIEW. Engine must be running in this way and that results in lower perform efficiency and then summarized their recent research progresses and applications. Finally, this analyzed their advantages, disadvantages and presents some recommendations for future work.

II. LITERATURE SURVEY

This literature survey deals with the study of various research papers that contributed in the image segmentation using Gabor filters.There is an increasing demand of image segmentation in various application areas that can be categorized as: edge detection, statistical approach, histogram thresholding, region based methods such as thresholding, region growing, region splitting and merging, color perceptron model, characteristic feature clustering, neural network, physics based technique and fuzzy set theory. Gabor filters can serve as excellent band-pass filters for one-dimensional signals. A Gabor filter is a linear filter whose impulse response is defined by a harmonic function multiplied by a Gaussian function. Gabor filters is having various transforms, image properties, operators, frequencies and various features which are used in detecting image segmentation.

| SR NO.	PAPER NAME/ STUDIES	AUTHOR NAME	CONTENT TAKEN FROM THIS PAPER
1	Improvisation of gaborfilterdesign using verilog HDL	M.F.MMohamed, S. ArazakA.H.Azoolfakar, A.S Al- Junid	This paper details important enhancement made to the Digital Gabor filter to minimi the sizing problem and the coding style tha synthesizable
2	Simulation of Gabor Filter for Fingerprint Recognition using Verilog HDL	Geetha M.N and Jagadeesh.B	This work demonstrates the application of Gabor filter technique to enhance the imag The incoming signal in form of image pixe will be filter out or convolute by the Gabo filter to define the ridge and valley regions of image.
3	The given image is pr processed by a sequence of Gabor filters	Z-Q Liu, R. M. Rangayyan, C. B Frank	Information regarding orientation of the linear patterns in the image and the area covered by the patterns in specific directio is then computed from the filtered images
4	Vhdl implementation for edge detection using log gabor filter for dieases detection	V.v.kumbhalwar,S.r. Dixit	Edge detection is first and essential step ir the field of image processing. Detected edges play a very important role such as image enhancement, object detection, focu area selection and many more
5	Design and implementation of gabor type filters	Sunitha m k,Harsha .b.k	The paper presents, a brief mathematical overview of the Gabor-type filters which involves floating point arithmetic operatio analysis results, the architectural details of the Gabor-type filter, and, the structure of the FPGA implementation is given.

III. SYSTEM IMPLEMENTATION
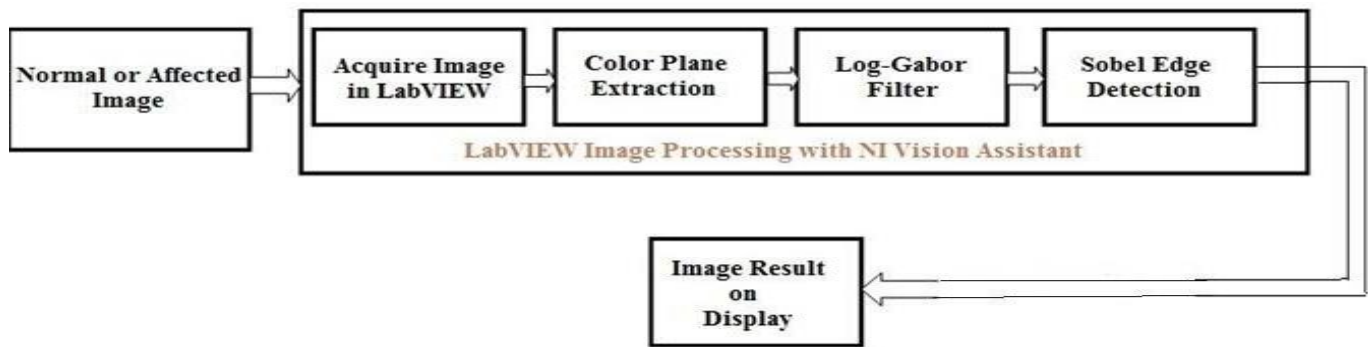
Fig. 1 Proposed disease detection model

Description of Proposed System

Platform used: LABVIEW SOFTWERE
Programming language: MATLAB

Normal or Affected Image:- in given design normal image or disease detected image is transferd to LabVIEW for image processing. IMAQ tool detect input image, acquire it for LabVIEW processing. Provide JPEG formatted Tonsillities image using input image tool which is used for provided path of image .The Imaqread file tool will read that image we will require some memory to save that image so we have used IMAQ Create tool

Color plane extraction: To convert color image into grayscale image here color plane extraction used. It improve the ridges of image. The result of color plane extraction left us with a grayscale image that gives bright intensities for strong edges, low intensities for weak edges, and gives black portion for no ridges . In image processing first RGB image converted in grayscale image with the help of color plane extraction. Color plane extraction extract one basic color from RGB image and at output grayscale image we found, Here mathlookup (exponential) and image thresholding function used for background   color   adjustment   After imageacquisitionpartLabVIEWapplysomebasicprocessingforfineresultand for better noise reduction so that resultant output will be accurate.

Log-Gabor filter: In signal processing it is useful to simultaneously analyze the spaceandfrequencycharacteristicsofasignal.WhiletheFouriertransformgives the frequency information of the signal, it is not localized. This means that we cannot determine which part of a (perhaps long) signal produced a particular frequency. It is possible to use a short time Fourier transform for this purpose, however the short time Fourier transform limits the basis functions to be sinusoidal. To provide a more flexible space-frequency signal decomposition several filters (including wavelets) have been proposed. The Log-Gabor filteris one such filter that is an improvement upon the original Gabor filter. Log-Gabor filter improve contrast ridges as well as reduce noise from images. ByusingLog-

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Gaborfilterwecanworkonmorethanoneoctavebandwidth.Filter used for noise reduction purpose from grayscale image.

When considering filters that extract local frequency information, there is a relationship between the frequency resolution and the time/space resolution. When more samples are taken the resolution of the frequency information is higher, however the time/space resolution will be lower. Likewise taking only a few samples means a higher spatial/temporal resolution, but this is at the cost of less frequency resolution. A good filter should be able to obtain the maximum frequencyresolutiongivenasettime/spaceresolution,andviceversa.TheGaborfilter achieves this bound. Because of this, the Gabor filter is a good method for simultaneously localizing spatial/temporal and frequency information.

The Log- Gabor filter does not have the same DC problem as the original Gabor filter. A one dimensional Log-Gabor function has the frequency response:

$$G(f) = \exp\left(\frac{-(\log(f/f_0))^2}{2(\log(\sigma/f_0))^2}\right)$$

F0 is the central frequency of the filter and affects the bandwidth of the filter. It is useful to maintain the same shape while the frequency parameter is varied.

Sobel edge detection :-

Here Sobel operator based edge detection technique used and extended it for real- time applications. Due to its property to counteract the noise sensitivity, Sobel operatoredgedetectionoverothergradientoperatorsareused.Thesobeloperator uses two 3×3 matrix parameter and kernels which are with the original image to calculate approximations of the derivatives one for horizontal changes in an image, and second one for vertical changes in that image. Sobel edge detection algorithm developed in LabVIEW for tonsillitis disease detection. Image acquisition tool is used for image detection and process purpose. File dialog consist total image processing parameter which proposed image preprocessing and filtering operation one of the most fundamental image analysis operations is edge detection. Edges are often vital clues toward the analysis and interpretation of image information, both in biological vision and in computer image analysis. Some sort of edge detection capability is present in the visual systems of a wide variety of Creatures, so it is obviously useful in their abilities to perceive their surroundings

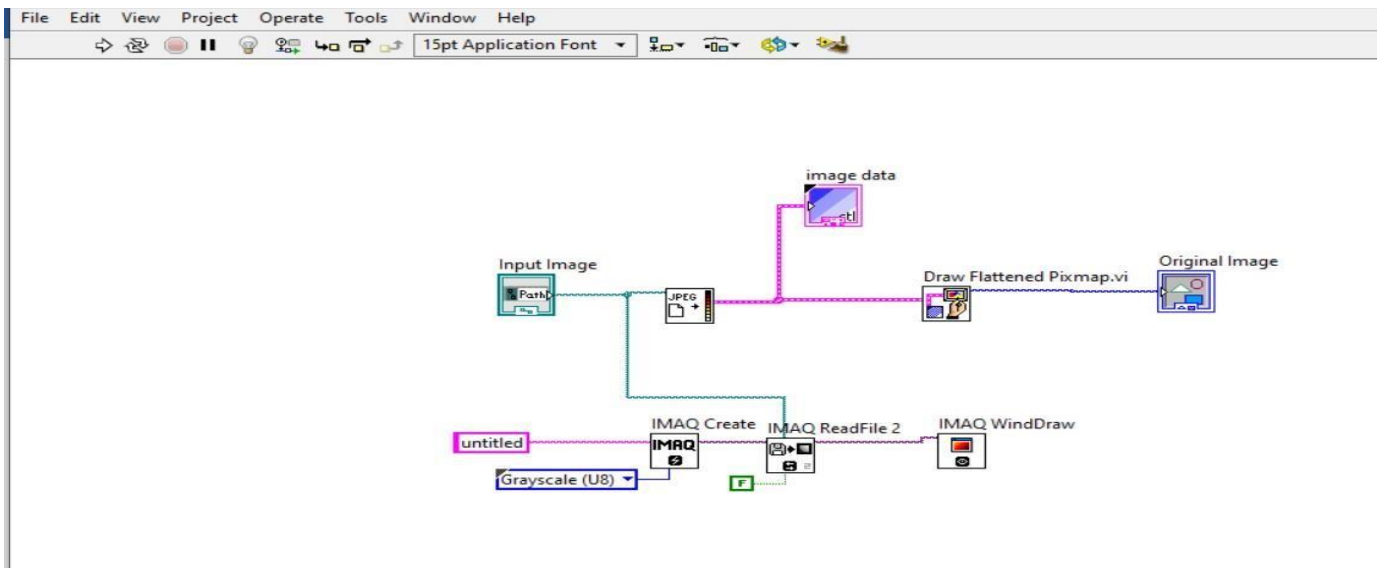IV. IMAGE ACQUISITION

Implementation image acquisition

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Fig. 2A implementation image acquisition
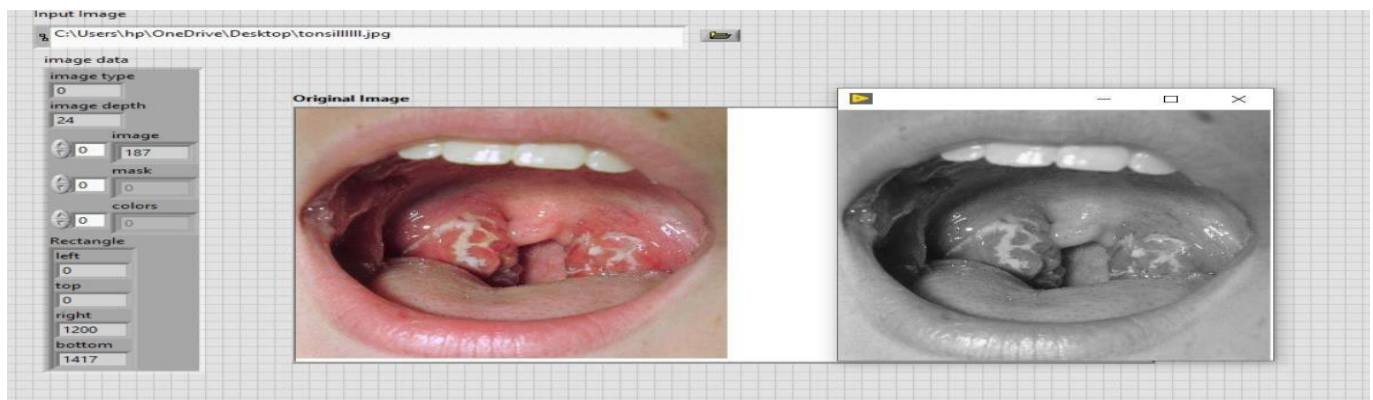
Result of Image Acquisition

Fig. 2B result of image acquisition

In the example presented in above fig 2A shows how to acquire a digital image in RGB and gray scale format using the IMAQ toolbox. In this case there are two important blocks: The first one is the IMAQ Create block located in Vision and Motion/Vision Utilities/Image Management, this block creates new image with a specified image type (RGB, Grayscale, HSL, etc.), the second block is the IMAQ Read Image which is located in Vision and Motion/Vision Utilities/Files/, the function oft his block is to open an image file which is specified previously in the file path of the block and put all the information of this opened image in the new image created by IMAQ create. In other words, in the example presented in Fig. 10 the tonsillllll.jpg is opened by the IMAQ Read Image and the information this image is saved in a new image called image Color that corresponds to a RGB (U32) image type. it is very simple to modify the image type of the system, in Fig.10 the image type is changed to Grayscale (U8) and the image is placed in image Gray.

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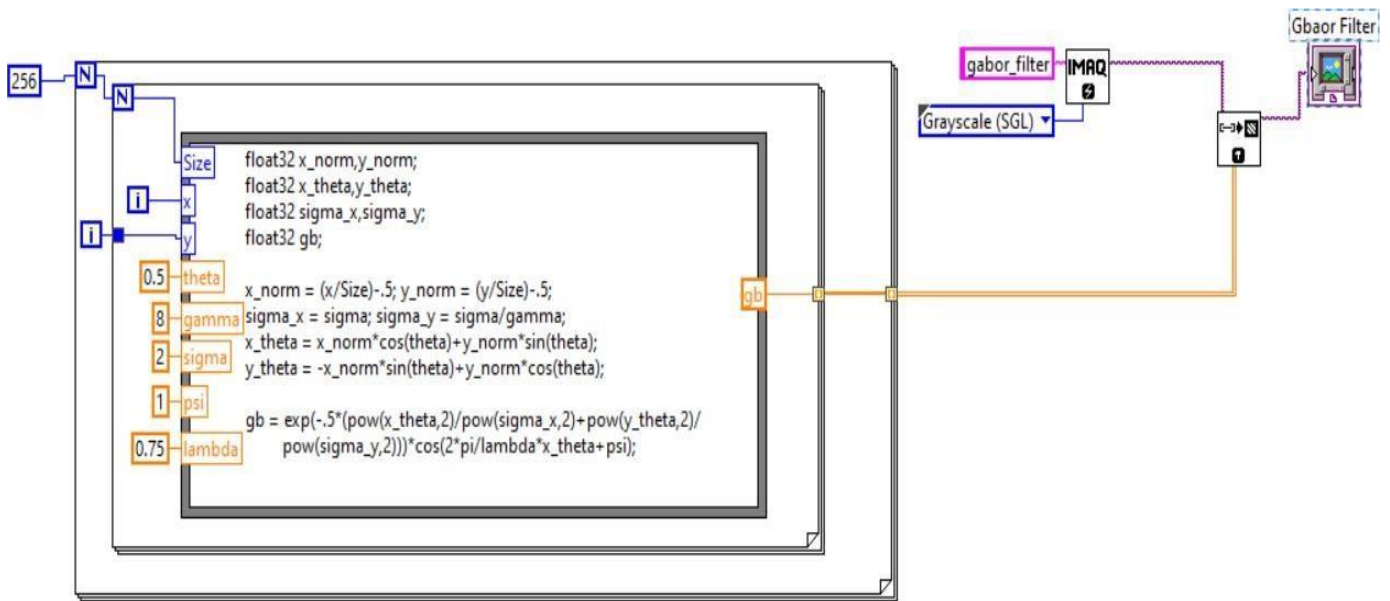
V. IMPLEMENTING LOG GABOR FILTER IN LABVIEW

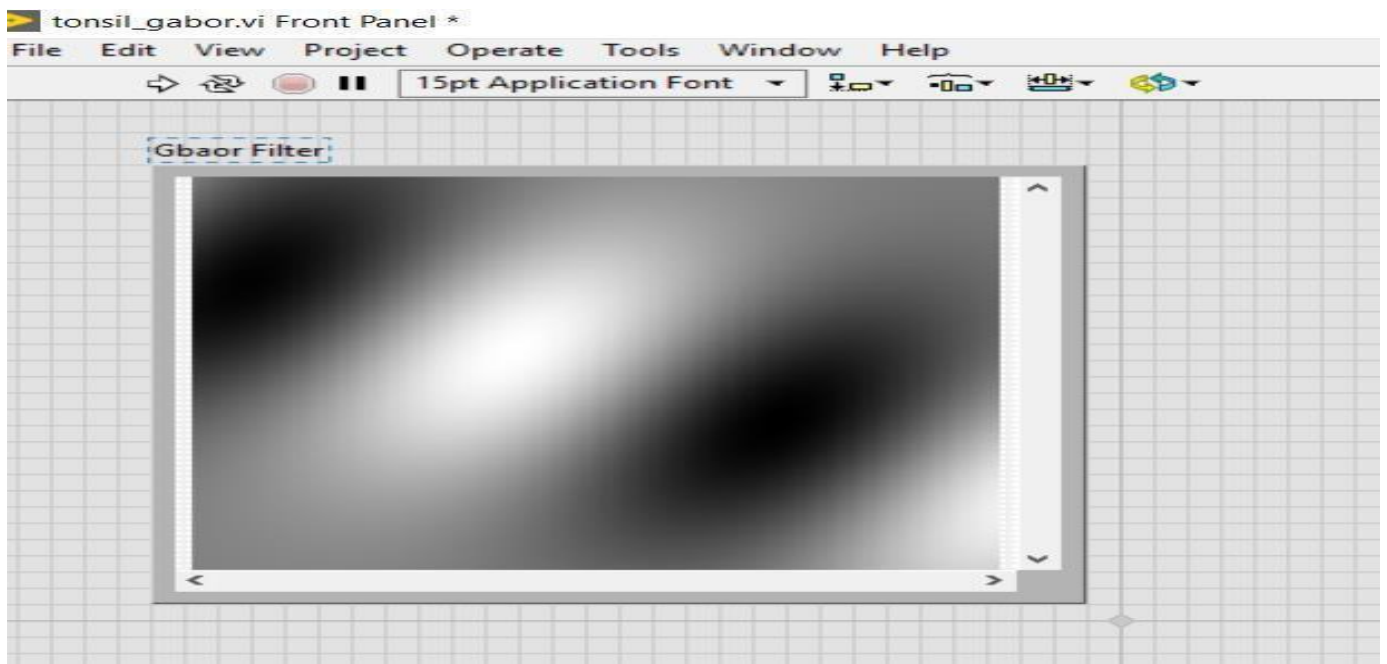Fig. 3A implementing log gabor filter in labView

Fig. 3B result of log gabor filter

In digital image processing, Gabor features are ideal for identifying the image pixels Gabor filters with different frequencies and with orientations in different directions have been used to localize and extract text-only regions from complex document images (both gray and color),since text is rich in high frequency components. Whereas pictures are relatively smooth in nature It has also been applied

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for facial expression recognition. Gabor filters have also 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. 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.
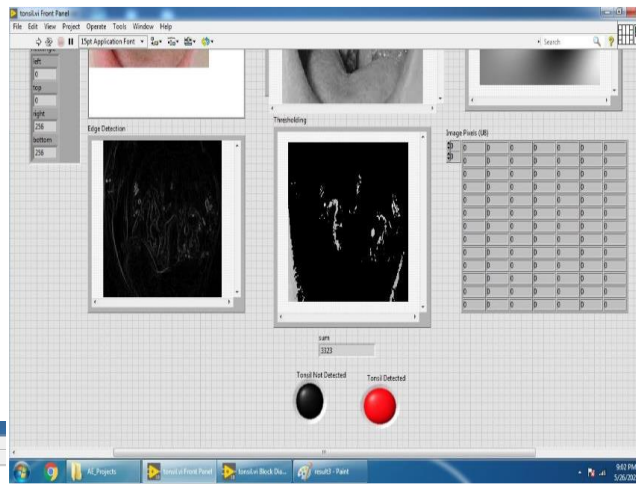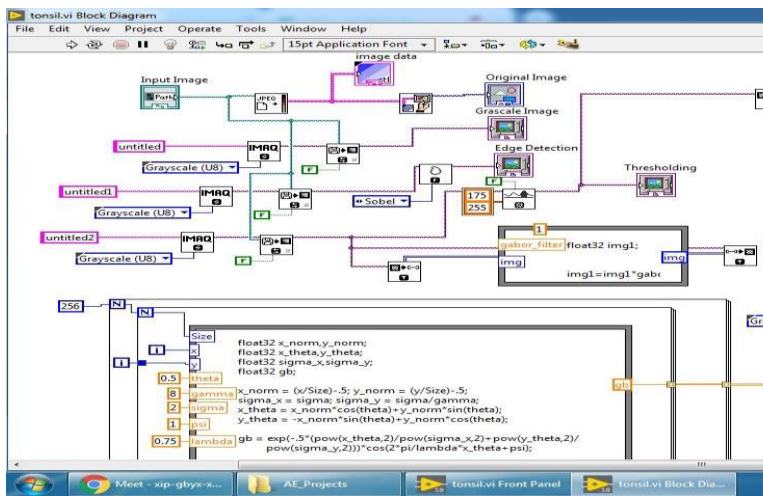
VI. RESULT

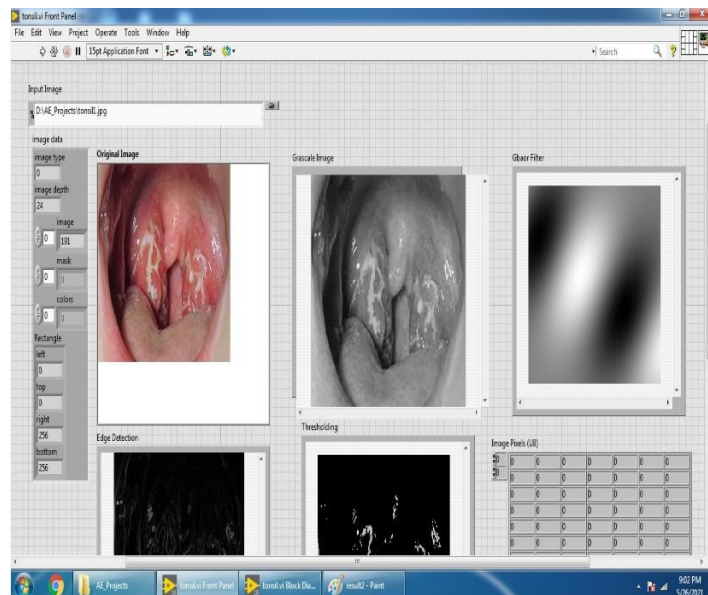Fig. 4a LabView design for disease detection

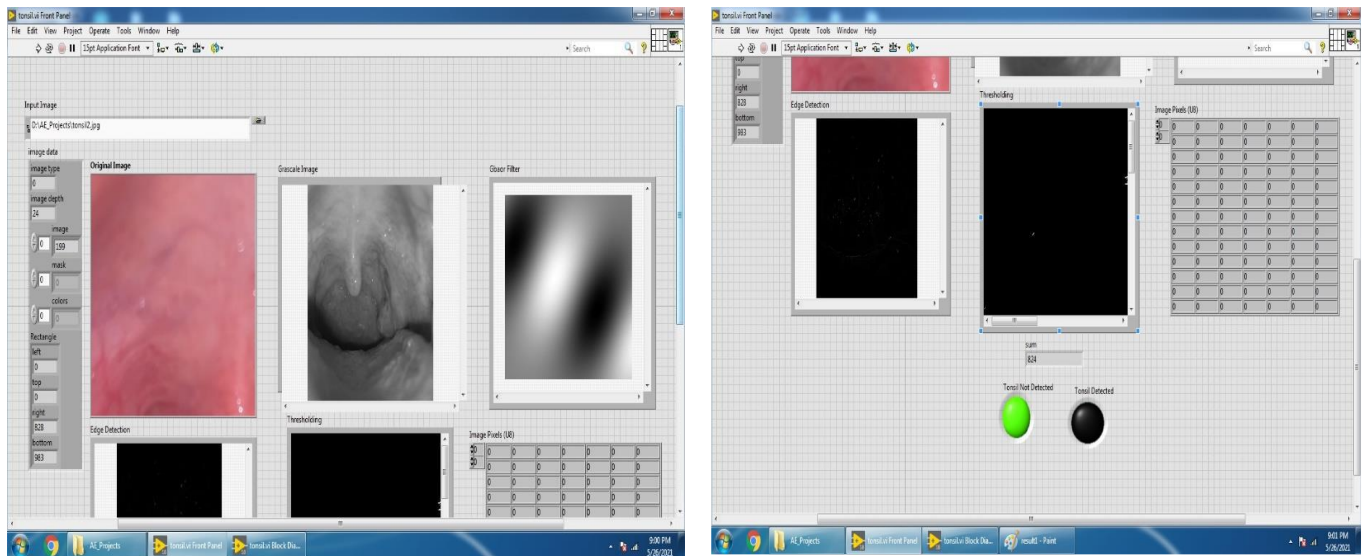Fig. 4b result of detected Tonsillitis disease

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Fig. 4**c** result of not detected Tonsillitis disease

Results of disease detection by using sobel operator, log gabor filter and with labview are shown above in fig 4 (a),(b) and (c).

VII.   CONCLUSION

In this we proposed the tonsillitis detection module with the help of sobel edge detection algorithm and log gabor filter. It conclude that the LabView is totally compatible for digital image processing. As LabView is graphical programming language it is easy to understand and also easy for implementation. In this project a concept of architecture for tonsillitis detection is proposed. It will improve data transfer rates, provide efficient noise reduction , less power consumption and require less memory storage. The gabor filter is an efficient tool to get all requirements as mentioned above. The processing time required for simulation is very less as compared to software simulation this concept will be helpful in detecting early stages of disease and cure it with proper treatment.

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