A Review on Automated Wound Area Segmentation

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Abstract— chronic wound is becoming major threats for health and economy. The current technique for wound area measurement are the ruler method and tracing. Computerized wound measurement system can provide more accurate. The process of chronic wound healing is very complex and time consuming. It is a simple and more efficient method for wound area segmentation on super pixel classifier with color and texture feature and SVM classifier. Wound segmentation can be done with the help of different machine learning algorithms like SVM, DNN FSC etc.

Keywords: DNN, SVM classifier, FSC

I. INTRODUCTION

Chronic wounds, with an approximate annual care cost of $28-$32 billion are a major challenge of today skin pathology and dermatological science. Chronic wounds are wounds that takes more than 30 days to heal. During the process of normal healing, there is a balance of healthy proteins and enzymes in the wound that promote healing. Chronic wounds are more complex than acute wounds. The surrounding skin can become excoriated/macerated and fragile, this can lead to wound breakdown and extension of wound [1]416 records of injuries were located .of which 10.33% were chronic wounds. The median duration was152 days and the mean average was 311 days, with pressure ulcers taking longest to heal.

In this paper review of different techniques which help in. wound area segmentation from digital photography image was the subject matter of several researches

II. LITERATURE SURVEY

There has been a great improvement in image processing and machine learning techniques for the past years in many fields including medical field. Various methodologies which is used in wound area segmentation.

[2]Primary function of skin is to serve as a protective barrier against the environment .tissue injury cause the disruption of blood vessels and extravasation. Wound contraction involves a complex and superbly orchestrated of cells. Large and life threatening skin wounds may require the use of cultured autologous epidermal cell grafts or biological skin substitute.

The Author proposed to introduce a mobile an application based on dynamic contour model [3] Wound area measurement method based on segmentation of digital image. Here the segmentation is based on active contour model which identifies the wound border irrespective of coloration and shape. It is modified active contour model by changing the energy calculation. An energy minimizing discrete dynamic contour is implemented in segmentation. It give high accuracy of 90%.but this method is very sensitive to the viewing angle and lighting condition.

Here [4] M.K.Yadav, D.D.Manohar, G.Mukherjee, and C.Chakraborty proposed system to find out the best working color channel for wound area segmentation using color contrast. The wound assessment through appropriate color space selection.5x5 median filter and anisotropic diffusion were used for the noise reduction and color homogenization respectively. Color space were compared based on contrast between wound and non-wound region. Db and Dc color channel used to segment the wound area .Wound segmentation algorithms: 1. K mean clustering algorithem, 2.fuzzy c algorithm. This method have important implication to field of clinical evaluation and diagnosis chronic wound. But comparatively low accuracy.

The author is used semi-automated method based on fuzzy spectral clustering was used. The fuzzy spectral clustering (FSC) [5] is used for effective delineation of wound region. The fuzzy measure is used to construct similarity matrix Here grey based fuzzy for similarity measure to segment the chronic wound image using spectral clustering. It is a two stage SVM based system for wound area determination. SVM is used to classify various tissue. The main drawback is it need an additional imaging device to capture the wound image.

The papers [6] [7] is based on the deep learning techniques .but it need high computational power. [6] The manual method is loss of time and labor. This paper presents composite model of wound segmentation. The skin and wound segmentation detection algorithm designed in the paper to highlight image feature. After the preprocesses image are segmented by DNN (deep neural networks). There is a drawback that is non skin background may be misjudged to skin.

C.Wang, X. Yan, M. smith, K.ochhar, M.Rubin, S.M Warren, J. Wrobel, and H .Lee proposed ConvNet feature [7] it is based on a large scale wound data base demonstrate the effectiveness and reliability of the proposed system. Which is followed by some procedure 1.wound segmentation and surface area estimation 2.wound infection detection 3.healing progress prediction. This proposed system ConvNet feature that can segment wound image in an end to end cycle.

In [8] this paper is to provide a proof of concept tool for segmenting chronic wound and transmitting the results as instructions and coordinate a bio printer robot and thus facilitate the treatment of chronic wounds. Images of the wound is taken by a camera with high resolution and by using segmentation measurement of the wound is taken. Segmentation methods include edge detection. Region growing, livewire, texture segmentation etc. This study is the first to perform wound bio printing based on image segmentation. It is also compares several segmentation methods used for this purpose to determine the best.

Topu Biswas, Mohammad Faizal Ahmad Fauzi. Proposed efficient method for wound area segmentation based on superpixel classification with color and texture feature and SVM classifier [9]. Here attempted a supervised machine learning approach with color and texture feature.

Here SLIC super pixel algorithm is used., grouped wound and skin superpixels in the same class (named as "skin" class) and the background is in another class (named as "background" class). So a total of 24997 superpixels grouped skin class and 224741 superpixels in background class which is classify pixel one of three class wound, skin, and background. SVM is used to separate background from skin and wound. In second stage, used to separate skin from wound. For skin superpixel classification the classification result for only color feature seems good but overall fusion of color and texture feature perform best. The overall accuracy for skin classification 95.0% using fusion of color and texture feature.

This method is very simple and computationally efficient. The accuracy achieved for classification and segmentation seems promising compared to other methods

The accuracy achieved for classification and segmen-tation seems promising compared to other work available in literature.

III. Conclusion

Most of the methods discussed above require either high computational power, conditional image capture, partial human involvement. This paper discusses various methods for segmentation and measurement of chronic wound. But most of the methods discussed above require either high computational power, conditional image capture, partial human involvement. Some of methods misjudged non skin background to skin. Proposed a fully automated wound area segmen-tation based on fusion of color-texture feature. It is comparatively very simple. This system can be make more effective by adding more enhanced set of data more color and texture feature.

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