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Automatic Recognition of Melanoma Disease Using Global and Local Methods

Saranya S
PG Scholar,
Dept of CSE, Sri Shakthi Institue of Engineering and Technology, India

Kavya S.P.
Asst. Prof.
Dept of CSE, Sri Shakthi Institue of Engineering and Technology, India

Abstract- This paper focuses on the detection, segmentation, classification and extraction of skin lesion as a literature survey. Melanoma is a category of cancer that develops from the pigment-containing cells recognized as melanocytes. Melanomas usually ensue in the fur but may arise in the jaws, guts or ogle. This paper addresses two different systems for detection of skin cancer in dermoscopy images. The first system uses global methods and the second system uses local features and the classifier. Hence, melanoma is easily to detect using with help of global methods and local features.

Keywords: Melanoma, skin lesion, IC (Image Clustering), Segmentation, Dermoscopic Images, Binary Classification, Abcd rule, Global and Local method, Feature extraction and Classification.

I. INTRODUCTION

Melanoma skin lesions are analyzed by ABCD technique which predict the disease with features like as (AS)ymmetry, (BO)rder, (CO)lor and (DI)fferential shapes. Many researchers have been analyzed feature to diagnose the dermoscopic diagnose the melanoma accurately. In the dermoscopic images using easily to reduce the noise. Melanoma is to separate part of the melanocytic from the clarity and noiseless. For skin detection, extraction and segmentation many procedures are developed to achieve the results with more performance. Next using the four parameters of ABCD rules used to assign the score to lesion[12][6][10]. Used to check whether it is melanoma or non melanoma[10]. Evaluate the pigmented skin lesion is easier to diagnose melanoma. In the type of lesion that contains the nevus cells in embryologic development for variant of melanocytes like as skin color or cell shapes[10]. Each parameter is used to predict the melanoma or non melanoma it is:

- Segmentation
- Extraction
- Classification

This above step is used to diagnose a skin lesion and to check whether it is melanoma or non melanoma[10] as shown in fig 1.

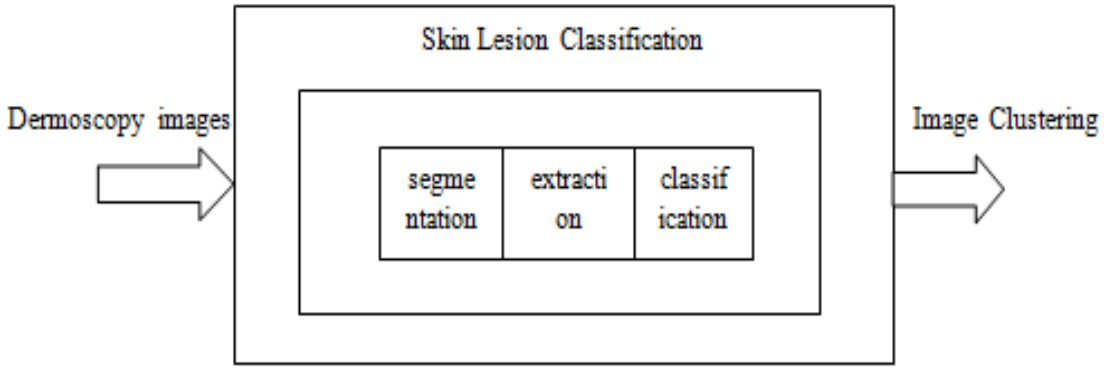

Figure 1: classifying or diagnosing melanoma using image processing

These methods are mainly used on two techniques that is:

1. Global methods
2. Local features

- **Global methods:**
  Global methods mean looking whole images[3].

- **Local features:**
  Local features mean focusing on some particular part of an image[3].

- **Advantages:**
  1. Less time to identification.
  2. More flexible.
  3. Signal to noise ratio.

II. STEPS INVOLVED IN DERMOSCOPY IMAGES USING MELANOMA DIAGNOSIS

A. Segmentation

The segmentation is the process of partition an image into lesion and non lesion images. Classify the dermoscopy image into the segment using the edge detection method[12].

B. Extracting the global features of the image:

Characterize the object by a set of global features (e.g., color moments and gradient histograms) and use these features to discriminate the object from the background[3]. These methods contain two types of analysis it is:

- Texture Analysis
- Color Analysis

1. Texture Analysis

Image Texture represents the spatial organization of intensity and color in an image, and it can be characterized in many different ways. Some methods use pixel statistics. A classic approach consists in computing the statistics of pairs of neighbouring pixels, using the co occurrence matrix[7][11][15].

2. Color Analysis

The most popular features used in dermoscopy analysis are color statistics, such as the mean color and color varaiance[8][11].

C. Extracting the local features of the images

Set of key points is selected inside the lesion region; a key point be categorized by a vector of local character. This element vector represents color and texture properties in a local patch centered at the key points[14]. Since the number of key points and local features varies from image to image, we cannot directly feed a classifier with these data. Instead, all local features associated with all the training images are gathered and used to compute a smaller set of prototypes (centroids) denoted as visual words. Then, the local features of each dermoscopy image are assigned to the nearest to visual word[3].

D. Classification

Classifier is then trained to discriminate melanoma lesions from non melanoma ones, using the histogram of visual words as input[12][2].

III. LITERATURE REVIEW

A. Texture Analysis methods to Automatic Detection of Melanoma Skin Cancer

Melanoma is one of the very dangerous cancer in skin. For diagnosis these disease required a experience, in the early stage[1] look like a normal to harmless moles. For the less experience physicians require a automatic diagnostic tools. In automatic structure of melanoma category was apply on dermoscopy image can be assist into early stage of melanoma and melanocytic nevi lesion. Dermoscopy images are analyzed using segmentation process.

Initially need to adjust the all the images to standard image format and fixed scale size i.e.(512*512) to maintain origin of exact description. Hence get the obviously distinction between two types of lesions. It has investigated a categorization of dermoscopy images using GLCM methods. Co-occurrence matrix contains 23 sufficient features for texture features in this fished score method is the most significant features. Despite fishers achieve simplicity, appears to be a good quality selecting methods. As per fisher method can select 12 features that representing the most significant features[7].

B. SKINcure: The Malignant Melanoma Prevention and Early Detection using A Real Time Image Analysis System:

The melanoma rates have increasing become passed five years. This type of cancer is insecure to uv radiation. In real time the malignant melanoma is mostly highly requireable. Here we developed system to prevent the earlier detection. Here we view the cancer images in different types of structures[9].

C. Top-down color attention for object recognition:

The types of the processes based on element detection, element description, and vocabulary construction and image representation are performed[4]. RGB Color is used to specify the attention map to compare with available methods that combine color and shape cubes on three data sets containing various important of color predominance[8][11].

Table I: Algorithm Comparison

ALGORITHM	TASK & TECHNIQUES	ADVANTAGES	LIMITATIONS	FEATURES
C4.5 algorithm	----------	----------	1. Small variation in data can lead to different decision trees. 2. Over fitting, 3. Does not work very well on a small training data set.	1. Build model can be interpreted. 2. Easy to implement. 3. deals with noise 4. use both discrete and continuous values.
ID3 Algorithm	1. Using inductive methods to given values of attributes of an unknown objects.	1. Easy to implemented and being quite a simple process. 2. Running time increases only linearly with the complexity of the problem.1	1. Requires large searching time. 2. It may generate very long rules which are very hard to prune. 3. Requires large amount of memory to store tree.	1. It produces the more accuracy result than the c4.5 algorithm. 2. Detection rate is increased and space rate is reduced.
K-Nearest neighbours algorithm	----------	1. Simplicity and effectiveness 2. Intuitiveness and competitive classification performance in many. 3. It is robust to noisy tranining data and is effective if the training data is large	1. Time to find the nearest neighbours in a large training data set can be excessive. 2. It is sensitive to noisy or irrelevant attributes. 3. Performance of algorithm depends on the numbers of dimension used.	1. Classes need not be separable. 2. Zero cost of the learning process. 3. Sometimes it is Robust with regard to noisy tranining area. 4. well suited for multidimensional classes.
Navie Bayes Algorithm	1. Real time classification 2. Text classification 3. Recommendation system	1. It is easy and fast to predict class of test data sets. 2. Better performance comparing to other models.	1. The precision of algorithm decreases if the amount of data is less. 2. For obtaining good results it requires a very large number of records.	1. Simple to implement. 2. Great computational efficiency and classification rate. 2. It predicates accurate results for most of the classification and prediction problems.
Support Vector Machine Algorithm	1. Sentimental classification using 4-point scale on document level	1. Avoiding over fitting. 2. Error rate is high.	1. Speed and size requirement both in training and testing is more. 2. High complexity and extensive memory requirements for classification in many cases.	1. High accuracy. 2. Work will even if data is not linearly separable in the base feature space.
Artificial Neural Network Algorithm	1. It used on conduct vibration based damage detection	1. Training large amount of data sets. 2. The output performance will depend up on the trained parameters and the data set relevant to the training data sets.	1. Requires high processing time if neural network is large. 2. Difficult to know how many neurons And layers are necessary. 3. Learning can be slow.	1. It is easy to use, with few parameters to adjust. 2. A neural network learns and reprogramming is not needed. 3. Easy to implement. 4. Applicable to a wide range of problems in real life.

IV. CONCLUSION

In this paper, two different strategies for the detection of melanomas in dermoscopy images based on local and global features. Most early works use global features (texture, shape, and color) related with lesion fol-lowed by a binary classifier trained from the data. The full pipeline of pattern recognition system including segmentation. Hence this local feature is increasing importance in many image analysis problems. A second driving idea associated with this paper is the Evaluation of the role played by color and texture features in the decision. This works consider both types of features at the same times, but they do not attempt to clarify if one of these features plays a more relevant role. Both issues were tested using a data set of dermoscopy images from Hospital, and the system parameters were tuned by exhaustive testing of many thousands of classifiers.

V. FUTURE ENHANCEMENT

Local features following a recent trend in image analysis and recognition using genetic algorithm to classify the features based on the characteristics of the melanoma.

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