International Journal on Applications of Information and Communication Engineering
Volume 1: Issue 2: February 2015 , Pages:50-54 www.aetsjournal.com

Squamous Cell Carcinoma Detection and Measurement by Image Processing

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***Abstract*—** Now a days image processing methods are widely used in medical science, to improve critical disease detection and fast treatment for recovery. Mainly this mechanism detects the disease as soon as possible and also find out the exact point of disorder and calculate the growth of this disease, especially in Squamous cell carcinoma in lower lip. Actinic keratosis which is 1/4 inch in diameter, is a pink or flesh coloured rough spot is one of the most important cause of squamous cell carcinoma, which is mainly grown in sun-exposed area. It is usually grow slowly and affects epidermis layer to dermis layer. Our proposed method focuses on five different modules. These methods are including in Image Acquisition module and respective Pre-processing (Image Clipping, Smoothing and Enhancement), Segmentation (Thresholding, Histogram Analysis), Filtering Phase and Edge Detection modules.

***Keywords*—** Image Processing , Squamous cell carcinoma, Image clipping, Image Acquisition.

I. INTRODUCTION

Squamous Cell Carcinoma(SCC) of the lip is an infiltrating and destructive malignant epithelial tumour, with high potential for lymphatic and/or blood metastasizes.Squamous cell carcinoma (SCC) is an uncontrolled growth of abnormal cells arising in the squamous cells, which compose most of the skin's upper layers (the epidermis). SCCs often look like scaly red patches, open sores,elevated growths with a central depression, or warts; they may crust or bleed. SCC is mainly caused by cumulative UV exposure over the course of a lifetime. It can become disfiguring and sometimes deadly if allowed to grow. An estimated 700,000 cases of SCC are diagnosed each year in the US, resulting in approximately 2,500 deaths.SCCs may occur on all areas of the body including the mucous membranes and genitals, but are most common in areas frequently exposed to the sun, such as the rim of the ear, lower lip, face, bald scalp, neck, hands, arms and legs. Often the skin in these areas reveals telltale signs of sun damage, such as wrinkling, changes in pigmentation, and loss of elasticity.Squamous cell carcinoma most commonly occurs on the lip, floor or roof of the mouth, tongue, soft palate, gums, and other areas of the oral cavity. Lip SCC is 15-30% of all SCC the cephalic extremity and 1/5 of the upper aerodigestive tract cancers. We conducted a prospective study in Dermatology Clinic from Craiova, between 2004-2010, with the aim of highlighting the epidemiological aspects, clinical and therapeutically evolution of patients with lip SCC.Lip SCC onset occurs frequently on premalignant lesions, especially on chronic keratoziccheilitis, pointing out the importance of early diagnosis and appropriate treatment for preblastomatouscheilitis. Early establishment of treatment of lip SCC offers the safety of therapeutic accomplishment. Option for surgical treatment of T0, T1N0M0 lip SCC is justified by the very good oncological, aesthetic and functional results in most cases. Surgical treatment of primary T0, T1 lesions, respecting the oncological surgery principles makes it not recommended to "filling in" the results with other therapeutic methods. Patients should be regularly examined for a period of at least three years to capture the moment of occurrence of metastases, or a possible relapse of a lip SCC. Actions are needed to educate the population about the risk factors and to detect precancerous lesions and SCC of rim in early stage. To present incisional biopsy importance as an effective clinical approach for the diagnosis of lip squamous cell carcinoma and actinic cheilitis malignancy as well as the professional's lack of knowledge on these two diseases.The physician and dentist must be aware of the main clinical features of lip squamous cell carcinoma so that they can establish its correct diagnosis and early treatment.

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II. EXPERIMENTAL RESULTS

Squamous cell carcinoma, or squamous skin cancer, is a type of skin cancer that develops from the flat, squamous cells that are the primary cell type that makes up the outermost layer of the skin, the epidermis. Squamous cells produce a protein called keratin, which helps to provide a protective layer for the rest of the body. As squamous skin cells die, they get pushed to the surface and form a tough, horny layer called the stratum corneum. These dead cells are continuously sloughed off and replaced by new cells.According to the American Cancer Society, approximately two out of every 10 non-melanoma skin cancers are squamous cell carcinomas. Non-melanoma skin cancers, which also include squamous cell carcinomas and a few other rare subtypes, are the most common form of cancer seen in the United States, with approximately 2.2 million cases each year. Lip cancer is one kind of oral cancer or skin cancer and it is occurred mainly lower lip in case of 90% to 97%. The Proper cause or explanation of lip cancer is not sure, but more crucial factor is that long time sun shine UV-radiation which can totally damage the DNA skin cells

[1]. Another important point of Squamous cell carcinoma is that Human papilloma virus (HPV) infection, tobacco use, alcohol use; oral sex etc. In case of oral sex, HPV viruses may spread into the mouth area [2]. Squamous cell carcinoma is

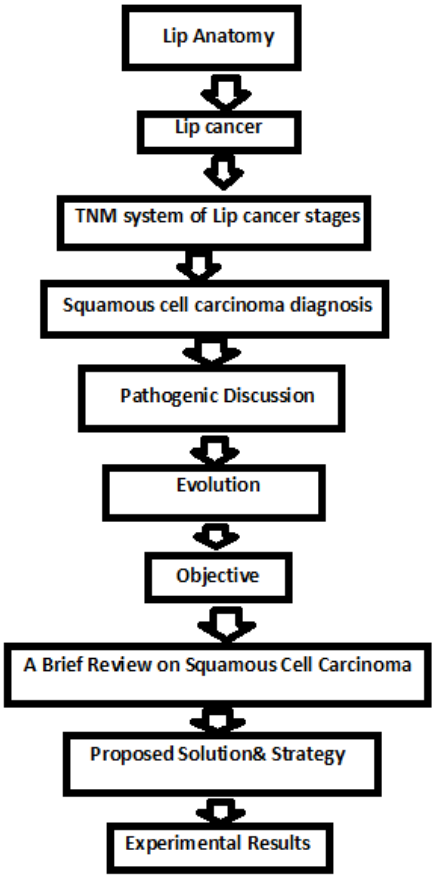

Figure 1: Flow-chart

mainly affected in white people rather than black people because secretions of leukoplakia, hyperkeratosis, and acetic changes are less than black people [3]. Yearly 10% to 15% lip cancers are occurred in United States because of thin pigmentation layer of lip surface. It is cleared to previous statistics that 90% to 95% of Squamous cell carcinoma is occurred in lower lip and less than 5% of upper lip. After studying 189 cases sins 1996-2000, [4] it is observed that among the people those who are affected by Squamous cell carcinoma, the 69% are male and 31% are female and 19% are died in this series. Potential squamous cell carcinomas are first examined visually. Your doctor or dermatologist will first examine the area, noting its size, shape, colour and texture, as well as any bleeding or scaling. Your doctor may also examine nearby lymph nodes to see if they are enlarged. At this point, if you are being seen by a primary care physician, you may be referred to a dermatologist who can perform more specialized tests and make an accurate squamous cell carcinoma diagnosis. A dermatologist may use a special microscope or magnifying lens to examine the suspicious spot more closely, a process called dermatoscopy. They may also take a digital or photographic image of the spot. The next step in diagnosing squamous cell carcinoma is to remove a piece of the suspicious growth for examination by a laboratory, where they will look for cancerous cells. In many cases, your doctor will remove the whole growth. During this procedure, your doctor will numb the area before removing a tissue sample. There are several different biopsy methods, but removal of the entire growth through an excisional biopsy is often sufficient to treat a squamous cell carcinoma.Other types of biopsies include a shave biopsy, in which your doctor shaves off the top layers of the lesion, and a punch biopsy, in which the doctor uses a special tool to cut a tiny round piece of the tumour, including deeper layers of the skin [1]. If you receive a squamous cell carcinoma diagnosis, your doctor may also perform some tests to determine whether or not the cancer has spread beyond the skin. Although squamous cell carcinomas do not typically spread, when they do the first place they usually spread is to nearby lymph nodes.Your doctor may feel to see if any lymph nodes are enlarged. They may also take a biopsy of any suspicious lymph nodes to see if they contain cancer cells.

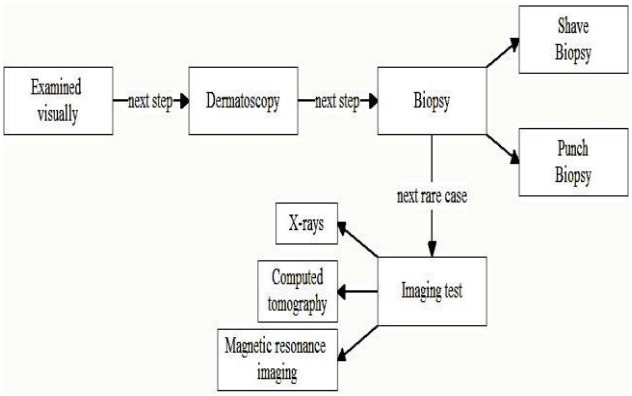

Figure 2: Squamous cell carcinoma diagnosis steps schematic diagram

III. PROPOSED DEVICE

A. Pictorial diagram of the proposed method is given below:

1. First images of affected area will be captured using a scanner.
2. Various kinds of pre-processing, image enhancement techniques should be applied on the captured images to reduce noise and improve the quality of images.
3. Using various kind of image processing techniques features of the captured images will be extracted and a decision will be made whether the captured images are benign or affected by disease.

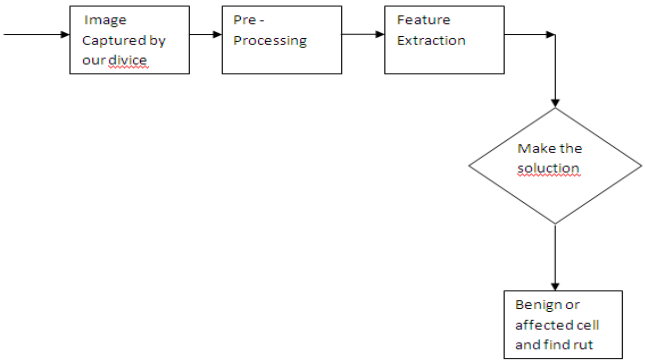

Figure 3: Pictorial Diagram

It is an optical device in which a camera is set to the backside of the device that captures the object image. It's mainly used for the Medical purposes. Suppose a picture of the lip is stored in that device. Next we apply this device for an injured patient whose lip is virus affected and continuously growing. In the medical system if we inject the medicine in the wounded place then it has been shown that it requires a long time than if we inject at the root of the wounded place.

That's why we scan a wounded virus affected lip and want to determine how much progressing has been occurred. This depth determination depends on the comparison between the Histogram of the original image and the injured image.

Histogram is a plot of the number of the pixels vs. pixel range. There is a huge difference of the line segment in the histogram curve.

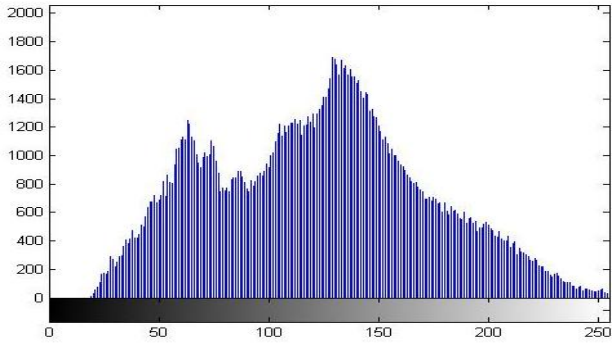

Figure 4: Injured Image Histogram

In *figure 1* pixel variety ranges in between 70 to 200 where in the injured image histogram (*figure 2*) it varies in the range between 30 to 200. The number of the pixels value for the original image decreases in the injured image which helps to determine the depth of the injured place.

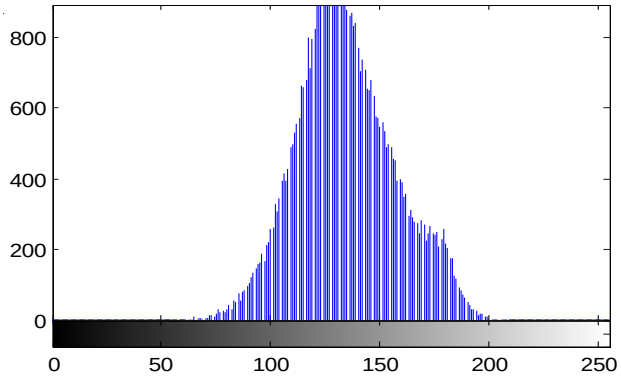

Figure 5: Original Image Histogram

B. Ordinary Lip

Scan the ordinary lip with scanner

Figure 6: Ordinary Lip

C. Ordinary Lip Graph

Found the ordinary graph make in the device automatically this is a one type of histogram

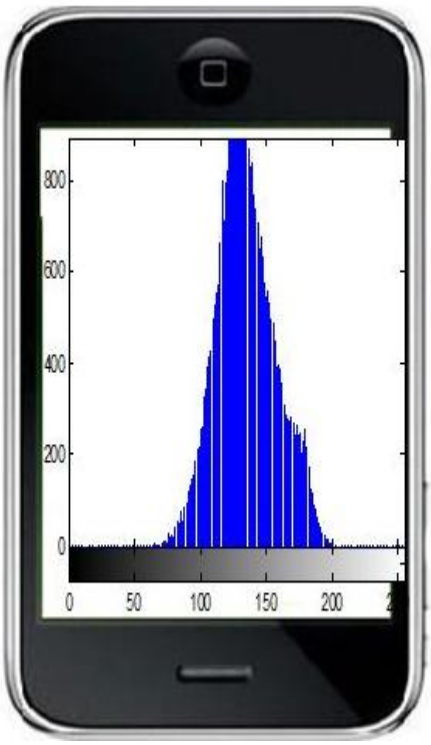

Figure 7: Ordinary Lip graph

D.Problem Lip

Scan the problem lip with scanner then again scan

Figure 8: Problem Lip

E. Problem Lip Graph

Found the problem graph make in the device automatically this is a one type of histogram so watch previous histogram . and match both histogram and found the problem what is it .we found the depth or rut of the problem area

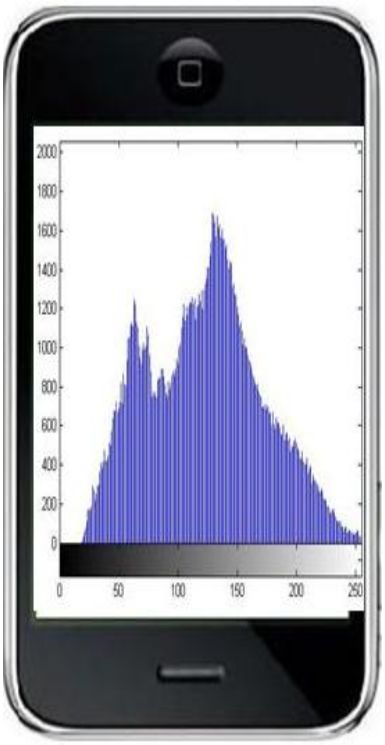

Figure 9: Problem Lip Graph

F. Final

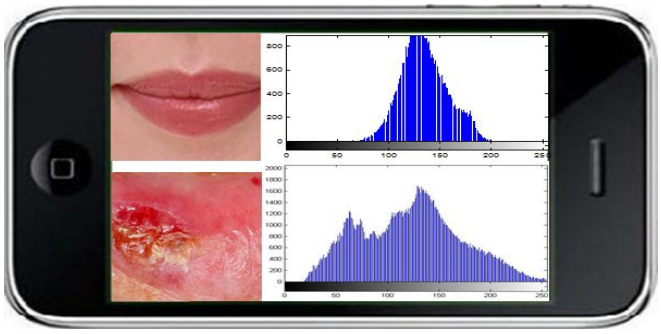

Figure 10: Final Graph

Found the ordinary graph make in the device automatically this is a one type of histogram

Here we use a scanner type device .This device is used for scanning the perfect lip and store it in device memory and we have found a graph in our device

After that ,when the problem occur in same person in lip whose fresh lip are store in our device then again we scan the lip then problem found and again another graph found .This graph and previous graph are changed . we found the problem on scan and found the length of the or depth of the problem

and found the rut the help of this graph .If we found the root then solve the problem quickly .

IV. Conclusion and Future work

We see that Squamous cell carcinoma is now a common disease and using image processing we identify the disease stages. After using Histogram analysis and filtering technique we get better result for detect the disease. After using Sobel gradient algorithm, it is indicated that this approach is more valuable. In future to get more accurate result we will use clustering method or Marker-control watershed algorithm. Also we will dedicate our future works that is developing a web based application. In this application patients upload there disease affected lips and gets instant result that their lips are normal or squamous cell affected lips or minor other lips disease. Another future work is that, now a day's android application is more useful so we try to develop an android application in this subject matter.

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References

[1] http://www.cancercenter.com/squamous-cell-cancer
[2] http://www.localhealth.com/article/lip-cancer/causes
[3] A. Kutluhan, M. Kiris, Z. Kaya, E. Kisli, V. Yurttas, M. Içli and M. Kösem[2003] Squamous Cell Carcinoma of the Lower Lip and Supra-Omohyoid Neck Dissection, PP. 304-308
[4] Egils Kornevs, Andrejs Skagers, Juris Tars, Andris Bigestans, Gunars Lauskis, Olafs Libermanis [2005] 5 year experience with lower lip cancer.
[5] http://cancer.stanford.edu/skincancer/squamous_cell_carcinoma/staging.html
[6] Naren N.Venkatesan, MD Raghu Athre, [December 2011] Lip Cancer and Reconstruction.
[7] VIRGIL PATRASCU, RALUCA CIUREA, Lip Squamous Carcinoma - Epidemiologic, Clinical, Evolutive and Therapeutical Aspects.
[8] J. Suryatenggara, B.K. Ane, M. Pandjaitan and W. Steinberg [2009] Patternrecognition on 2D cervical cytological digital images for early detectionof cervix cancer, pp. 257-262.
[9] H. S. Wu and J. Barba [November 1994]An algorithm for noisy cell contour extraction via area merging, vol. 38, pp. 604-607.
[10] J. M. Sharif, M. F. Miswan, M. A. Ngadi, Md Sah Hj Salam, Muhammad Mahadi bin Abdul Jamil [February 2012]Red Blood Cell Segmentation Using Masking and Watershed Algorithm: A Preliminary Study, in 2012 International Conference on Biomedical Engineering (ICoBE), pp. 27-28.
[11] Prasanna G. Shete, Dr. Gajanan K. Kharate And Sanket C. Rege [November- 2012]Breast Cancer Cell Detection Using Digital Image Processing,Vol. 1 Issue 9.
[12] Pornchai Phukpattaranont and Pleumjit Boonyaphiphat, Segmentation of Cancer Cells in Microscopic Images using Neural Network and Mathematical Morphology.
[13] Anita Chaudhary, Sonit Sukhraj Singh [February 2012]LUNG CANCER DETECTION USING DIGITAL IMAGE PROCESSING, Volume 2, Issue 2.
[14] Thanatip Chankong, Nipon Theera-Umpon, Sansanee Auephanwiriyakul [2009] Cervical cell classification using Fourier transform,ICBME 2008, proceeding 23, pp. 476-480.
[15] Vipin Kumar Jain, Dr. Ritu Vijay,Lungs Cancer Detection from MRI Image Using Image Processing.
[16] Bustanur Rosidi, Noraini Jalil, Nur. M. Pista, Lukman H. Ismail, Eko SupriyantoTati L. Mengko, Classification of Cervical Cells Based onLabeled Colour Intensity Distribution.
[17] Zhi-Hua Zhou, Yuan Jiang, Yu-Bin Yang, Shi-Fu Chen, Lung Cancer Cell Identification Based on Artificial Neural Network Ensembles
[18] Basim Alhadidi, Mohammad H. Zu'bi and Hussan N. Suleiman [2007] Mammogram Breast Cancer Image Detection Using Image Processing Function,PP. 217-221.
[19] Hossein Ghayoumi Zadeh, Siamak Janianpour and Javad Haddadnia [February 2013] Recognition and Classification of the Cancer Cells by Using Image Processing and LabVIEWVol.5, No.1.
[20] http://ijournals.in/ijshre/wp-content/uploads/2014/03/IJSHRE-2333.pdf
[21] http://en.wikipedia.org/wiki/Smoothing
[22] http://www.cs.uu.nl/docs/vakken/ibv/reader/chapter10.pdf
[23] http://www.cse.usf.edu/~r1k/MachineVisionBook/MachineVision.files/MachineVision_Chapter4.pdf