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Facial Recognition Approach using ABCD Algorithm for Cancer Treatment

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Abstract*: Malignant melanoma is one of the generally known cancers due to the changes in the skin behaviour that cause a drastic increase in numerous melanomas which is seen among many white-skinned people. To detect and classify skin lesions, we require a fast and reliable system. The face detection algorithms are used in which, an image dataset is formed and from that several images are tested for the presence of a face. When the face is present, the image is selected for further processing and separate features are detected. The presence of the face, along with two eyes, nose, mouth and lips are necessary for the face detection to work efficiently. A specific area of the face is selected as a test case and the skin irregularity is checked for abnormal features are present or not. An algorithm by the name Asymmetry, Border, Color and Dermatoscopic features (ABCD) is developed which will check the skin parameters and help figure out the presence of abnormal growth. The accuracy of detection will depend upon the clarity of the input image, the brightness and the sharpness. The later part of the project will stress the importance of data exports from the working data sets to a portable format.

***Index Terms*: Medical Imaging, Facial Recognition, ABCD Algorithm, Cloud Computing, Feature Selection**

I. INTRODUCTION

Skin cancer is a malignant tumor, which is considered to be the most common of all cancers that grows in the skin cells that is found among many white-skinned people around the world. The aim is to develop a system that is capable to spot the presence of a face from the input image and classify skin lesions with high accuracy, followed by storage of information in the cloud [1], [2].

II. RELATED WORKS

In this paper, various face detection and recognition methods are evaluated using various face datasets that are evaluated in terms of subjects, pose, emotions, race and light. [5].

In this paper, expressions of the faces are recognized by analyzing various face detection and feature extraction, and facial expression classification methods. During face detection, preprocessing is done to obtain the pure facial images, and then it is converted to a normalized image with all feature extractions in order to sense the feature points of the face and finally the expression are classified [6].

In this paper, Cohn-Kanade and, Informatics and Mathematical Modeling database were used to perform testing on the various feature points of the face [8].

In this paper, a novel cloud-based Facial Recognition (FR) methodology was proposed. The working of the proposed system applied to the task of Face Tagging in the context of social networks [7].

III. PROBLEM IDENTIFICATION

To take a random image and identify whether it contains a face or not, followed by detecting of the three distinct features such as two eyes and the nose, to crop a certain portion of the image and check for abnormal skin features.

A. Overview

In the proposed methodology, image processing techniques of skin lesions and image classifiers are used to categorize melanoma from benign pigmented lesions. The pre-processing sequence of the dataset are analysed to remove the noise and undesired structures of the color image. Then, based on the adaptive color segmentation technique, the images are segmented by localizing the suspicious lesions. Finally, the quantitative image analysis helps in measuring the series of candidate attributes which contains information that differentiate melanomas from benign lesions.

The pixel coordinates are then exported from MATLAB to Excel, from where they are uploaded to Cloud Services. Figure 1 shows the architecture design for the different stages of the procedure in face detection and processing of the data.

The process initiates by getting an input image in any form, within which the presence of a face is detected and after that a cropping function takes place and then followed by running ABCD algorithm to check if the skin abnormalities go beyond the threshold.

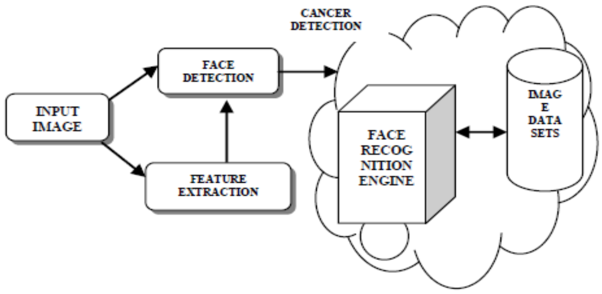

Fig. 1. Architectural Design of the System

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1) Asymmetry: Usually, moles or freckles are completely symmetrical and if a line is drawn through such spot, two symmetrical halves are obtained. But, in cases of skin cancer, such spots do not look same.
2) Border: A normal mole or spot with blurred and/or jagged edges.
3) Color: Usually, normal spots are of one color either light or dark mole but a mole with more than one hue that appear in various shades of tan, brown and black is actually needs to be examined by a doctor.
4) Dermatoscopic Features: This feature includes one-fourth inch or 6mm, it needs to be examined by a doctor.

B. Proposed Work

The work spans across seven modules from which input image is undergone through several steps for face detection, feature detection, image cropping, skin checking, pixel collecting, exporting and storing.

Image Input and Face Detection: A random image is selected as input from which the presence of a face should be checked. The criteria for this are that two eyes along with the nose and mouth must be present in the picture [3].

Fig.2. Image Input and Face Detection

Feature Detection: This step will decide the pass or fail criteria of face detection. The features to be detected are left eye, right eye, nose, mouth. When half of the face is missing, the detection will fail. It is mandatory that two irises must be present for a face to feature detection process [4].

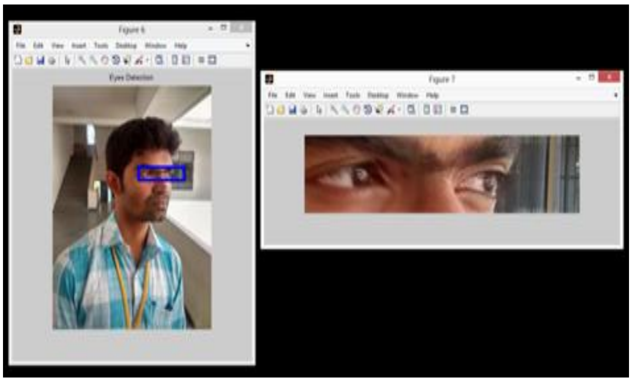

Fig.3. Eye Detection

Fig.4. Nose Detection

Fig.5. Undetected face due to missing eye

Feature Selection and Image Cropping: Once the features are present, a certain section of the face is to be zoomed in and cropped using appropriate cropping algorithms.

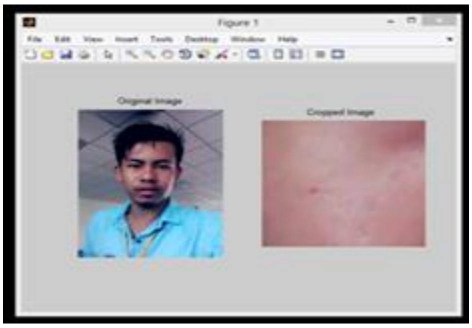

Fig.6. Feature Selection and Image Cropping

The cropping function must adjust the viewport to that of the area on the face, and not on hair or background [5].

Cancer Detection: To check for abnormal skin growth, ABCD algorithm is implemented based on four criteria: Asymmetry, Border, Color, and Dermatoscopic features. If any suspicious skin feature is present, it is checked and if it is beyond the threshold, the picture is noted.

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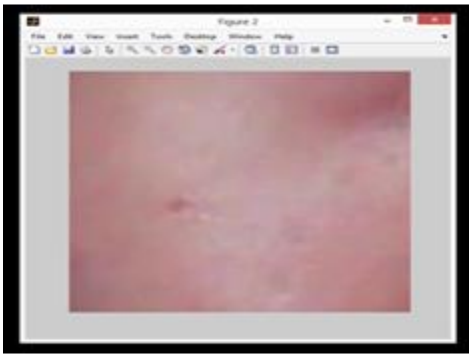

Fig.7. Cancer Detection

Take Pixel Values of Pictures: If detected, the pixel values of the face in the image using MATLAB given in figure 8 are recorded for further processing.

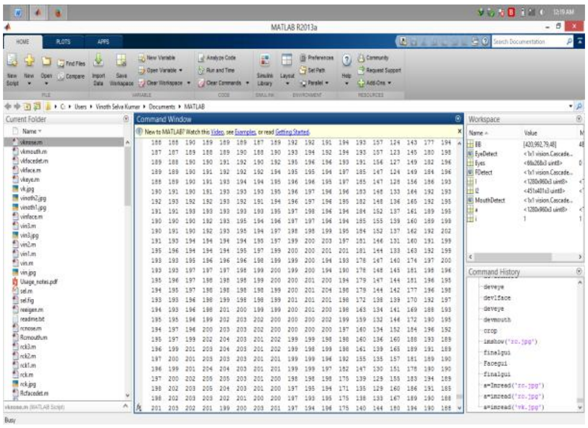

Fig.8. Pixel Values in MATLAB

Export to Microsoft Excel: Once the pixel values of an image are generated, they are exported to an MS Excel sheet as shown in figure 9. The Excel sheet may be composed of thousands of rows into thousands of columns depending upon the size of the image.

Upload Excel Data in Datameer: The Excel sheet is imported into Datameer where support for such uploads exists. Data is then stored and made available for analysis.

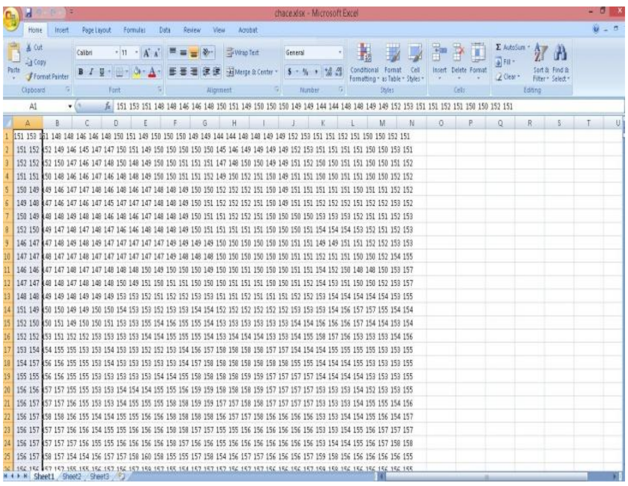

Fig.9. The same Pixel Values in Excel Sheet

IV. RESULTS & DISCUSSION

The melanoma is the deadliest form of skin cancer cells can spread to all organs or parts of the human body through the lymphatic system has been an alarming rate of 3% per year. Skin cancer can be cured at very high rates with simple and economical treatments with a survival rate of 70% [9] are achieved, which is mainly the result of early recognition.

A. Asymmetry

The asymmetry of a lesion is based on the distribution of colors and shapes of its structures, according to the principal and secondary axes of inertia that intersect at the centroid of the lesion. The centroid of a binary image can be defined through its geometric moments. To find the principal and secondary axes of inertia, we used the central moments to obtain the angle. This angle is used to rotate the image clockwise in order to align the axes of the image with the axes of inertia.

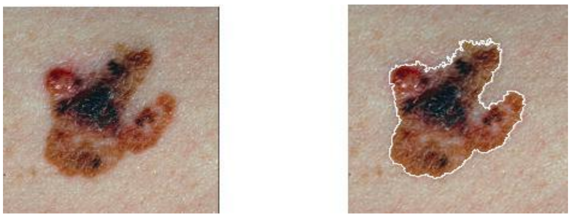

Fig.11. Borders

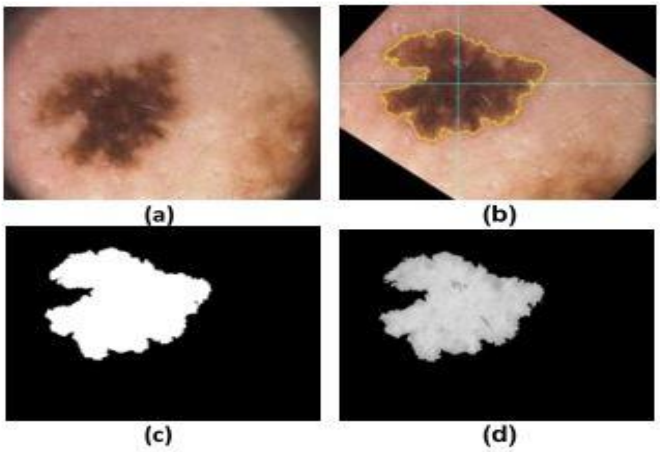

Fig.12. Rotation of the original image (a) In order to align the principal axes (in blue) with the axes of the Image, (b) As well as the obtained mask in binary, (c) Grayscale, (d) Format

The main goal of this feature is to find the abrupt ending of pigment pattern at the periphery of the lesion in which, two regions are definitely one inside and the other outside the lesion. For this purpose, we start by applying a Euclidian Distance Transform (EDT) to the border mask of the lesion obtained in the segmentation stage. The outer peripheral region is bounded by two contour lines of the image resulting from the EDT image, where A is the area of the lesion. The same procedure is applied for calculating the inner peripheral region, while in this case are considered region. Peripheral areas immediately adjacent to the border with an area of 10% of the injured area are omitted, in order to protect the extraction of this feature from errors related to the segmentation process.

B. Colors

The purpose of this feature is to find the six colors proposed by the ABCD rule (black, white, blue-gray, red, light brown and dark brown). To find these colors the distance of each pixel to the color we want to detect must be used.

These codes were chosen as follows: 1) the RGB code that represents the color is chosen as starting point and is used as reference; 2) five more colors were chosen through color combinations that return colors related to the reference code. The choice of these combinations was based purely on experimental results, since there was no possibility to collect data from experts that help the algorithm to learn the colors to detect, and no literature was found that documented this information. The distance between the referred RGB codes and the value of each pixel is calculated through the sum of the difference in each color channel. A pixel is considered to belong to a particular reference color if the distance between them is less than a predetermined threshold.

Table 1. Detected Colors and respective RGB Codes

Black	White	Blue-gray
(0,0,0)	(255,255,255)	(150,125,150)
(10,10,10)	(245,245,245)	(125,125,150)
(20,20,20)	(235,235,235)	(100,100,125)
(30,30,30)	(225,225,225)	(100,125,150)
(50,40,40)	(215,215,215)	(50,100,150)
(50,50,50)	(205,205,205)	(0,100,150)
Red	**Light Brown**	**Dark Brown**
(255,0,0)	(200,150,100)	(150,100,100)
(255,50,50)	(200, 100, 0)	(125,75,75)
(200,0,0)	(200,100,50)	(100,50,50)
(200,50,50)	(150,100,50)	(100,50,0)
(150,0,0)	(150,100,0)	(100,0,0)
(150,50,50)	(150,50,0)	(50,0,0)

V. CONCLUSION

The images are, hence, tested for early skin cancer detection after the face detection approach and precautions can be made. Different sets of image data are collected, either manually or by the use of an image dataset from the Internet. At least a set of four different persons from different facial angles must be involved. Some of the images must have incomplete features to determine whether the algorithm fails to detect a face when features are incomplete. This method can be enhanced and used by medical organizations in the real time applications. Most of the skin cancer cells are found to be from scattered lesions and rash skin types. This simple and accurate tool helps the Dermatologists for early detection of skin cancer for further treatment. Due to spread of cancer in complete image, we may get wrong results which give us overestimated A-B-C-D factors during backend calculations.

REFERENCES

1. Animetrics, “Cloud Face Recognition Services” article http://animetrics.com/cloud-face-recognition-services, Jan 28, 2015.
2. Chen, M., Mao, S., Zhang, Y., Leung, V.C.. "Big Data Analysis", pp. 51-58. Springer International Publishing, 2014.
3. Bhumika G. Bhatt, Zankhana H. Shah “Face Feature Extraction sequences", 2011 International Conference on Image Information Processing Techniques: A Survey”, National Conference on Recent Trends in Engineering & Technology, 13-14 May 2011.
4. Computervisiontalks.com, “Image processing and cloud computing architecture overview” http://computer-vision-talks.com/ articles/ 2011-04-13-image-processing- cloud-computing- architecture-overview/, Jan 28, 2015.
5. Faizan Ahmad, Aaima Najam, Zeeshan Ahmed “Image-based Face Detection and Recognition: State of the Art”, IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 6, No 1, November 2012.
6. G. Hemalatha, C.P. Sumathi “A Study of Techniques for Facial Detection and Expression Classification”, International Journal of Computer Science & Engineering Survey (IJCSES) Vol.5, No.2, April 2014.
7. Vinay A, Vinay S Shekhar, Rituparna J, Tushar Aggrawal, K N Balasubramanya Murthy, S Natarajan “Cloud Based Big Data Analytics Framework for Face Recognition in Social Networks using Machine Learning” 2nd International Symposium on Big Data and Cloud Computing, April 2015.
8. Rajesh A Patil. "Automatic detection of facial feature points in image, 11/2011.
9. Wolff K, Pehamberger H, “Malignant melanoma: early detection and prognosis”. Editorial. Vienna Klin Wochenschr 97: 451-456, 1985.