International Journal of Application or Innovation in Engineering & Management (IJAIEM)
Web Site: www.ijaiem.org Email: editor@ijaiem.org
Volume 6, Issue 5, May 2017 **ISSN 2319 - 4847**

Detection of Intensity Variations in Oropharynx

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ABSTRACT

Wheeling through the process of finding a device to examine the oropharynx(throat) which consists of the trachea and portion ofoesophagus as the infants are prone to infections concerned with the throat mostly due to seasonal changes and also due to lack ofimmunity in them. Over the last few years, the doctors across the globe have noticed a graphical increase in infections related to the throat, and have estimated that a little over 2 million people have been subjected to the throat related problems, mainly involving women and children. A recent study shows that every alternate patient who visit paediatricians suffer from throat related problems. In this paper we are developing a device wherein the transmitter module is interfaced with the camera which is used for monitoring the oropharynx, this device consists of light emitting diodes which acts as a source of light to scan the area required. In addition to this we develop an app on the users(doctor) phone in which the control unit is present functioning the camera to screen the image on the phone , and to control the switching action of the Led together recording the entire session.

Keywords- Oropharynx, Oesophagus, WIFI Module, Throat

1. INTRODUCTION

Over the last few years, the doctors across the globe have noticed a graphical increase in infections related to the throat, and have estimated that a little over 2 million people have been subjected to the throat related problems, mainly involving women and children. A recent study shows that every alternate patient who visit paediatricians suffer from throat related problems.The throat infection is frequent in children generally aged below five (years) due to factors such as lack of immunity to adjust to seasonal changes, deficiency of Iodine content in their food. Amidst various reasons that lead to throat infection like scarcity of thyroid hormone (Thyroid Hormone is produced by Iodine), the other major contributor is the cold environment (i.e., winter and rainy seasons).

However, the present measures to treat throat infections, in case of infants include the usage of Tongue depressors, Spatulas of various shapes and sizes and torch (light source) by the doctors to view the inner mouth a little beyond Uvula. On the other hand for adults various assessment tools such as Flexible fibre optic laryngoscope, Flexible fibre optic bronchoscope etc., are utilized to examine larynx and beyond.Considering infants, doctors have a tough time pacifying the child to access its mouth by the means of spatula or tongue depressors; it becomes more cumbersome when the child fails to cooperate. This type of assessment has several limitations such as inability to view the area beyond Uvula. Considering several research reviews, we can clearly understand that there is a necessity of a handy device or gadget that can capture visuals starting from interior of the mouth (which includes the oral cavity that can also help in dealing with teeth related issues such as cavities and vitamin deficiency) all the way down till larynx. This device will be recommendable as a better approach to deal with the oral examination pertaining to the child.

2. BLOCK DIAGRAM

The block diagram depicts the image processing of the captured image. Initially an image that is captured by the camera is to be processed so as to detect the abnormality in the interior region of the throat. A pre-processing is performed on the captured image using Matlab, the pre-processing procedure includes the reading of the image from the folder, resizing the same, converting it into gray scale and finding its pixel intensity. The pre-processed image is then segmented to reduce the computational time. The total pixel intensity of the 1st row in the image is found and it is divided by the number of pixels in that row, the same procedure is carried out for all the rows. Similarly the total pixel

intensity of the columns are also found using the exact method. This procedure is applied on both normal and abnormal images and their respective stem plots are compared to find the approximate values of the affected areas. Based on these approximate values, a threshold is applied to the image which displays only the affected areas (Region of Interest) in the throat while the rest of the region is blackened out. The entire computation is performed on different types of images such as RGB, Gray scale, Indexed image, bitmap image.

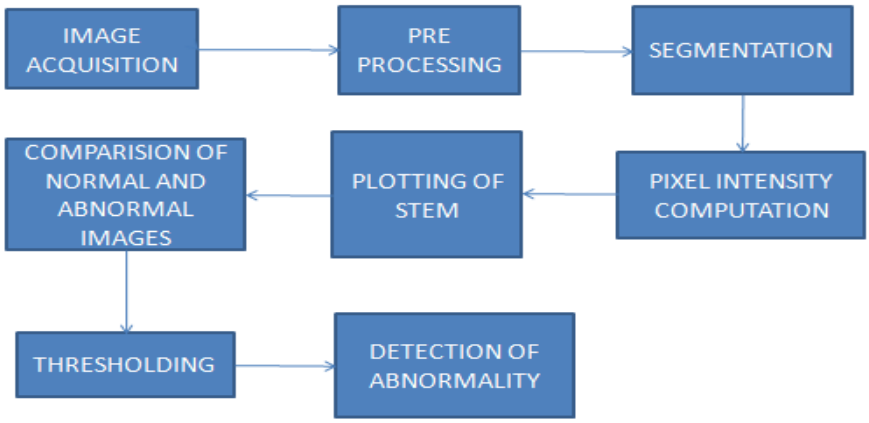

Figure 1: Block diagram of image processing

3. METHODS AND METHODOLOGIES

- The major principle of this project is to find out the affected portion of the interior region of the throat
- The project consists of an endoscopic camera that captures the image of the interior region of the throat.
- It also consists of an android application that uploads the image to the cloud, where the Matlab code is run. Thus, performing the image processing on the uploaded picture.
- The image processed picture is retrieved to the phone by the same mobile application that uploaded the captured picture.
- The stem of the Region Of Interest (ROI) is plotted of both normal and abnormal image.
- The comparison between the plots help detect the abnormality in the interior region of the throat. The below table indicates the variation in normal and abnormal throat regions.

Table 1: Intensity Indications

INTENSITY VALUE	TYPE
>10	ABNORMAL
<10	NORMAL

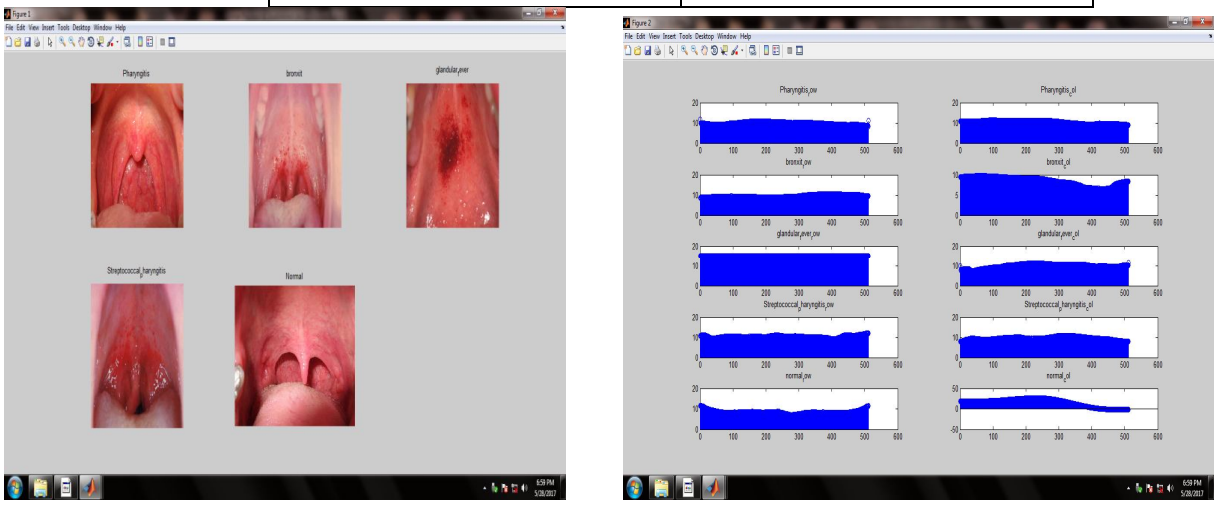

Fig: Comparison of images (Pharyngitis, Laryngitis ,sore throat, Glandular fever ,normal throat) with their corresponding intensities.

4. PROBLEM STATEMENT

- Project module can be used for recording and capturing images of the interior region of the throat with high clarity.
- Image processing is computed and performed on the cloud and its results are retrieved by the android application .
- Being a paediatrician is rewarding and challenging work, but how do they overcome the unique challenges that come with the job?
- When treating young kids and developmentally delayed patients who can't explain their symptoms, paediatricians must also be good detectives
- In order to overcome these problems, this design acts as a supplement to the existing instruments as we design the device in the shape of a lollipop which is a better approach to treat the infants thus making the work easier and for better examination of the inaccessible areas.

5. ADVANTAGES

- Cost effective, weightless and no delay in capturing images.
- Portable and safe.
- Live streaming of video can also be processed.

6. DISADVANTAGE

- If there is any damage to the camera, the entire system must be replaced.

7. CONCLUSION

In this paper, we presented the intelligent oropharynx throat examiner for infants by using the image acquisition and processing system. We set a combination of the image processing and thresh holding to detect the abnormality of the interior throat region. As a result, we are focusing in detecting the abnormality in the inner throat area. Future prospect of this system is to make the larger work space of throat examiner and to build more interactive system for remote operation which can control the camera position and orientation.

8. ACKNOWLEDGEMENT

This work is deemed incomplete without acknowledging the various individuals immensely instrumental in ushering in a great deal of effort, time and valuable guidance. I would like to thank our guide and Associate Professor Ms. Natya S of M S Engineering College, for providing vital suggestions, relentless support, imperative help and guidance throughout the course of our project.

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