An Approach for Skin Cancer Diagnosis using Retinex Enhancement Techniques

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Abstract— In recent years there has been a dramatic increase in the prevalence of skin cancer worldwide. There has been a huge amount of research literature on skin cancer especially in the last 10-15 years. There is no doubt that this is in direct relation to the increases in prevalence of the disease on a worldwide basis. Australian and American research has led in the field and again it is probable that this has been due to the increase in rates of skin cancer in those countries. This paper provides a comprehensive review of the existing international literature in the area. The skin protects against heat, sunlight, injury, and infection. Skin also helps control body temperature and stores water and fat. Skin cancer is the most common type of cancer. It usually forms in skin that has been exposed to sunlight, but can occur anywhere on the body. Skin has several layers. Skin cancer begins in the epidermis, which is made up of squamous cells, basal cells, and melanocytes. There are several different types of skin cancer. Squamous cell and basal cell skin cancers are sometimes called melanoma skin cancers. Nonmelanoma skin cancer usually responds to treatment and rarely spreads to other parts of the body. Melanoma is more aggressive than most other types of skin cancer. If it isn’t diagnosed early, it is likely to invade nearby tissues and spread to other parts of the body. The number of cases of melanoma is increasing each year.

Keywords—: Skin cancer, diagnosed, self-examination, radiation, large proportion, Health System.

I. INTRODUCTION

Primary prevention and early detection continue to be of paramount importance in addressing the public health threat of skin cancer. The aim of this systematic review was to provide a comprehensive overview of the prevalence and correlates of skin cancer-related health behaviors in the general population. To achieve this aim, 91 studies published in international peer-reviewed journals over the past three decades were reviewed and synthesized. Reported estimates of sunscreen use varied considerably across studies, ranging from 7 to 90%. According to self-report, between 23 and 61% of individuals engage in skin self-examination at least once per year, and the documented prevalence of annual clinical skin examination ranges from 8 to 21%. Adherence to sun protection and screening recommendations is associated with a range of factors, including: female gender, sun-sensitive phenotype and greater perceived risk of skin cancer, greater perceived benefits of sun protection or screening, and doctor recommendation for screening [1]. The literature suggests that a large proportion of the general population engage in suboptimal levels of sun protection, although there is substantial variability in findings. The strongest recommendation to emerge from this review is a call for the development and widespread use of standardized measurement scales in future research, in addition to more studies with a population-based, multivariate design. It is also recommended that specific targeted interventions are developed to increase the prevalence of preventative and early intervention behaviors for the control of skin cancer[2]
Figure 1: India Rising Cancer Cases Straining a Health System.

The Skin Cancer Foundation receives many questions about sun protection and skin cancer prevention. The safety of certain sunscreen ingredients, the link between indoor tanning and skin cancer, and the role of vitamin D are among the most popular and debated subjects for our readers and members of the media [3]. Here, we share our positions on some common controversies. Our position statements are supported by scientific research that has been published in medical journals after review by experts in the field. We’ve include references to relevant studies and articles, which you can find under “Related Reading and Evidence-Based Research Studies.

II. RELATED WORK

A survey revealed that males were nearly 1.5 times less likely than females to limit their sun exposure during peak hours. In another study, the multivariable analysis indicated that females reported more frequent use of sunscreen compared to males. These gender differences may be attributable to higher knowledge regarding skin cancer and greater perceived susceptibility among females compared to males [4]. Age-related discrepancies were also noted in the literature. As discussed above, older males are more likely to wear protective clothing, and another study revealed that older patients are more likely to avoid the mid-day sun. Employed patients were less likely to engage in sun protective behaviors, which may be due to the confounding variable of age, as those in the workforce tended to be younger, as well as more susceptible to societal pressures to maintain what is perceived as a “healthy” or “attractive” skin tan. Patients with other medical co-morbidities were less likely to change their behavior, perhaps due to focusing on other concerns that were perceived to be more pressing [5]. In light of these results, future skin cancer educational interventions may be more beneficial if targeted toward specific population subgroups of non-melanoma skin cancer patients. The use of indoor tanning facilities is widespread in India, and this impels consideration of the risk for adverse health consequences, particularly melanoma. Consideration is hampered by the relative recency of widespread use and the limitations of available studies [6].

III. OBJECTIVES

- Our research work is helpful in detection of cancer disease in early stage, better diagnosis, and provides preventive measure before the situation becomes critical.
- We are applying MSR – CR algorithm for enhancing the image quality so that we will to try find out better results for poor quality of images.
IV. IMPLEMENTATION

The proposed colour and contrast enhancement scheme is simulated on standard color images of improved skin lesion segmentation such as peppers and also on few real time images. Low contrast images were subjected to the retinex based enhancement techniques i.e. MSRCR and SSR. It was observed experimentally that SSR scheme is able to enhance to a much better extent than MSR. The image results obtained using SSR contains much higher image details such as edges and color information are preserved even under noisy conditions. Since there is no standard objective criteria for comparing the results subjective results are presented below [7]. The simulation work is based on MATLAB and it is therefore included the survey of research work where MATLAB based simulation is implemented [8].

By using of retinex theory we can improve the performance of our Skin cancer detection system [9]. When we acquire the image from any external source like digital camera, medical equipment, etc. Then some possibility occurs for image degradation which cause features cannot be calculated more precisely. To avoid this problem we adopt retinex theory which is based on lightness for improve the quality of image [10]. There are various retinex algorithms for image enhancement like single scale retinex, multi scale retinex, multi scale retinex with color restoration, etc.

The medical profession mentions the increasing epidemic of skin cancer but the unique nature of the visibility and accessibility of the skin allows easy and rapid assessment of potentially malignant lesions [11,12]. The only tools required are clinical acumen and a through knowledgeable approach. If more medical professional practice these strategies regularly and routine, a reduction in this epidemic is certainly an achievable goal. The work in the present thesis primarily focuses on retinex theory of skin lesion image enhancement[13,14]. The work reported in this thesis is summarized and also presents dimension and colour contrast of the work. The last section provides some scope for further development [15].

V. RESULT

The accuracy of the algorithm is determined by computing the minimum Euclidian distance between the white pixels situated on the border of the lesion in the ground truth image and the white pixels from the border of the image segmented by our algorithm[16]. To evaluate the errors we calculated the standard deviation, mean and RMS errors to measure the border displacement between the ground truth and the segmented skin images[17]. The experimental data is depicted and it can be noticed that accurate results were obtained for the first five-melanoma images, while the errors obtained for M6 image are larger [18]. This is motivated by the fact that the interface between the melanoma and healthy skin is very fuzzy and this made difficult to trace precisely the outline of the skin cancer [19].
VI. CONCLUSION

The Cancer Society estimates that more than 1 million new cases of basal cell and squamous cell carcinomas and approximately 55,100 new cases of melanoma will be diagnosed in the United States each year [20]. If the cancer is detected in its early stages, it has a 95% cure rate, but current detection methods cannot adequately detect the presence of cancer. These methods are painful and costly to the patient and are not guaranteed effective. Data analysis involved lengthy statistical procedures to extract image features. Overall classification accuracies ranged from 84.21-100% for pigmented lesions and 84.62-93.33% for non-pigmented lesions. The pigmented algorithm was able to identify all of the high risk lesions. Six lesions were incorrectly put into this category, but this is preferable over the problem of classifying high risk lesions as benign. The non-pigmented algorithm classified the high risk lesions in the testing set with over 85% accuracy. It is likely that the rate is lower due to an increased number of lesions. The next step for this technology is to establish a statistically significant database for different types of skin lesions as well as normal skin. Furthermore, physiological parameters responsible for diagnostic optical features need to be identified.

VII. FUTURE WORK

Future work is suitable for determining relative color skin lesion image enhancement and An Implementation of Standard Multi-scale retinex processing works is suitable for determining relative patterns of cancer disease and prediction of class label of new patients. This approach is also suitable for identifying relative patterns between attributes of some more diseases.

REFERENCES


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