

Detection of Skin Cancer in Skin lesions using Image processing Technique And Precaution to Avoid Skin Melanoma

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ABSTRACT

In this article we will discuss about detection of Skin cancer using Image processing method, based on the texture and color in affected area. In this explains skin cancer identification using ABCDE rule. If we obtain clear information about the dead skin which is invisible to the human eye then we can easily prevent Spreading of that disease throughout the body in the initial stage. One of the major problems in the medical field is not identifying the diseases in the initial stage due to its invisibility to human naked eye, so in this we use Image Enhancement technique to obtain clear and perfect digital images of the effects Skin parts .Due to this we can prevent the spreading of disease in the initial stage.

Keywords: ABCDE rule, Squamous cells,Basal Cell, Melanoma, HSV-histogram, SURF, SVM.

1. INTRODUCTION

Skin melanoma Is not a normal growth of skin cells. Due to this metabolism the skin cells will spread throughout the body and it create firm red patches , a dry skin results in bleeding and their might be a chance of developing a crust which does not heal quickly [1]. Most skin cancer causes due to highly exposing body to the Sun or to X-rays and also rubbing continues in the itching Area as shown in figure 1.

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Fig 1:Affected Skin images dataset

1.1 Types of Skin Cancer

- Squamous Cell Carcinoma:** A skin Cancer caused by an un-control growth of unhealthy squamous cells growth. As shown in the figure 2.
- Basal Cell Cancer:** A skin type cancer which starts with basal cell growth. As shown in the figure 3.
- Melanoma:** It is the most serious type of skin cancer. Melanoma used to be death lesions. As shown in the figure 4.



Fig 2: Squamous Cell Carcinoma



Fig 3: Basal Cell Cancer

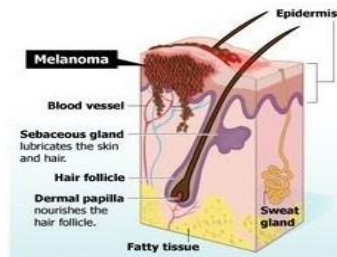


Fig 4: Melanoma

1.2 Causes for Skin Cancer

- Family history of skin cancer, specifically melanoma type.
- Moles and irregular moles will be more in number.
- Before tanning freckles and burns can be observed .
- In tropical climate live or vacation can be observed at altitudes.
- Spending more time leading skin to expose to environment.
- Have certain autoimmune diseases, such as systemic lupus erythematosus (SLE, or lupus)
- Infections like HIV which weakness immune system may also lead to skin cancer.
- Organ transplant is also one of the causes.
- Medicine which cause irritation to skin can also lead to melanoma.

2. SKIN LESION

A skin lesion melanoma is an abnormal sore, lump, bump, ulcer or color area in skin. Commonly skin lesion includes Mole and Actinic keratosis.

2.1 Types of Skin Lesions:

- **Primary Skin lesions:** The Skin condition which is present from birth or gained over lifetime which is abnormal in condition shown in Figure 5.
- **Secondary Skin lesions:** Irritation or change appears in primary skin lesion region. is shown in Figure 5. If we continuously scratches on a mole reaction until it bleeds results to the secondary skin lesions.

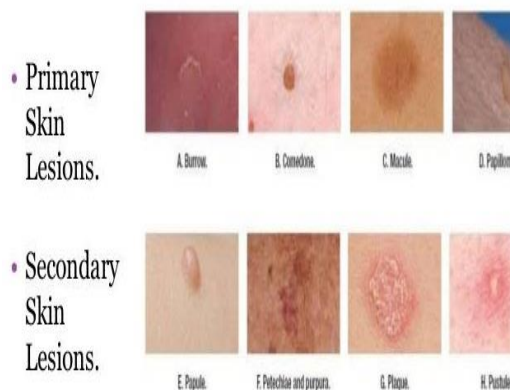


Fig 5: Primary and Secondary Skin lesions

3. IDENTIFICATION PROCESS OF SKIN CANCER

The main steps of proposed methodology of skin cancer are Image Acquisition, Image processing, features extraction and SVM classification [5] are Shown in figure 6 below.

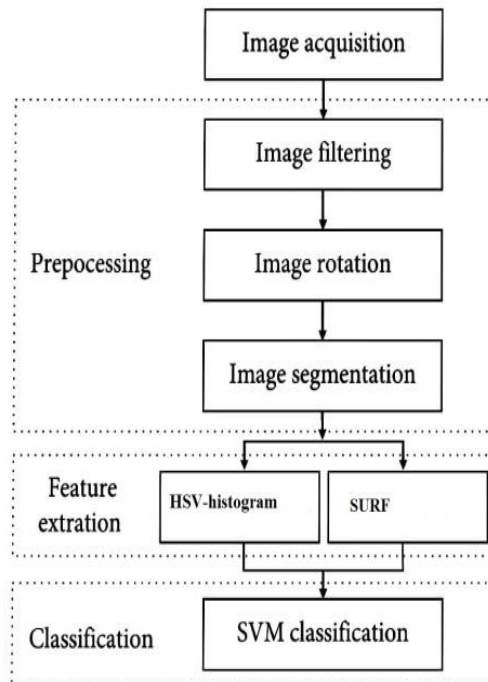


Fig 6: Identification Process of Skin cancer

3.1 Image Acquisition

The process of retrieving the image from source, usually which is hardware based source in processing. Its first step in workflow process, Because with put image capturing, Image processing is not possible

3.2 Image Processing

Image processing is the methodology to convert an image into digital form and performs some operations on it, to obtain an clear image to extract use full information from it [3]. As the technology grows, the application based on the image processing also grows because we get a clear and digital photography of the damaged cell.

3.2.1 Image processing consist of following steps

- Extracting image with optical scanner to through digital method [3].
- Analyzing and manipulating the images by image rotation and segmentation which consist of data compression, noise removal and image enhancement by using Spine method and making use of spotting patterns which are not visible to Human eyes [3].
- After Skin lesion Segmentation, Post-Processing the obtained image and extract affected cells Boarder from it.
- Output is the last stage in this we obtain a clear and altered Skin lesions segmented images [3]. As shown in fig 7.

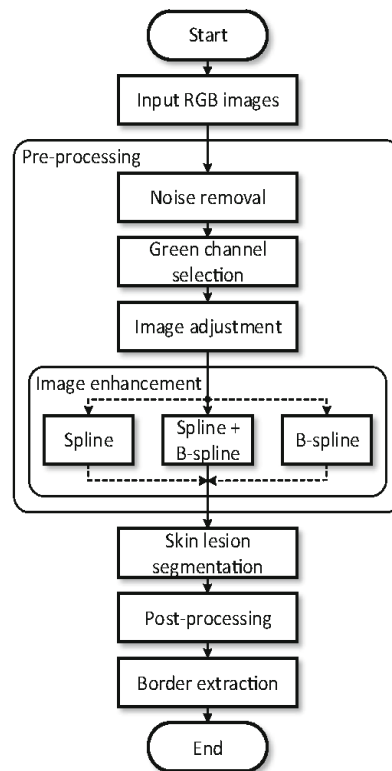


Fig 7: Steps of image Processing

3.2.2 Purpose behind Image processing

- Visualization: Detecting the objects which are not visible to naked eye.
- Image sharpening and restoration: To develop a good quality image.
- Image Retrieval: Retrieving image of interest.
- Measurement of pattern: Measures Different objects which are detected in image.
- Image recognition: Distinguish the object in an image.

3.3 FEATURE EXTRACTION

In the image processing and pattern recognition field, the feature extraction is a technique used for collecting various features from Texture and color. Here, I use two different feature extraction methods (i.e. HSV-histogram feature extraction and SURF) to obtain different features from enhanced images [6].

3.3.1 HSV-histogram

In HSV color space method each pixel gives information about Its Hue or its intensity. The number of constituents in features vector produced based on Hue is given as

$$N_h = \text{Round}(2pMULT_FCTR) + 1$$

Here MULT_FCTR gives information about the quantization level for hues. We typically choose a value of 8 for it.

The total number of constituents signifying gray values is

$$N_g = \text{Round}(I_{max}/DIV_FCTR) + 1$$

Here the I_{max} is the maximum value for the intensity (Commonly it will be 255), and DIV_FCTR tells the number of quantized gray levels [6]. We normally take DIV_FCTR value as 16. Explains in Figure 8.

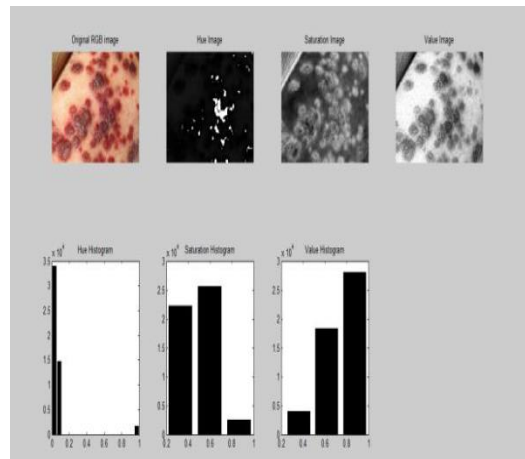


Fig 8: HSV-histogram

3.3.2 SURF feature

The SURF algorithm consist of three portions, interest point identification ,local neighborhood, description and matching as shown in Figure 9. SURFmakes use of blob detector which is based on hessian matrix to identify search point of interest .Determinant of hessian matrix can be used as a degree of local change and points chosen rom where determinant is highest highest.

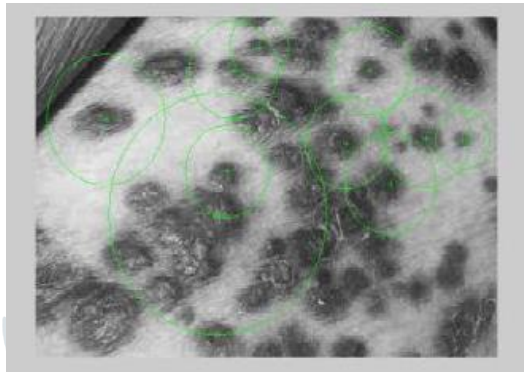


Fig 9: SURF feature

3.4 SVM Classification

SVM is a statistical method which is more suitable for the classification of small sample number. That It can be obtain the minimized training error and confidence interval term by checking the given training set to predict the test set.

4. ABCDE RULE

ABCDE rule is created by Stolz et. al and it was used by dermatologists to difference between normal and affected skin region [1].

A for the Asymmetry: Birth mole or one half of the mole doesn't match with normal mole [2]. As shown in figure 10.

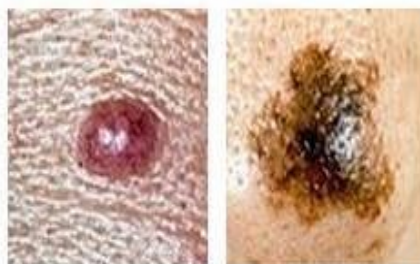


Fig 10: Asymmetry

B for the Border: The edges or corner of the affected parts are irregular, not ched, ragged or blurred, when compare to regular one [2].As shown in figure 11.



Fig 11: Border

C for the Color: The color of a affected mole will not be same for all over and it can include shades of brown color or black color and sometime with patch of red color, white color or pink with blue.[2].As shown in figure 12.



Fig 12: Color

D for the Diameter: For detection of effected mole, the size of it will be greater than 6mm, although melanomas can sometimes be smaller than affected mole size [2].As shown in figure 13.



Fig 13: Diameter

E for the Evolving: As the time passes the mole size, shape and color will gradually changes [2].As shown in figure 14.

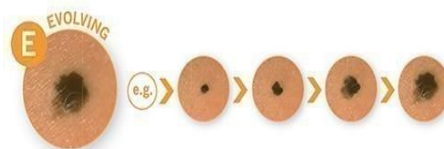


Fig 14: Evolving

Sometimes melanomas don't follows above rules. So it's the most important to tell doctor if any abnormal mole or any new spots growths on skin are observed.

5. TREATMENT AND PREVENTION OF SKIN LESIONS

5.1 Treatment

- The vaporize growth laser therapy can be adopted .
- Mohs surgery can be used to remove growth layer of the skin until no abnormal cell growth remain on the skin layer. The mohs treatment is used for larger, recurring type of skin cancer.
- Freezing with liquid nitrogen is one of the treatment to treat skin melanoma.
- When surgery is not the only option to treat, then radiation can be adopted..

- Chemotherapy, can also be include topical creams imiquimod or diclofenac, or systemic drugs such as decarbonize (Commonly called as DTIC) or temozolomide (Temodar)
- The drugs which uses biological therapy such as interferon, interleukin-2 which provide a better immune system to kill abnormal cell growth.
- Curettage and electrodesiccation, which makes use of a circular blade called curette and an electric needle to scrape away and helps in destroy lesions.
- Photodynamic therapy (PDT), which makes use of combination of the laser and drugs that makes cancer cell vulnerable to radiation.

5.2 Prevention

- To avoid exposure to sunlight between 10am to 4pm.
- Making use of sunscreen daily with sun protection (SPF) which contains 30 or higher percent of SPF factor.
- Avoiding Tanning beds.
- Its better to wore protection clothing such as full length pants ,long sleeved shirt and hats .

6. CONCLUSION AND FUTURE WORK

In this paper we developed automatic diagnostic system using image processing technique to identify different types of skin diseases with an appropriate clear digital image. ABCDE medical procedure used to diagnosis Melanoma based diseases. Due to image processing technique the doctors can easily identify the symptoms of skin disease in the earlier stages; hence the survival rate of person has increased to 92 percent.

The following Opportunities are suggested for further work:

- Implementing the proposed system in various Mobile devices.
- Implementing high-end graphical techniques to get perfect defected cells.
- Increase the size of the dataset.
- In future we need to use remote sensing towards improved sensors that records same scene in many spectral channels.

7. REFERENCES

- [1] Nidhal K.EL. Abbadi and Zahraa Faisal, “*Detection and Analysis of Skin cancer from Skin Lesion*” International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 19 (2017) pp. 9046-9052.
- [2] “*Save your Skin from Skin Cancer and Sun Damages*”. Available in <https://preventcancer.org/programs/save-your-skin/>.
- [3] “*Introduction to image processing*”. Available in <https://www.engineersgarage.com/articles/image-processing-tutorial-applications>.
- [4] “*Skin Disease recognition method based on image color and texture features*”. Available in <https://www.hindawi.com/journals/cmmm/2018/8145713>.
- [5] “*Computer Aided Melanoma Skin Cancer detection Using Image processing*”. Available in <https://www.sciencedirect.com/science/article/pii/S1877050915007188>.
- [6] Ajit Singh, PhD & Suneel Kumar “*Image Processing for Recognition of Skin Diseases*” International Journal of Computer Applications (0975 – 8887).