

UNIVERSITI TEKNOLOGI MARA

**DIGITAL IMAGE PROCESSING TECHNIQUES
FOR PRE-DIAGNOSIS OF PSORIASIS SKIN
DISEASES**

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ABSTRACT

This research involves the analysis of psoriasis skin lesions images. The images are captured using digital camera under controlled conditions. These images were collected from psoriasis patients at Hospital Universiti Kebangsaan Malaysia (HUKM) over five months starting from July 2002. The images include three major types of psoriasis skin lesions. Two major works were carried out; one is done using image color and another one on skin lesion border segmentation. Color analysis was employed to distinguish the three major types of psoriasis skin diseases infecting the Malaysian population. Four color analysis techniques were applied; normalization techniques, Gaussian parameters', color spaces and pre-processing techniques. These color analyses produce a color model to distinguish the psoriasis skin disease. Second, border segmentation technique is introduced. Skin lesion border segmentation is a new technique to segment the psoriasis image into lesion, skin and other background. Accurate and reliable outline detection is important in order to segment the image into lesion, skin and other background, thereby ensuring that asymmetry and diameter measurement can be carried out only in the lesion image. Results from psoriasis skin lesion segmentation can be used in skin lesion shape, diameter and asymmetry calculation.

From the results, a simple unified approach model for color analysis was constructed integrating significant normalization technique, Gaussian parameters', color space and pre-processing techniques. The mean value of red color component was found to be significant in pre-diagnosing the types of psoriasis skin diseases. In this color model, the plaque confidence interval is between 1.823 to 2.248, guttate confidence interval is between 1.169 to 1.594 and erythroderma confidence interval is between 2.974 to 3.399. Many combinations of the processing techniques had been tried to find robust border segmentation technique. From all the techniques, the proposed segmentation technique gives higher reliability and visually accurate continuous boundaries for a range of images. In this research, it produces visually accurate border segmentation more than 90% of psoriasis skin disease images. The results from border segmentation can be used for diameter calculation, asymmetry of lesion and recognition of the lesion border.

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Dermatology is about medical study on skin diseases or lesions. Visual inspection lies at the heart of clinical diagnosis for skin diseases. The fundamental concept of learning it is by looking at the skin lesion and trying to match its appearance to the closest appearance from a photo library [Herbin, 1990; Haeghen, 2000; Gawkrödger, 1992; Fitzpatrick, 1997 and Donohoe, 1998]. After this, experienced dermatologist will use morphological learning method and the differential diagnosis steps to identify the disease. However, both of these methods still need conventional clinical photos or images as guidance for diagnosis. Therefore, it needs a preliminary analysis of color and texture of a lesion, but the human eye is not always sufficient to perform such analysis [Herbin, 1990].

Since color, color difference as well as shape in images convey important diagnostic information for a lesion, their quantitative measurements are very helpful when investigating the lesion especially when early diagnosis is crucial. At the same time, visual record for the evolution and progress growth of a suspected skin lesion is also critical.