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A NOVEL METHOD FOR SEGMENTATION OF SKIN LESIONS FROM DIGITAL IMAGES

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Abstract - Melanoma is the deadliest form of skin cancer. Skin cancer at its early stages can be cured. But when it is not recognized at its early stages, it begins to spread to other parts of the body and can be deadly. So an early detection of skin cancer can save the patients. Due to the cost for dermatologists to screen every patient there is need for an automated system using images of their skin lesions using a standard digital camera. In existing system A novel texture-based skin lesion segmentation algorithm is used. A set of representative texture distributions are learned from an illumination-corrected photograph and a texture distinctiveness metric is calculated for each distribution. Next, regions in the image are classified as normal skin or lesion based skin. In proposed system SVM is used for classification. For that, the user will have to upload an image of skin disease.The image of skin disease is taken and it must be subjected to various preprocessing for noise eliminating and enhancement of the image. And the feature of the image is extracted by using GLCM algorithm. This image is segmented by using support vector machine. And finally fuzzy classification is used to detect the skin cancer. The proposed system has higher segmentation accuracy compared to existing system.

Key words: *Melanoma, segmentation, Classification, skin cancer.*

1. GRAY-LEVEL CO-OCCURRENCE MATRIX

Hussein Attya Lafta, Esraa Abdullah Hussein (2013) have proposed Design a Classification System for Brain Magnetic Resonance Image [1]. This method consist of three stages collection of images, feature extraction and classification . They are used gray-level co-occurrence matrix (GLCM) is used to extract features from brain MRI. These features are given as input to k-nearest neighbor (K-NN) classifier to classify images as normal or abnormal brain MRI .

Sibia Elizebeth Varughese, Mareena George, Jose Anand (2014) have proposed Content Based Image Retrieval Technique on Texture and Shape Analysis using Wavelet Feature and Clustering Model [2]. This paper discusses on the comparative method used in colour histogram based on two major methods used frequently in CBIR which are normal colour histogram using GLCM, and colour histogram using K-Means. Using Euclidean distance, similarity between queried image and the candidate images are calculated. The colour histogram with K-Means method had high accuracy and precise compared to GLCM.

Nitish Zulpe and Vrushsen Pawar(2012) have proposed GLCM Textural Features for Brain Tumor Classification [3]. In this research work, they used four different classes of brain tumors and extracted the GLCM based textural features of each class, and applied to twolayered Feed forward Neural Network.

K.Kalaiyarasi, A.Kabilar (2014) have proposed Image Retreival Based On Colour, Texture And Shape Analysis Using Genetic Algorithm [4]. This project presents the image retrieval based on its contents shape and texture analysis. The need for efficient content-based image retrieval has increased tremendously in many application areas such as biomedicine, military and web image classification and searching. For texture analysis, GLCM in hue and saturation color space is used. It provides the rules that gray scale of a pair of pixels appears in a certain distance away in a certain direction. The retrieval system has implemented for evaluating performance between shape and texture features.

Mohd Zulfaezal Che Azemin, Mohd Izzuddin Mohd Tamrin, Mohd Radzi Hilmi and
Khairidzan Mohd Kamal (2015) have proposed GLCM texture analysis on different color space for pterygium grading [5]. This study is aimed to find an optimal set of GLCM features extracted from different color space for pterygium grading. Mimicking human color perception has commonly employed RGB color space, which is shown in this paper is inadequate. GLCM features when extracted in various color space show better

representation of human perception (correlation coefficient > 0.6) compared to using RGB color space (correlation coefficient < 0.2).

2. SUPPORT VECTOR MACHINE

Rosy Kumari (2013) proposed an SVM classification an approach on detecting abnormality in brain MRI Images [6]. This method consists of two stages: feature extraction and classification. In first stage features are extracted from images using GLCM. In the next stage, extracted features are fed as input to SVM classifier. It classifies the images between normal and abnormal along with type of disease depending upon features. For Brain MRI images; features extracted with GLCM gives 98% accuracy with SVM-RBF kernel function.

Kyoung-jae Kim (2003) proposed Financial time series forecasting using support vector machines [7]. This paper explains that theSupport vector machines (SVMs) are promising methods for the prediction of nancial time series because they use a risk function consisting of the empirical error and a regularized term which is derived from the structural risk minimization principle. This study applies SVM to predicting the stock price index. In addition, this study examines the feasibility of applying SVM in nancial forecasting by comparing it withback-propagation neural networks and case-based reasoning. The experimental results show that SVM provides a promising alternative to stock market prediction.

Sujun Hua and Zhirong Sun have introduced a new method of protein secondary structure prediction which is based on the theory of support vector machine (SVM) [8]. SVM represents a new approach to supervised pattern classification which has been successfully applied to a wide range of pattern recognition problems, including object recognition, speaker identification, gene function prediction with microarray expression profile, etc. In these cases, the performance of SVM either matches or is significantly better than that of traditional machine learning approaches, including neural networks.

3. ANALYSIS OF SKIN CANCER AND SKIN DISEASE

Mahmoud Elgamal proposed (2013) Automatic Skin Cancer Images Classification. In this paper, an automated medical decision support system for skin cancer developed with normal and abnormal classes [9]. First the discrete wavelet transformation were applied on the images to get the feature vectors, as the dimensionality of the vectors quite large, one needed to reduce it through the principle component analysis. The resulting feature vectors have a few components; means, less time and memory requirements. Afterwards, those vectors were used for classification either with feed-forward neural network or k-nearest neighbor algorithm.

A.A.L.C. Amarathunga, E.P.W.C. Ellawala, G.N. Abeysekara, C. R. J. Amalraj (2015) have proposed Expert System For Diagnosis Of Skin Diseases [10]. This research paper presents a development of a skin diseases diagnosis system which allows user to identify diseases of the human skin and to provide advises or medical treatments in a very short time period. For this purpose, user will have to upload an image of skin disease to our system and answer questions based on their skin condition or symptoms. It will be used to detect diseases of the skin and offer a treatment recommendation. This system uses technologies such as image processing and data mining for the diagnosis of the disease of the skin. The image of skin disease is taken and it must be subjected to various preprocessing for noise eliminating and enhancement of the image. This image is immediately segmentation of images using threshold values. Finally data mining techniques are used to identify the skin disease and to suggest medical treatments or advice for users.

Nikhil J. Dhinagar and Mehmet Celenk, Mehmet A. Akinlar (2011) have proposed Noninvasive screening and discrimination of skin images for early melanoma detection [11]. This paper has described a non-invasive detection of skin cancer at the early stages using the optical scanners. Otsu's segmentation is used effectively to differentiate the three regions in the different skin samples representing normal, sun-tanned and early stages of Melanoma. Each of the regions in the segmented images is correctly identified during the experimentation. The further research is needed to analyze the segmented layers of the skin samples in order to detect and differentiate types of anomalies present in the three respective skin layers.

Do Hyun Chung and Guillermo Sapiro have proposed (2000) Segmenting skin lesions with partial-differential-equations-based image processing algorithms [12]. In this paper, a partial-differential equations (PDE)-based system for detecting the boundary of skin lesions in digital clinical skin images is presented. The image is first preprocessed via contrast-enhancement and anisotropic diffusion. If the lesion is covered by hairs, a PDE-based continuous morphological filter that removes them is used as an additional preprocessing step. Following these steps, the skin lesion is segmented either by the geodesic active contours model or the geodesic edge tracing approach. These techniques are based on computing, again via PDEs, a geodesic curve in a space defined by the image content.

Dr. J. Abdul Jaleel, Sibi Salim, Aswin.R.B (2012) have proposed Artificial Neural Network Based Detection of Skin Cancer [13]. In this paper the dermoscopy image ofskin cancer is taken and it is subjected to various pre-processing for noise removal and image enhancement. Then the image isundergone

image segmentation using Thresholding. There are certain features unique for skin cancer regions. Such features areextracted using feature extraction technique - 2D Wavelet Transform method. These features are given as the input nodes to theneural network. Back-Propagation Neural (BPN) Network is used for classification purpose. It classifies the given data set into cancerous or non-cancerous.

Harald Ganster, Axel Pinz, Reinhard Röhrer, Ernst Wildling, Michael Binder, and Harald Kittler (2001) have proposed Automated Melanoma Recognition [14]. In this paper a system for the computerized analysis of images obtained from ELM has been developed to enhance the early recognition of malignant melanoma. As an initial step, the binary mask of the skin lesion is determined by several basic segmentation algorithms together with a fusion strategy. A set of features containing shape and radiometric features as well as local and global parameters is calculated to describe the malignancy of a lesion. Significant features are then selected from this set by application of statistical feature subset selection methods.

Table -1: Comparison table

S.NO	PAPER	ALGORITHM USED	PROS &CONS
1	Automatic skin cancer images classification [9].	Feed-forward neural network or k-nearest neighbor algorithm.	**Pros:** Very simple implement-ation **Cons:** Lazy learner.
2	Expert system for diagnosis of skin diseases [10].	Watershed segmentation.	**Pros:** The union of all the regions forms the entire image region. **Cons:** Over segmentat-ion and sensitivity to noise.
3	Non invasive screening and discrimin-ation of skin images for early melanom-a detection. [11]	Optimal histogram-based segmentation and boundary tracing.	**Pros:** Computati-onal efficiency. **Cons:** It may be difficult to identify significant peaks and valleys in the image.
4	Segmenting skin lesions with partial-differential-equations-based image processin-g algorithm-s.	Geodesic active contours model or the Geodesic Edge tracing approach.	**Pros:** Active contour are handled implicitly during the curve evolution. **Cons:** Contour cannot split automatically. This makes recognition of multiple objects difficult.
5	Artificial Neural Network Based Detection of Skin Cancer	Thresholding	**Pros:** Simple to implement **Cons:** No guarantees of object coherency may have holes.
6	Automate-d Melanom-a Recogniti-on	k-nearest neighbor algorithm.	**Pros:** Very simple classifier that works well on basic recognition problem. **Cons:** Lazy learner.

CONCLUSIONS

In this survey, many papers for skin cancer and skin disease analysis, svm algorithm, glcm algorithm are discussed. Different methods in different papers are compared to find the performanace of each method. By considering these techniques and comparison results, best method is chosen for the skin cacer analysis. In proposed system SVM is used for classification. The image of skin disease is taken and it must be subjected to various preprocessing for noise eliminating and enhancement of the image. And the feature of the image is extracted by using GLCM algorithm. This image is segmented by using support vector machine. And finally fuzzy classification is used to detect the skin cancer.

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