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Malignant Melanoma Classification using GLCM and SVM

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ABSTRACT

In today's modern world, Skin cancer is the most common cause of death amongst humans. Skin cancer is abnormal growth of skin cells most often develops on body exposed to the sunlight, but can occur anywhere on the body. Most of the skin cancers are curable at early stages. So, an early and fast detection of skin cancer can save the patient's life. With the new technology, early detection of skin cancer is possible at initial stage. Formal method for diagnosis skin cancer detection is Biopsy method. It is done by removing skin cells and that sample goes to various laboratory testing. It is painful and time-consuming process. We have proposed skin cancer detection system using Support Vector Machine (SVM) for early detection of skin cancer disease. It is more advantageous to patients. The diagnosing methodology uses Image processing methods and SVM algorithm. The dermoscopy image of skin cancer is taken and it goes under various pre-processing technique for noise removal and image enhancement. Then the image is undergone to segmentation using Thresholding method. Some features of image have to be extracted using GLCM methodology. These features are given as the input to classifier. Support vector Machine (SVM) is used for classification purpose. It classifies the given image into cancerous or non-cancerous.

Keywords: Support Vector Machine, GLCM methodology.

I. INTRODUCTION

Skin cancer is a deadly disease. Skin has three basic layers. Skin cancer begins in outermost layer, which is made up of first layer squamous cells, second layer basal cells, and innermost or third layer melanocytes cell. Squamous cell and basal cell are sometimes called non-melanoma cancers. Non-melanoma skin cancer always responds to treatment and rarely spreads to other skin tissues. Melanoma is more dangerous than most other types of skin cancer [3]. If it is not detected at beginning stage, it is quickly invade nearby tissues and spread to other parts of the body. Formal diagnosis method to skin cancer detection is Biopsy method. A biopsy is a method to remove a piece of tissue or a sample of cells from patient body so that it can be analysed in a laboratory. It is uncomfortable method. Biopsy Method is time consuming for patient as well as doctor because it takes lot of time for testing. Biopsy is done by

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removing skin tissues (skin cells) and that sample undergoes series of laboratory testing [1]. There is possibility of spreading of disease into other part of body. It is riskier. Considering all the cases mentioned above, So Skin cancer detection using SVM is proposed. This methodology uses digital image processing technique and SVM for classification. This technique has inspired the early detection of skin cancers, and requires no oil to be applied to your skin to achieve clear sharp images of your moles. In this way, it's quicker and cleaner approach. But, most importantly, due to its higher magnification, Skin Cancer Detection Using SVM can prevent the unnecessary excision of perfectly harmless moles and skin lesions.

II. LITERATURE SURVEY

Skin cancers are the most common form of cancers in humans. It is a deadly type of cancer affecting skin. Most of the skin cancers are curable at initial stages. So, an early detection of skin cancer can save the patients. Conventional diagnosis method for skin cancer detection is Biopsy method. It is done by removing or scraping off skin and that sample undergoes a series of laboratory testing. It is painful and time consuming one. Computer based skin cancer detection is more advantageous to patients, by which patients can identify the skin cancer without going to hospital or without the help of a doctor. Computer based detection uses imaging techniques and Artificial Intelligence. The different stages of detection involves- collection of dermoscopic images, filtering the images for removing hairs and noises, segmenting the images using Maximum Entropy Threshold, feature extraction using Gray Level Co-occurrence Matrix (GLCM), and classification using Artificial Neural Network (ANN). Back-Propagation Neural (BPN) Network is used for classification purpose. It classifies the given data set into cancerous or non-cancerous [1].

Human skin is that the largest organ in our body that provides protection against heat, light, infections and injury. It conjointly stores water, fat, and nourishment. Cancer is that the leading reason behind death in economically developed countries and also the second leading reason behind death in developing countries. carcinoma is that the most typically diagnosed kind of cancer among men and ladies. Exposure to ultraviolet illumination rays, modernize diets, smoking, alcohol and phytotoxin area unit the most cause. Cancer is more and more recognized as a important public ill health in African nation. There area unit 3 kind of carcinoma and that they area unit recognized supported their own properties. seeable of this, a digital image process technique is projected to acknowledge and predict the various kinds of skin cancers victimization digital image process techniques. Sample carcinoma image were taken from yank cancer society center and DERMOFIT that area unit standard and wide focuses on carcinoma analysis. The arrangement was supervised love the predefined categories of the kind of carcinoma. Combining Self organizing map (SOM) and radial basis perform (RBF) for recognition and diagnosing of carcinoma is far and away higher than KNN, Naive Thomas Bayes and ANN classifier. it absolutely was conjointly showed that the discrimination power of morphology and color options was higher than texture options however once morphology, texture and color options were used along the classification accuracy was magnified. the most effective classification accuracy (88%, 96.15% and 95.45% for Basal cell malignant neoplastic disease, malignant melanoma and epithelial cell malignant neoplastic disease respectively) were obtained victimization combining Kyrgyzstani monetary unit and RBF [2].

Early diagnosis of skin cancer is essential health requirement for the patient and a critical task for the dermatologist. The factual thinking is that the chance of patient's survival is high if diagnosed early. Analysis of the skin images and dermoscopy is a

mandatory for medical professionals to take appropriate decision on treatment. A number of methods have been researched to use automated and computerized system for skin diseases image processing. Various dermoscopy image processing techniques have been reviewed to explore the possible solution to skin diseases and to select an appropriate method for early detection7 of skin diseases. This review work will be a pathway to scientist, research scholars and medical practitioners [3].

Patil Rashmi R. et al. [4-9] proposed the systems to detect melanoma from benign, then classified stages and types of melanomas. Authors have used different transfer learning techniques to detect type of cancer.

III. PROPOSED SYSTEM

Skin cancer detection using Svm is basically defined as the process of detecting the presence of cancerous cells in image. Skin cancer detection is implemented by using GLCM and Support Vector Machine (SVM). Gray Level Co-occurrence Matrix (GLCM) is used to extract features from an image that can be used for classification. SVM is machine learning technique, mainly used for classification and regression analysis.

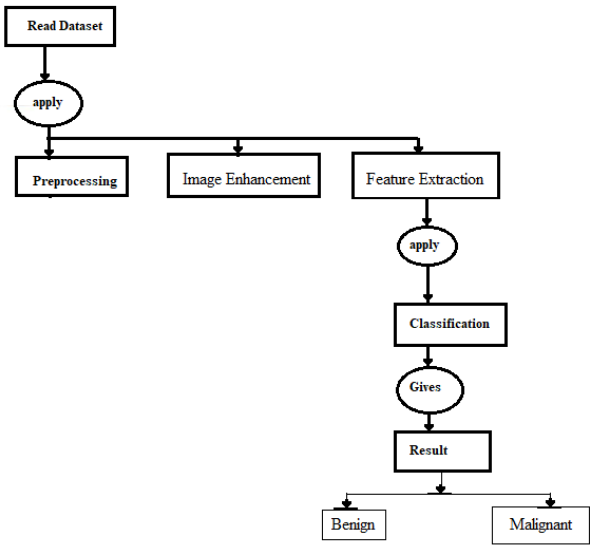

Figure 1: Flow Diagram

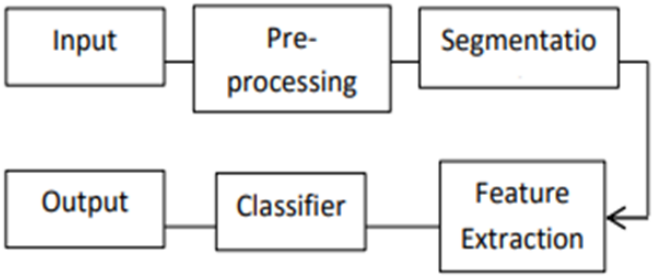

Figure 2: System Architecture

Input image

Input to proposed system is dermoscopic images, dermoscopic images are images taken by dermatoscope. It is kind of magnifier used to take pictures of skin lesions (body part). It is hand held instrument make it very easier to diagnose skin disease.

Pre processing

Goal of pre-processing is an improvement of image data that reduces unwanted distortions and enhances some image features important for further image processing. Image pre-processing involves three main things 1) Gray scale conversion 2) Noise removal 3) Image enhancement. Grayscale conversion Grayscale image contains only brightness information. Each pixel value in grayscale image corresponds to an amount or quantity of light. The brightness graduation can be differentiated in grayscale image. Grayscale image measures only light intensity. 8 bit image will have brightness variation from 0 to 255 where '0' represents black and '255' represents white. In grayscale conversion colour image is converted into grayscale image shows in fig (3). Grayscale images are more easy and more faster to process than coloured images. All image processing technique are applied on grayscale image. In our proposed system coloured or RBG image is converted into grayscale image by using weighted sum method by using following equations Grayscale intensity= 0.299 R + 0.587 G + 0.114

Image enhancement

The objective of image enhancement is to process an image to increase visibility of feature of interest.

Feature extraction Feature extraction plays an important role in extracting information present in given image. Here we are using GLCM for texture image analysis. GLCM is used to capture spatial dependency between image pixels. GLCM works on gray level image matrix to capture most common feature such as contrast, mean, energy, homogeneity

Classifier

Classifier is used to classify cancerous image from other skin diseases. For simplicity Support Vector machine classifier is used here. Svm takes set of images and predicts for each input image belongs to which of the two categories of cancerous and non-cancerous classes. The purpose of SVM is create hyper plane that separates two classes with maximum gap between them [2]. In our proposed system output of GLCM is given as input to SVM classifier which takes training data, testing data and grouping information which classifies whether given input image is cancerous or non-cancerous.

IV. RESULTS AND DISCUSSION

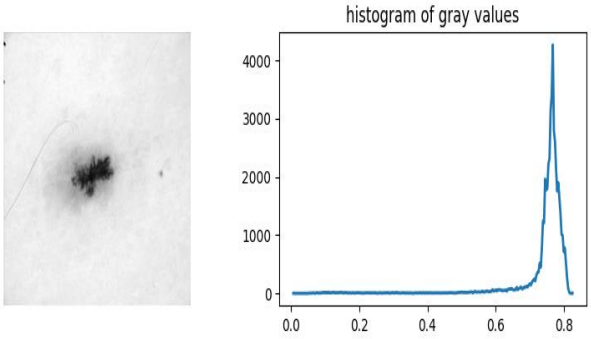

Figure 3: Feature Extraction

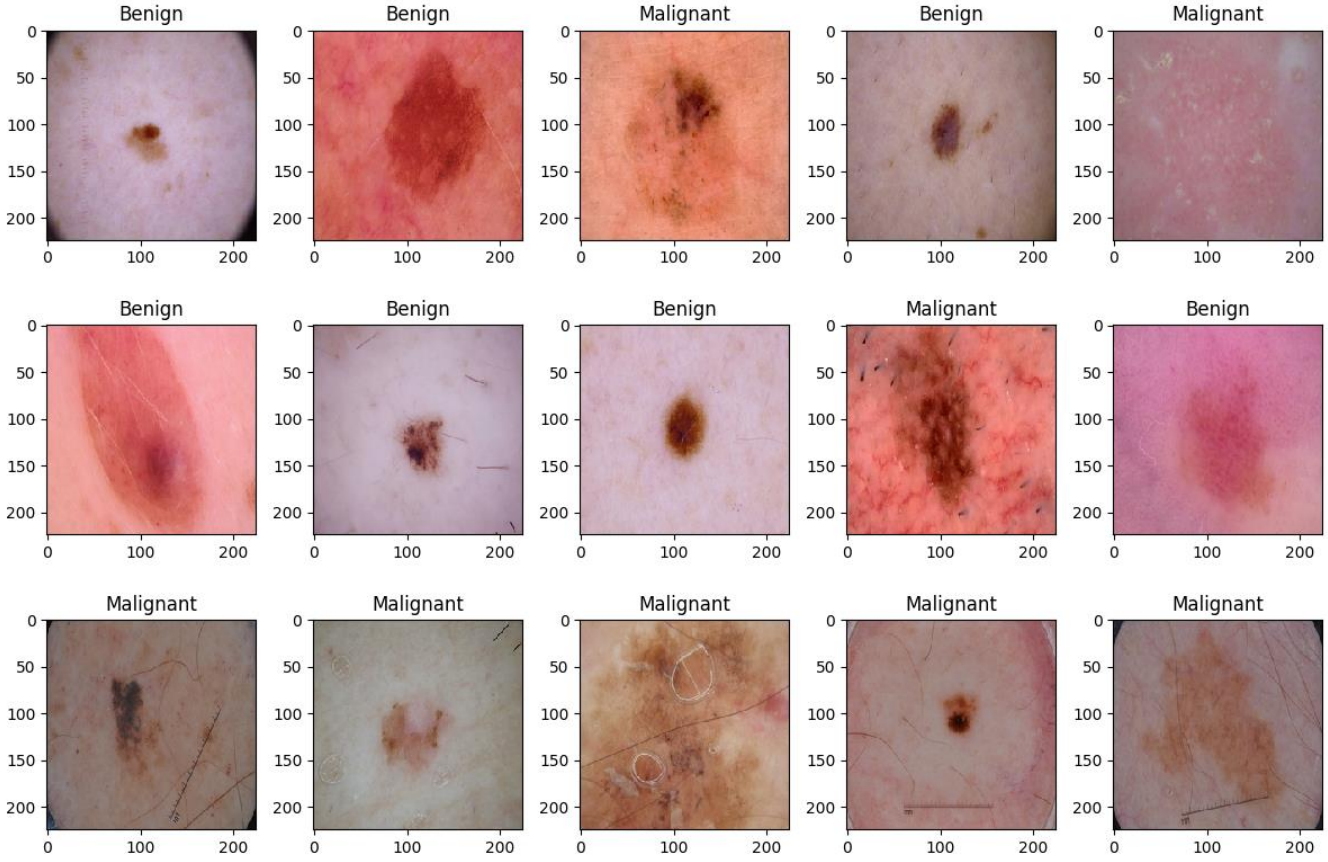

Figure 4: Classification

V. CONCLUSION

The proposed system of skin cancer detection can be implemented using gray level co-occurrence matrix and support vector machine to classify easily whether image is cancerous or non-cancerous. Accuracy of proposed system is 95%. It is painless and timeless process than biopsy method. It is more advantageous to patients.

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