International Journal of Emerging Technology and Computer Science
ISSN: 2455-9954

Survey on Different Methods to Detect Melanoma Using Image Processing

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ABSTRACT

Malignant melanoma is the most hazardous type of human skin cancer and its incidence has been rapidly increasing. Early detection of malignant melanoma in dermoscopy images is very important and critical, since its detection in the early stage can be helpful to cure it. Computer Aided Diagnosis systems can be very helpful to facilitate the early detection of cancers for dermatologists. In this proposed, system uses a novel method for the detection of melanoma skin cancer. To detect the hair and several noises from images, pre-processing step is carried out by applying a bank of directional filters and therefore, Image processing method is implemented to fill in the unknown regions. System has tested on publicly available PH2 dataset in terms of accuracy, sensitivity, specificity. It is observed that good results are achieved using de duplication concept on features to avoid same feature or image in training and testing phase, hence proving the validity of the proposed system.

Keywords: melanoma, image processing, svm data

I. INTRODUCTION

The paper aims to make a comparative analysis on different tumor detection techniques, and results are made on the basis of parameters considered, so as to find the robust algorithm for tumor detection. The origination of the term cancer in (460-370 BC), is credited to the “Father of Medicine”, Greek Physician Hippocrates. However, having its earliest evidences as osteosarcoma (bone tumors) in fossilized human mummies in Ancient Egypt (3000 BC), cancer, in accordance with latest statistics is amongst the leading causes of deaths all over the world as it’s a life threatening disease. Cancer in living beings occur when the DNA, basis of genetic code of cell gets corrupted due to an exposure to chemicals, radiations, inheritance or viruses that lead to mutation in the genetics. The 19th century was the birth of scientific oncology when Digital Images began to be used for screening and early detection of tumor and its classification into malignant or non – malignant as shown in Table 1. The concept of the images, that aroused millions of years back has its roots in nature because of its origination since the existence of a source of light, today has become of great help to the experts in detection and accurate location of tumor sites in humans which was earlier difficult due to complex pathologies. The scope of this review is to address various image processing techniques being used for tumor detection and considering there pros and cons. On the basis of their pros and limitations it becomes relatively easy to detect tumor at a much early stage.

II. LITREATURE SURVEY

Automatic Diagnosis of Melanoma: a Software System based on the 7-Point Check-List: In 2010, G. Di Leo et al. shown new analytic system, the ”ELM 7 point agenda”, characterizes an arrangement of seven components, taking into account and texture parameters, which portray the malignancy of a lesion. It has been displayed as speedier and with the same exactness than the customary ABCD criteria in the determination of melanoma [1].

Moletest: A Web-based Skin Cancer Screening System: In 2011, Jonathan Black ledge et al.

proposed an online skin growth Screening Framework known as Moletest. Moletest depends on a procedure for actualizing applications that is worried with two key undertakings: The partial examination of a picture as far as its fractal structure and the fractal properties that describe that structure; the utilization of a fuzzy logic engine to characterize an item taking into account both its Euclidean and fractal geometric properties [2].

Automating Skin Disease Diagnosis Using Image Classification: In 2013, Damilola A. Okuboyejo et al. designed and modelled a system that will collate past Pigmented Skin Lesion (PSL) image results, their analysis, corresponding observations and conclusions by medical experts using prototyping methodology [3].

Border Detection of Melanoma Skin Lesions on a Single System on Chip (SoC): In 2013, Peyman Sabouri presented, a basic border detection algorithm developed based on ZYNQ-7000 SoC, using VIVADO High Level Synthesis (HLS) tool. They take the advantage of accelerating an embedded system design on a single SoC, which offers the required features for real-time processing of skin cancer images [4].

Automatic Detection of Melanoma Skin Cancer using Texture Analysis: In 2012, Mariam Sheha proposed a mechanized melanoma determination strategy linked to a dermoscopic image arrangement. The highlights that have been omitted based upon a low level co-event network (GLCM) and a Using Multilayer Perception Classifier (MLP). Two separate methods were suggested for the planning and testing process for the MLP classification: the optimized MLP and the standard MLP [5].

Comparison between Different Classification Methods with Application to Skin Cancer:
In 2012, the Yogendra Kumar Jain et al. focused on improving a diagnostic system for skin cancer which non-specialists could use to distinguish ordinaries from unusual cases as part of a general procedure. The method of progression involves defining and buying [6].

Melanoma Recognition Interpretable Assistive Diagnosis System: Messadi M in 2012. Et al. proposed a technique to interpret skin tumor order with the light of shape descriptors on a dermoscopic picture. Their work shows a fluffy rule-based melanoma classification. In order to find fluid rules that prompt proper classification, a versatile Neuro Fuzzy inference system is linked to a certain end target [7].

Segmentation and Classification of dermoscopic object with the aid of algorithms for machine learning: G.Subha Vennila and L.Padma Suresh suggested 2012 to detach organize and segment Dermoscopic image utilizing calculators for machine learning. Of starters, back game programs (BPN), RBF, Extreme Learning Machine (ELM) are used. Calculations are used [8].

SKINCURE: Innovative, Smartphone-based support application for early-detection and prevention: Omar Abuzaghleh et al. proposed an inventive and fully utilitarian, state-of - the-art mobile phone app for early detection and prevention of melanoma in 2013. The first segment is a continuous alert to help customers prevent skin smoldering caused by daylight. A new mathematical statement is presented along these lines, providing the perfect opportunity to skin to blow [9].

Feature Segmentation
As in lesion segmentation, feature segmentation also includes pre-processing, segmentation and post processing steps. Color, texture, shape, structure, relative size, location in the lesion etc. are some of the main attributes used in clinical feature segmentation [70]. In addition to their presence, distribution of a feature in the lesion area provides further diagnostic information. The steps involved in clinical feature segmentation are very similar to the lesion segmentation steps described in the previous section.

Feature pre-processing steps are largely feature-dependent. Pre-processing techniques such as color standardization/correction and correcting lighting variation are similar to the equivalent techniques used in lesion segmentation. Any method involving image enhancement, sharpening, blurring, color space transformation, frequency/space transformation, etc., would be dependent on the type of feature being segmented. A number of such pre-processing methods are rigorously investigated upon through many iterations to find the right combination that best suits the detection of the targeted feature. Similar analysis is performed to select the best color, texture or frequency channel. Either visual observation or annotated masks can be used for tuning/training in these steps.

Feature Generation and Classification
Predicting a lesion to be benign or malignant is a binary classification problem. In order to solve a classification problem, features or attributes that characterize the samples are required. In the problem of melanoma detection, some features can be collected clinically and some are generated using dermoscopy images. Lesion and feature segmentation are the preliminary steps in the feature generation process. Lesion-related morphological features such as estimated diameter (estimated because the images may be acquired at different magnification levels), symmetry, irregularity, eccentricity etc. can be calculated from the lesion border. Color and texture features related to the lesion can also be calculated from the lesion area; these can be referred to as global features. Various color channels can be used for this purpose. Because of the significance of various color distribution and texture around the lesion, clustering methods can also be used to divide the lesion into various regions and then color and texture features can be calculated from those regions separately. The lesion area may also be divided concentrically into various peripheral and central regions from which global features can be extracted.

There are very few publicly available datasets of dermoscopy images. Among them, PH2 and EDRA image databases are most commonly used by the research communities. Recently, the International Skin Imaging Collaboration (ISIC) has also created the ISIC Archive for the Melanoma project which is a large public database of dermoscopy images. The dermoscopy images from these databases can be used for the research, development and comparison of various algorithms for identifying melanoma.

III. CONCLUSION

Results of a survey on melanoma detection via image processing showed that we can make a distinction between normal and cancer lesions using features and we can also compare ostus with ostus modification. The modified ostus method works best for image segmentation, taking the less time. Future work could include increasing the size of the dataset and trying it on more images. To improve the precision, a particular machine learning algorithm is explored.

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