# Chapter 11
# Classification of Skin Lesion Using (Segmentation) Shape Feature Detection

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## ABSTRACT

*Malignant melanoma has caused countless deaths in recent years. Many calculation methods have been created for automatic melanoma detection. In this chapter, based on the traditional concept of shape signature and convex hull, an improved boundary description shape signature is developed. The convex defect-based signature (CDBS) proposed in this paper scans contour irregularities and is applied to skin lesion classification in macroscopic images. Border irregularities of skin lesions are the predominant criteria for ABCD (asymmetry, border, color, and diameter) to distinguish between melanoma and nonmelanoma. The performance of the CDBS is compared with popular shape descriptors: shape signature, indentation depth function, invariant elliptic Fourier descriptor (IEFD), and rotation invariant wavelet descriptor (RIWD), where the proposed descriptor shows better results. Multilayer perceptron neural network is used as a classifier in this work. Experimental results show that the proposed approach achieves significant performance with mean accuracy of 90.49%.*

DOI: 10.4018/978-1-7998-0326-3.ch011

## INTRODUCTION

Skin cancer is known as one of the most usual forms of cancer in different countries (Oliveira et al., 2016). There are three commonly known types of skin cancers including basal cell carcinoma (BCC), squamous cell carcinomas (SCC), and melanoma. However, malignant melanoma is considered as the deadliest type of skin cancers and is the cause of majority of deaths (75%) related to skin cancer (Jerant et al., 2000). The American Cancer Society estimated that there will be about 87110 new cases (52170 in men and 34940 in women) and about 9730 deaths (6380 in men and 3350 in women) related to melanoma in the United States in 2017 ("American Cancer Society", 2017).

Early detection of melanoma can help dermatologists find appropriate treatment and survive patient (Jerant et al., 2000). The clinical methods for diagnosing skin lesions are established on visual examination. Several approaches were suggested by dermatologists, such as ABCD(E) (asymmetry, border, color, diameter, and evolution) (Blum et al., 2003; Nachbar et al., 1994), seven-point check list (MacKie & Doherty, 1991), and Menzies method (Menzies et al., 1996).

Rapidly growth of melanoma incidence rate and also possibility of misdiagnosis encouraged the development of computational methods for melanoma detection. Principal steps of computer aided diagnosis (CAD) systems for identifying skin lesions include image acquisition, preprocessing, segmentation, feature extraction, and classification (Wighton et al., 2011).

Macroscopy and dermoscopy are common non-invasive imaging techniques of skin lesions (Smith & MacNeil, 2011). Whereas dermoscopic images are captured by a proper device to provide a magnified visualization of the skin surface, macroscopic images are ac- quired by standard camera, a more accessible device (Engasser & Warshaw, 2010).

The rest of this paper is organized as follows. Section II presents the newly suggested descriptor, its feature set, and also a shape and textural feature set. Section III discusses the experimental results of the proposed feature set. Finally, Section IV provides the summary and conclusion.

## PROPOSED METHOD

In this section, we represent our extension to the shape sig- nature and show it can be more helpful in describing a concave contour in comparison with the conventional shape signature. The new signature is created based on a known concept: convex hull. Hence, we firstly give the definition of conventional signature and convex hull and