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Review on Techniques and Steps of Computer Aided Skin Cancer Diagnosis

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Abstract

Early stage detection of skin cancer needs computer aided detection. Automatic skin cancer diagnosis is one of the major challenging task in medical image processing. This paper discusses more efficient methods to reduce rate of error. Automatic diagnosis system works on two reliant steps – the first detect skin anomalies and second identifies the benign or malignant melanoma. This paper presents steps and methods for automatic skin cancer diagnosis. This paper provides useful information of techniques and basic steps of skin cancer diagnosis for researchers in their starting phase.

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Keywords: Skin cancer, Artificial neural network, Fuzzy rule based , Adaptive fuzzy inference neural network .

1. Introduction

Skin cancer is the deadliest form of cancer if it is not detected in early stage. Skin cancer may appear as benign melanoma and malignant melanoma. Benign melanoma is appearance of mole on skin [7]. Malignant melanoma is deadliest form of cancer thus it needs immediate detection. Malignant melanoma arises from cancerous growth in

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pigmented skin lesion. Melanocytes are the pigments giving color to skin which generally starts with a small region later spreads to the other skin areas through lymphatic system or blood. In normal case old cell replace by new cell while in case of cancer they grow in abnormal way it become cancerous due to genetic disorder by external or internal factor. Human skin is made of three layers - dermis, epidermis and hypodermis [3]. Cells in the outermost layer of skin produce melanin pigment which protects human skin from ultraviolet radiations. Dermatology is the bough of medical science that is concerned with diagnosis and treatment of skin based disorder.

Early stage detection of skin cancer needs computer aided detection. Generally, doctors use biopsy method for the diagnosis of skin cancer. Biopsy is the removal or scrapping off the skin and those skin samples are undergone many laboratory test hence it is time consuming and painful [7]. There are many features or sign of skin cancer such as blue-white veil, multiple brown dots, psuedopods, radial streaming, scar-like depigmentation, globules, multiple colors, multiple blue gray dots, pigmented network [11,8,4].

There are many steps for diagnosis of skin cancer such as pre-processing, image segmentation, feature extraction, classifier for diagnosis. In this paper we discuss each step and its methods for skin cancer diagnosis. As a classifier we can use artificial neural network, fuzzy rule based system or adaptive fuzzy inference neural network.

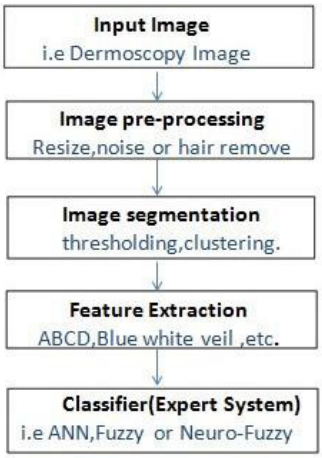

Fig. 1 Steps of skin cancer diagnosis.

2. Steps for Skin Cancer Diagnosis

Dermoscopy also known as Epiluminenescence. In diagnosis process, input image is dermatoscopic image. It is imaging technique used to examine skin lesions with a dermatoscope [7]. Skin cancer diagnosis includes different steps as shown in Fig. 1. In this paper we will discuss each step of diagnosis process.

2.1. Image pre-processing

Preprocessing is the first stage of detection to improve the quality of images, removing the irrelevant noises such as hair, bubbles etc. These noises cause inaccuracies in classification [7]. We need pre-processing of input image because of several reasons [4]: (i) low contrast between skin lesion and surrounding skin, (ii) irregular borders, (iii) artifacts such as skin lines, hairs, black frames, etc.