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A Feature Selection Framework for Granular Parakeratosis Lesion Detection

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Abstract: ***The dermatoscopy images play an essential role in the identification of skin diseases such as granular parakeratosis. This disease appears as an intertrigo or as a non intertriginous rash (intertrigo is nothing but rash in the body folds) and sometimes causes itchy. Extracting the features from skin lesion image is very important for the classification of skin disease. Some features such as shape, size, and color can be extracted from the image depending upon the ABCD (asymmetry, border, color and diameter) rule of dermoscopy. These extracted features are mainly used to determine asymmetry and border irregularity. Asymmetry is one of the main attributes in the early detection of skin disease. The dermatologists inspect shape and irregular color distribution to identify the lesion asymmetry. This paper provides a large set of skin lesion feature extraction approaches for the lesion analysis. Several techniques exist for extracting the features from lesion images and the computational methods have been developed for enhancing the features and allow dermatologists in the earlier diagnosis of the disease. The methods or the procedures adopted by several researchers for extraction of features are explained and the effect of these methods on the skin lesion is evaluated using suitable metrics. Though extraction of the features from the skin lesion has been successfully addressed in several articles, still there is a requirement for the modification or development of new techniques for improving the efficiency of the diagnosis system.***
Keywords: Skin Lesion, Granular Parakeratosis, Intertrigo, ABCD rule

I. INTRODUCTION

Granular parakeratosis is a disease that usually affects the axillary folds, and sometimes the other body folds [1]. Few authors have proposed that the disease can be caused due to contact with deodorants or antiperspirants. Parakeratosis can occur as both benign and malignant skin diseases. A person may suffer from the disease for months, immediately resolve and recur, and sometimes develop into fissures and erosion due to irritation. Figure 1 shows the sample of Granular parakeratosis (erythematous papules involving the abdomen)

Figure 1: The Granular parakeratosis sample

In recent techniques of medical imaging, there are several computational solutions available that aid clinicians to interpret the acquired images [2]. Considering the dermatology field, an assorted number of software solutions are available that is proved to be useful in the identification of skin disease or classification of a lesion from non-lesion.

If there are doubts in clinical procedure, then a biopsy is carried out and the type of skin lesion is determined on the cellular level of the histopathology report. In diagnostic dermatological methods, this is considered to be the “gold standard” to determine the type of lesion but requires additional cost and additional stress for the patient.

In the latest study, researchers have proposed several techniques for extracting the features that aid in isolating the affected part of the skin from the unaffected part. Some of these techniques are ABCDE, pattern analysis, texture analysis, etc [3]. In all these methods, many characteristics are identified according to some criterion and a numerical score is allotted to these characteristics. It then calculates the total score to determine the melanoma or not. Table 1.1 and Table 1.2 give the rules and result of the ABCD rule, respectively. Most of these techniques are based on comparing the changes in color, shape, and texture variations.

Table 1.1 ABCD rules

CONDITION	DESCRIPTION	SCORE
Asymmetry	Contour, Color and Structure	0-2
Border	8 segments	0-8
Color	Dark-brown, light-brown, white, black, red, blue-grey	1-6
Diameter	Greater than 6mm	1-5

Table 1.2 Results of ABCD rule

CLASS	TOTAL DERMATOSCOPY SCORE (TDS)
Suspicious	4.76 - 5.45
Melanoma	> 5
Benign	< 4.76

The machine-learning based diagnosis of skin lesion includes image acquisition, pre-processing, segmentation, feature extraction and classification. An effective tool for extracting features from the image is mathematical morphology [4]. A study concerning the shape of an image is nothing but morphology, and describing the shape of an image using set theory is known as mathematical morphology. In digital image processing, this determines the interaction between an image and the structuring element.
The rest of the paper proceeds as follows. In the section, "Analysis of feature extraction techniques", we present an overview of the techniques used by researchers for extracting the features from skin lesions. The manuscript concludes in "Conclusion" section.

II. ANALYSIS OF FEATURE EXTRACTION TECHNIQUES

Over the past few decades, several researchers in the computer vision and medical image analysis field are trying to develop automated techniques for skin lesion detection to achieve high performance.
The work of [5] extracted 12 shape features, 35 texture features, and 75 color features from the binary image based on the ABCD rule. The extracted features are normalized and then SVM classifier is applied to obtain a high performance leading to 90% specificity, 80% sensitivity, and 84% accuracy.
A computer-assisted method of [6] uses image processing techniques for the identification of melanoma. Geometric Feature is considered to be the main feature of a melanoma lesion. Hence, the authors adopted some Geometric Features such as the area, diameter, perimeter and irregularity index and concluded that the method can diagnose the melanoma disease more accurately.
The work of [7] by Rahil Garnavi et al specifies that a set of features have been used to recognize the irregular distribution of color, the structural properties of the lesion and shape-based features. These features have been experimented on images of the publicly available PH2 dataset. Then, several types of classifiers like binary classifier were applied that improved the detection of the asymmetry. Figure 2 shows the samples of Full and Half Symmetry and Full Asymmetry lesions.

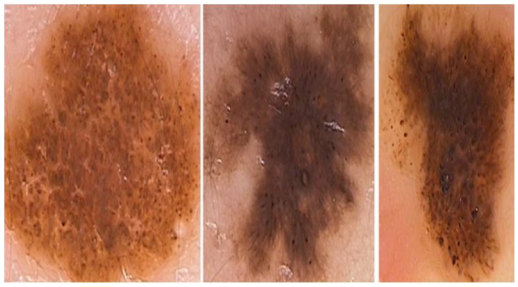


Figure 2: Example of Full Symmetry, Half Symmetry and Full Asymmetry types

An Entropy-Controlled Neighborhood Component Analysis (ECNCA) framework of [8] is proposed for the selection of features and the reduction of dimensionality. It merges the deep feature information to generate the feature vector and preserves the original feature space. "The proposed framework categorizes the skin lesion with 98.8%, 99.2%, 97.1% and 95.9% accuracy on PH2, ISIC MSK, ISIC UDA, and ISBI-2017 datasets, respectively and used only 3% of the total features". The utilization of such a small number of features improved the classification accuracy as well as minimized the computational time.

The ABCD-based feature extraction method of [9] proposes one asymmetry, three border irregularity, one color and two diameter features as different features. These features are grouped into two categories, the reflection of shape (*A*, *B*, and *D*) and color (*C*) and can detect melanoma lesions giving an accuracy of 72%.

A computer-aided method of [10] introduces a fractal-based border irregularity measurement and regional texture analysis technique for extracting the features from Dermoscopic images. A combination of gray level co-occurrence matrix (GLCM) and a proposed fractal-based regional texture analysis (FRTA) algorithm extracts the irregularity of lesion texture. It also proposed SVM-RFE (SVM based Recursive Feature Elimination) based feature selection method before each stage of the classification model to improve the performance of multi-class classification.

An ABCD-rule-based computational tool of [11] helps dermatologists to avoid the biopsy and identify the melanoma disease in the earlier stage. A Euclidian distance based Color Variation Index algorithm was used to determine the colors available in the lesion. The Asymmetry Index evaluation led to 81% sensitivity, 53% specificity, and 63% accuracy.

A computational method of [12] is based on diffusion filter and edge independent contour model. This model adopts the asymmetry, border, color and texture analysis for extracting the features from lesions. Eleven features represent the asymmetry, six features represent the border and eighteen features represent the texture attribute of the lesion and resulted in asymmetry accuracy of 97%, border accuracy of 74%, color of 74% and the texture of 64%.

The work of [13] used spatial and color features to determine the growth of the lesion pattern. A tree is constructed where the cluster of every pixel is paired with the node. The model was evaluated to determine the pattern growth of dermoscopic atlas images and resulted in the sensitivity of 89% and specificity of 90%.

III. CONCLUSION

Due to the rapid growth of skin diseases, there is a need for the development of new methods for the early diagnosis of lesions, such as granular parakeratosis that is caused due to irritation or allergy. The algorithms such as ABCD, and pattern analysis provides a strong input for healthcare professionals to diagnose skin diseases at an early stage. Therefore, the attributes such as "Asymmetry" must be correctly classified by an automated system. The main purpose of this paper is to survey and determine the efficient feature vector method for the identification of skin lesions. An overview of the feature extraction methods that are implemented on skin lesions to extract the features such as color, texture, and shape is presented. From this, it can be analyzed that extracting the features from skin images provides better accuracy by using a combination of several techniques like SVM-RFE, GLCM, ABCD, etc. Hence, a suitable feature extraction technique can be modified for taking the features from granular parakeratosis before classifying it as benign or malignant.

IV. CONFLICT OF INTEREST

The authors declare that there is no conflict of interest

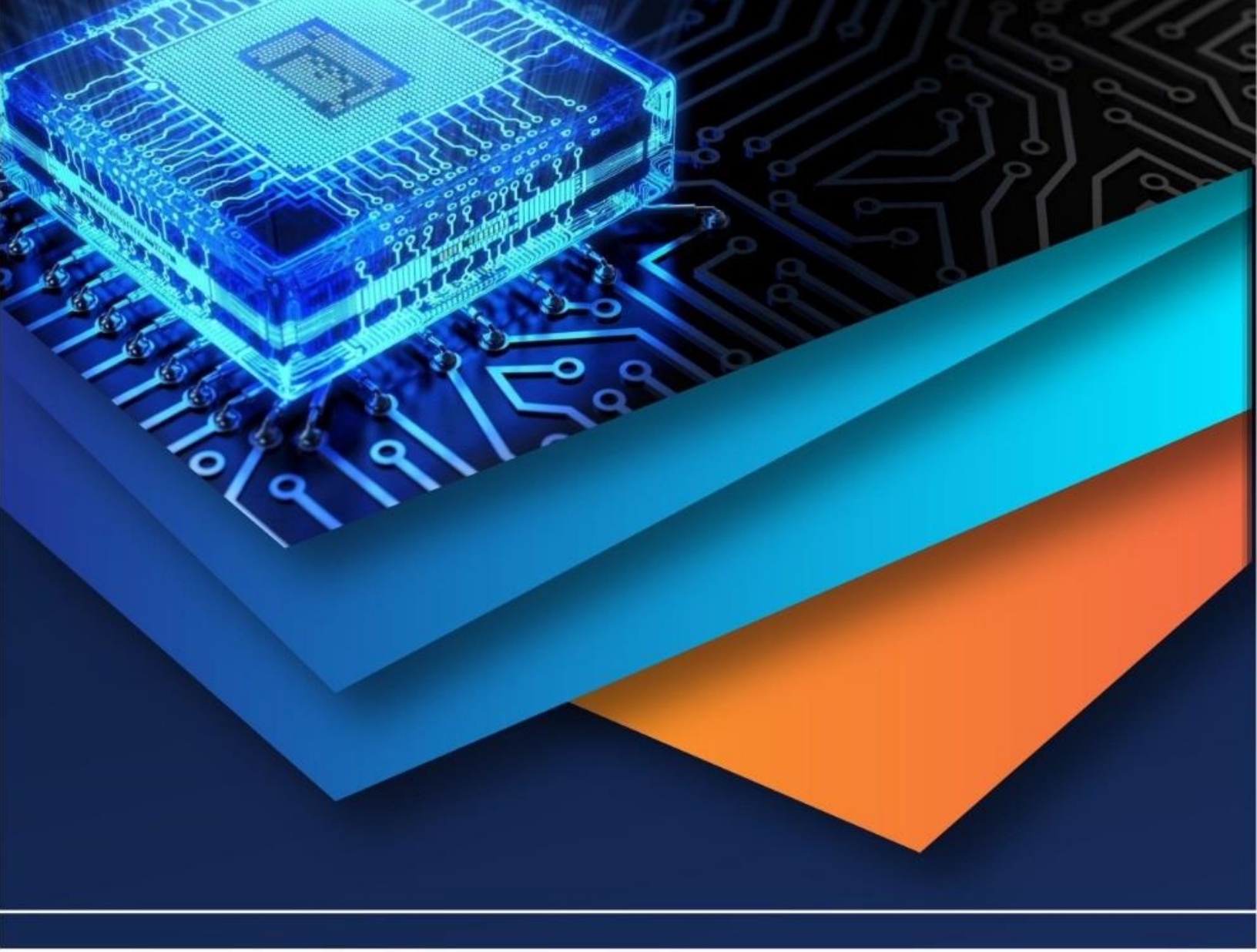
V. ACKNOWLEDGMENT

(Sheetal and Dr.Girisha have contributed to this paper equally.)

REFERENCES

[1] J. C. Cardoso et al., "'Hints' in the horn: diagnostic clues in the stratum corneum," J. Cutan. Pathol., vol. 44, no. 3, pp. 256–278, 2017, doi: 10.1111/cup.12839.
[2] H. G. Stockmeier, H. Backer, W. Baumler, and E. W. Lang, "BSS-Based feature extraction for skin lesion image classification," Lect. Notes Comput. Sci. (including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics), vol. 5441, pp. 467–474, 2009, doi: 10.1007/978-3-642-00599-2_59.
[3] N. S. Zghal and I. K. Kallel, "An effective approach for the diagnosis of melanoma using the sparse auto-encoder for features detection and the SVM for classification," 2020 Int. Conf. Adv. Technol. Signal Image Process. ATSIP 2020, 2020, doi: 10.1109/ATSIP49331.2020.9231611.
[4] S. Chatterjee, D. Dey, and S. Munshi, "Mathematical morphology aided shape, texture and colour feature extraction from skin lesion for identification of malignant melanoma," 2015 Int. Conf. Cond. Assess. Tech. Electr. Syst. CATCON 2015 - Proc., pp. 200–203, 2016, doi: 10.1109/CATCON.2015.7449534.
[5] N. Razazzadeh and M. Khalili, "A high performance algorithm to diagnosis of skin lesions deterioration in dermatoscopic images using new feature extraction," Can. Conf. Electr. Comput. Eng., vol. 2015-June, no. June, pp. 1207–1212, 2015, doi: 10.1109/CCECE.2015.7129449.
[6] S. Jain, V. Jagtap, and N. Pise, "Computer aided melanoma skin cancer detection using image processing," Procedia Comput. Sci., vol. 48, no. C, pp. 735–740, 2015, doi: 10.1016/j.procs.2015.04.209.

[7] R. Chakravorty, S. Liang, M. Abedini, and R. Garnavi, "Dermatologist-like feature extraction from skin lesion for improved asymmetry classification in PH2 database," Proc. Annu. Int. Conf. IEEE Eng. Med. Biol. Soc. EMBS, vol. 2016-October, pp. 3855–3858, 2016, doi: 10.1109/EMBC.2016.7591569.
[8] T. Akram et al., "A multilevel features selection framework for skin lesion classification," Human-centric Comput. Inf. Sci., vol. 10, no. 1, 2020, doi: 10.1186/s13673-020-00216-y.
[9] S. Majumder and M. A. Ullah, "A Computational Approach to Pertinent Feature Extraction for Diagnosis of Melanoma Skin Lesion," Pattern Recognit. Image Anal., vol. 29, no. 3, pp. 503–514, 2019, doi: 10.1134/S1054661819030131.
[10] S. Chatterjee, D. Dey, and S. Munshi, "Integration of morphological preprocessing and fractal based feature extraction with recursive feature elimination for skin lesion types classification," Comput. Methods Programs Biomed., vol. 178, pp. 201–218, 2019, doi: 10.1016/j.cmpb.2019.06.018
[11] Walid Al-Zyoud, Nathir A Rawashdeh, "Visual feature extraction from dermoscopic colour images for classification of melanocytic skin lesions ", EurAsian Journal of BioSciences , pp. 1299-1307, 2020
[12] Roberta B. Oliveira, Norian Marranghello, Aledir S. Pereira, João Manuel R.S. Tavares, "A computational approach for detecting pigmented skin lesions in macroscopic images", Expert Systems With Applications, pp. 53–63, 2016, doi: http://dx.doi.org/10.1016/j.eswa.2016.05.017
[13] Sina KhakAbi, Tim Lee, Margaret Stella Atkins, "Multi-level Feature Extraction for Skin Lesion Segmentation in Dermoscopic Images", Proceedings of SPIE - The International Society for Optical Engineering , February 2012, DOI: 10.1117/12.911664



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