ABSTRACT

For efficient surveillance of the wounds remotely in telemedicine environments, a system based on colour image processing was designed to replace visual examination by clinicians with automatic analysis of wound healing status. The Wound Image Analysis Classifier (WIAC) system design enables reproducible and standardized results required in the analysis of the wound. The present work focuses on monitoring of wound remotely by uploading wound images to the doctors and to avail treatment for the wound from a far off location and analysing the status of the wound by using automation methods of various image processing techniques. This present work focuses on developing an efficient technique for monitoring healing status of the wound which considers the wound image as input and analyses the status of the wound by measuring the intensities of various colours present in the wound. Different methodologies being followed at present, which are dealing about the assessment of the wound by prevailing methods like contact, non contact, personal and remote observation were analysed. The segmentation of the validated wound images must be carried out toanalyse the severity condition of the wound and the data for extracting the wound area. Supervised and unsupervised are the two types of image segmentation techniques and this work focuses on unsupervised techniques only.
A novel transformation technique called colourlet transform used for denoising the wound which is the basic step in preprocessing stage of a classifier. The denoising process of an image is performed to improve the quality of an image using denoising technique by implementing colourlet transformation technique. Various traditional transforming techniques like wavelet, curvelet, ridglet are used for denoising an image. The performance metric PSNR is used to compare the transform techniques along with novel approach called Colourlet Transformation Technique.

The present study investigates the performance of two major filtering methods implemented for wound image segmentation and the first one under study is using Gabor Filters. During the usage of the first method the different textures available in the wound image is used for the segmentation of the image. This entails the generation of a large number of two dimensional Gabor Filters called a Filter Bank. The next step is to filter the concerned image with the use of filter bank and immediately the process of feature extraction is guaranteed. Finally based on the extracted features from the wound image the clustering and the segmentation of the image is performed. Alternatively kernel graph cut is also explored in the segmentation of the wound image, and a variety of features such as colour, intensity, pixel relationships, texture vectors and spatial location of pixels were used for the segmentation of the wound image. This method involved in the minimization of a
assessment area containing the original data term which allusions the wound image data transformed by means of a kernel function.

In the present study, many classifiers like K-NN and Fuzzy have been implemented and made a comparative study to analyse the best classifier. The differentiation among pressure, diabetic and venous ulcer wounds are performed by these classifiers. The major classification is internal and external wounds, the changes involved in chronic wounds which must be digitized frequently to analyse the changes and extracting the classifier decision based on classifying labels. The classifying labels decide which type of wound rather than the severity level of the wound.

An optimal set of techniques for a single view tissue classification and depth determination, have been proposed in this present work. Colourlet Technique proved to be more suitable for the air bubbles and hair removal on and around the wound and to improve low contrast wound region. From the segmented image, features are extracted and subjected to Support Vector Machine (SVM) Classifier, which classifies the segmented image into different types of the tissue observed in the wound. SVM and its subdivisions have been implemented to classify the wounds based on the type of tissues present in a wound. The present study discusses about the type of tissues based on the feature extracted.

A novel classifier Wound Image Analysis Classifier (WIAC) which classifies the wound based on the severity level of the wound. However a new classifier for classifying the wound not based on the type of wound
but on its severity level such as ‘0’ or ‘1’ or ‘2’ but the intensities of the tissue colour is very much required which resulted in the development of WIAC classifier. Wound Image Analysis Classifier is used for tracking a high performance wound healing status by performing a quantitative analysis on the status of the wound. A novel classifier to classify the wound images based on its severity level and applying transparent overlay techniques on the boundaries of the wound and reduces the severity of the wound in order to determine the severity level. The WIAC technique is very efficient when compared to SVM and K-NN on the measurement of classifier parameters like sensitivity, specificity, success rate and accuracy.