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Web App for Skin Cancer Detection Using Machine learning

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ABSTRACT—The most prevalent type of cancer is skin cancer, which is diagnosed in millions of people each year. Every year, this illness is diagnosed in almost three million people in the US alone. Early skin cancer screening is a challenging and expensive technique. In this paper, we suggest a mechanism for classifying skin lesions as benign or malignant using photos captured by ordinary cameras. Skin cancer is divided into melanoma, squamous cell carcinoma, and basal cell carcinoma. Melanoma is the most fatal kind of cancer, having a very poor chance of survival. The system has two parts: training and testing. Support Vector Machines will be used in this instance. I will create a web-app using API to display the result.

Index Terms— Melanoma skin cancer, SVM.

1. INTRODUCTION

1.1 PROBLEMSTATEMENT

Now days, Skin cancer is life threatening disease which causes human death. Abnormal growth of melanocytic cells causes a skin cancer. Due to malignancy feature skin cancer is also known as melanoma. Melanoma appears on the skin due to exposure of ultraviolet radiation and genetic factors. So, melanoma lesion appears as black or brown in color. Early detection of melanoma can cure completely. Biopsy is a traditional method for detecting skin cancer. This method is painful and invasive. This method requires laboratory testing so it is time consuming. Therefore, in order to solve the above stated issues computer aided diagnosis for skin cancer is needed. Computer aided diagnosis uses Dermoscopy for capturing the skin image. In this paper first pre-processing of the skin image is done. After pre-processing lesion part is segmented by using image segmentation technique which is followed by feature extraction in which unique features are extracted from segmented lesion. After feature extraction, classification by using support vector machine is performed for classifying the skin image as normal skin and melanoma skin cancer. The proposed system results shows that support vector machine with linear kernel gives optimum accuracy.

1.2 OBJECTIVE&SCOPE

Objectives of doing this project are:

To build fire and smoke detector system using image analysis.

1. To propose skin cancer detection system using machine learning for early detection of skin cancer disease.
2. Classification will be done by using Support Vector Machine (SVM) which will detect the given image into cancerous or non-cancerous.
3. By selecting an image web app will give prediction.

1.3 RELEVANCE

Now a days, cancer is one of the wide spread causes of death. Uncontrolled growth of abnormal cells is called cancer. Human body consists of number of cells. Normal cells are produced from DNA. These normal cells again divided into other normal cells. Due to some problem, defect can be occurring into the DNA. This defected DNA produces abnormal cells. These abnormal cells again divided into another abnormal cell. This out-of-control growth of abnormal cells causes cancer.

Benign lesion will differ from melanoma in Asymmetry, Border, Color and Diameter. Benign lesions are symmetric in shape whereas Melanoma lesions are asymmetrical. Benign lesions are in circular shape but Melanoma has irregular boundary. Benign lesion has uniform color whereas melanoma has variation in color. The diameter of benign lesion is less than 6mm. watershed segmentation algorithms. These techniques are evaluated and examined for finest results and highest accuracy.

1.4 APPLICATIONS

Following are the applications of this project:

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1. Used in Medical field.
2. For early detection of skin cancer.
3. In providing real time patient information to hospital.

1.5 ADVANTAGES

Following are the advantages of the project.

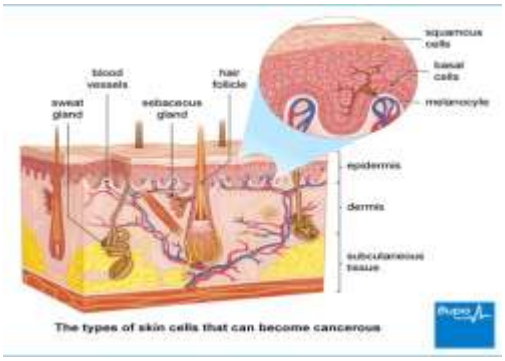
1. Uses single images.
2. More accurate as their is less human interaction.
3. It is more advantageous to patients as it is painless and timeless process.
4. Saving manpower and expenses.
5. High speed of classification.

II. BACKGROUND AND LITERATURE REVIEW

Although melanoma is life threatening diseases in white skinned population, early detection of melanoma along with other skin cancer types can increase the chance of survival of the victim. Hence, there is a need of automated system for detection of skin cancer with high accuracy. There are two types of images available for skin cancer detection. The dermoscopy image is captured by specialized dedicated system in pathological center with focused on region of interest with high zoom (E.g., 20x), which needs skilled dermatologist to conclude the image as positive or negative. This type of image can be feed to computerized semiautomated system for classification. But in this technology, the victim always needs to walk into the pathological center and need to take consultancy of the skilled dermatologist. On the other hand, if there is a computer software which can automatically detect skin cancer from digital image captured by any digital image capturing system with little focus on the region of interest, victim can anytime perform the test even at home. Hence the motivation of this literature survey is to understand the recent technology for skin cancer cell detection and focus on developing an automatic system for skin cancer detection from digital image using machine learning technology.

III.SYSTEM DEVELOPMENT

3.1 INTRODUCTION



There are three types of skin cancer defined as,Squamous Cell Carcinoma (SCC), Melanoma and Basal Cell Carcinoma (BCC), Melanoma is most dangerous in which survival rate is very low. Early detection of Melanoma can potentially improve survival rate of victim. In USA, in every hour one person dies in melanoma. From a study, it is estimated that around 87,110 new cases of melanoma will be diagnosed in 2018. Among them, 9,730 will die because of melanoma. Melanoma consists of only 1% of all skin cancer cases but the majority of skin cancer death. The major reason for melanoma is due to sun. From a survey done by a UK University, it is found that 86% of melanomas are exposed by ultraviolet (UV) radiation. In general, if a person has more than five sunburns, their risk of developing melanoma doubles. Regular use of sunscreen with an SPF of 15 or higher can cut the risk of melanoma and squamous cell carcinoma by 50% and 40%, respectively [1].

3.2 PROPOSED METHODOLOGY

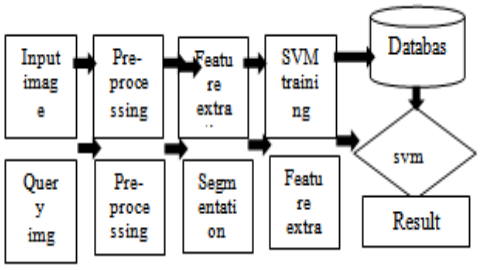


Fig. 1

The system's two components are testing and training. Both components are subjected to the processes.

Step 1] The first step in image collection is collecting skin photographs with the proper magnification on a medical microscope.

Step 2] The second phase is image preparation,

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where a color image is first converted to grayscale, followed by the removal of hair, the reduction of noise, the application of sharpening, and the scaling of the skin image. The median filter does a great job of removing hairs, small bubbles, and noise. The median filter does a great job of preserving the spatial resolution of the image. In Fig. 1, to eliminate hair median filter is used. After applying a median filter to remove hair, use a circular averaging filter to smooth the skin.The sizes of the images collected from various sources for the detection of skin cancer vary. The system for detecting skin cancer should use uniformly sized images. Thus, the standard dimension must be applied to all images.

Step 3] The third stage involves segmentation using k-mean clustering. Because the placement of the beginning centers is so important to k-means, choosing starting centers at random could lead to subpar clustering. In our research, we have improved three k-means optimization techniques as well as the k-means clustering algorithm

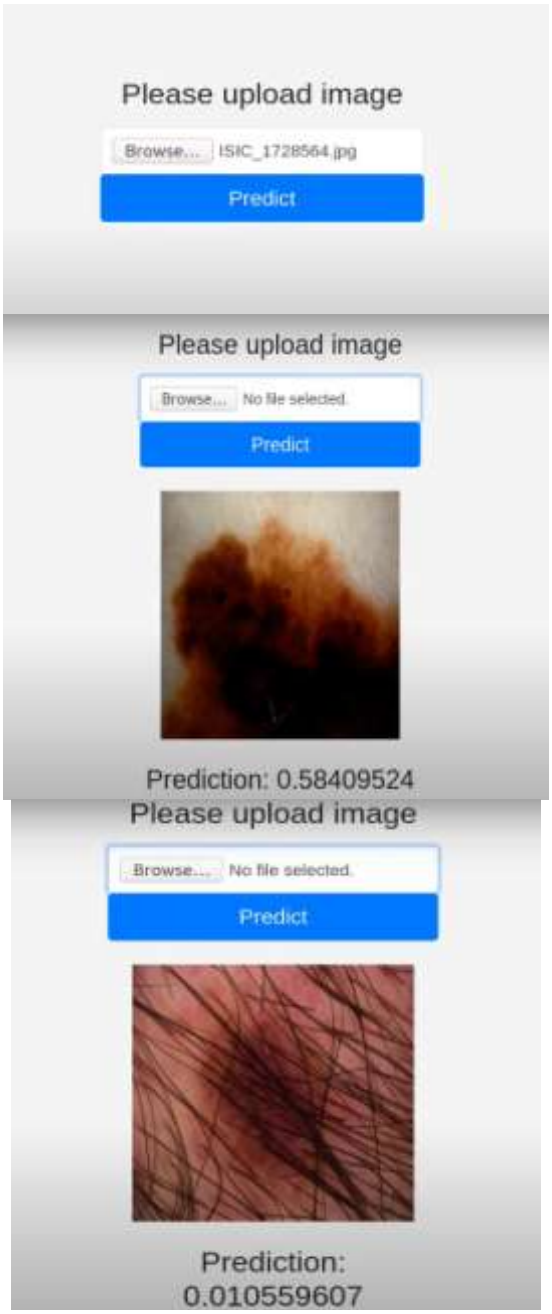
Segmentation is followed by feature extraction. No machine learning algorithm can work without predefined features set. The type of features can be broadly divided into following categories.
1.Shape Features - Asymmetry, Compactness, Ulnar Variance, Diameters.

Step 4] The database records the traits of a pure cancer cell in the training section.
During the testing step, the cell that needs to be tested is used as input.

Step 5] Finally, the classification process using an SVM classifier and data from the database is used to determine whether or not the cell is cancerous.

3.3 SOFTWARE IMPLEMENTATION

For software implementation we have used Python and VScode platform.Using PyTorch library.



IV. ADVANTAGES & APPLICATION

4.1 ADVATAGES

1. Uses single image.
2. More accurate due to less human intervention.
3. It is more advantageous to patients as it is painless and timeless process.
4. Saving of manpower and hence, expenses.
5. High speed of classification.

4.2 APPLICATION

1. Used in Medical field.
2. For early detection of skin cancer.

3. In providing real time patient information to hospital.

V. CONCLUSION & FUTURE SCOPE

5.1 CONCLUSION

Support vector machines can be used to apply the suggested system of skin cancer diagnosis and quickly determine if a picture is cancerous or not. The system will determine the stage of the skin cancer, based on various features such as the area of the spread, diameter, color of the lesion, etc. The analysis can be made with the help of the machine learning algorithm, in which we train the system based on the history of the images stored in the database, and the test image comes in the category of the melanoma or not, if it does, then to determine its stage. A comparison can be made with the existing systems, machine learning reduces the computational time. Hence, the treatment can begin faster.

5.2 FUTURE SCOPE

1. The system can be more accurate and efficient. The ABCD rule of skin cancer detection is the most adopted method of skin cancer detection.
2. The system can be implemented in the stand-alone application. The system can be more reliable and robust
3. The system may provide the encryption of data and authentication for the users so that there is no unauthorized access of the data of the patient, because if there is unauthorized access performed on the data then the data integrity may be lost.
4. In future it is more interactive and user friendly for checking the lesion that if it is cancerous or not.

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