

International Conference on Robot PRIDE 2013-2014 - Medical and Rehabilitation Robotics and Instrumentation, ConfPRIDE 2013-2014

The Beneficial Techniques in Preprocessing Step of Skin Cancer Detection System Comparing

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Abstract

Automatic diagnostics of skin cancer is one of the most challenging problems in medical image processing. It helps physicians to decide whether a skin melanoma is benign or malignant. So, determining the more efficient methods of detection to reduce the rate of errors is a vital issue among researchers. Preprocessing is the first stage of detection to improve the quality of images, removing the irrelevant noises and unwanted parts in the background of the skin images. The purpose of this paper is to gather the preprocessing approaches can be used in skin cancer images. This paper provides good starting for researchers in their automatic skin cancer detections.

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Peer-review under responsibility of the Center for Humanoid Robots and Bio-Sensing (HuRoBs)

Keywords: Preprocessing Techniques, Skin cancer, Detection, Automatic Systems

1. Introduction

Skin cancer is an increasing cancer in different countries. With this type of cancer, the patient can be survived if it is detected in early stages [1]. So, early detection is the promising strategy to cut the mortality rate of skin cancer [2]. As skin cancer diagnosis can be faced to different human faults and involves some expense and morbidity, researchers are trying to automate this assessment to verify if it is inoffensive or dangerous, and estimate it with a small margin of error less than the human achievements [1]. In such systems, the accuracy of diagnostics is not always acceptable and involves some errors. Therefore, high performance computer aided diagnostic systems help the physicians to avoid misdiagnosis. The common approaches to skin lesion early detection include different steps of Preprocessing, Segmentation, Feature extraction and Classification [1].

Since the output of each step is the input of next step, all steps have an important role to avoid misdiagnosis. Preprocessing as the first stage of computer aided cancer diagnostics has serious effects on misleading the results [3]. Although the success of such systems critically depends on pre-processing [4], only a few papers until now dealing with preprocessing techniques.

In skin cancer detection, preprocessing step can be divided into image enhancement, image restoration and artefact removal. Each stage includes different techniques which will be discussed in this paper. Furthermore, the selection of

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preprocessing techniques depends on the subsequence methods which have been selected for the automaton system [4]. The Gaussian, mean and median filters [5], and speckle noise filters [6, 7] are as the most popular pre-processing techniques.

The paper is organized as follows. In Section II, we review the total scheme of preprocessing stages. Thereafter in Sections III, VI and V, the different techniques of image enhancement, image restoration and hair removal are discussed respectively, and also the most effective techniques are illustrated according the literature. Section VI is conclusion of the paper.

2. Pre-processing In Skin Cancer Detection Systems

Image pre-processing is an essential step of detection in order to remove noises and enhance the quality of original image. It required to be applied to limit the search of abnormalities in the background influence on the result [8]. The main purpose of this step is to improve the quality of melanoma image by removing unrelated and surplus parts in the back ground of image for further processing. Good selection of preprocessing techniques can greatly improve the accuracy of the system [9]. The total framework of techniques followed in preprocessing stage of medical image processing is illustrated in Fig. 1.

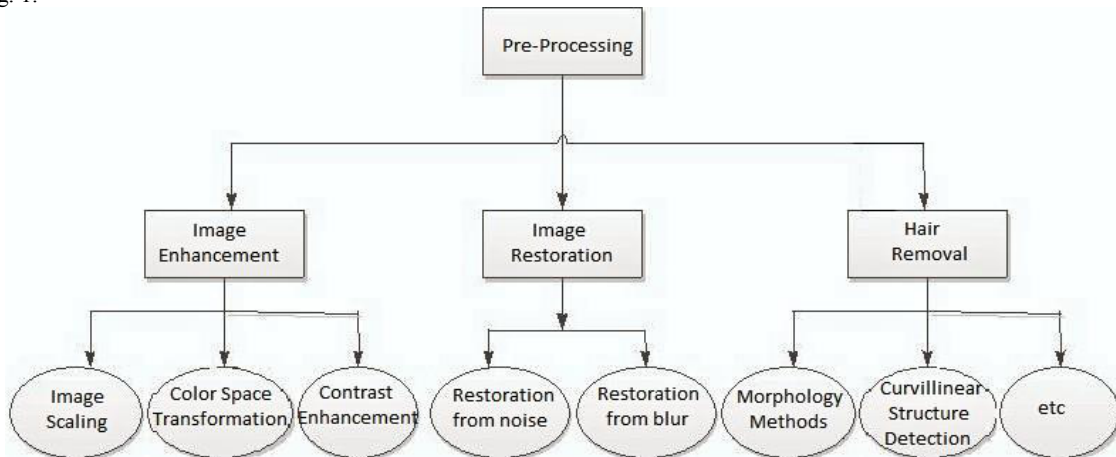


Fig. 1. Total framework of preprocessing in Skin cancer detection systems

The objective of the preprocessing stage can be achieved through three process stages of image enhancement, image restoration and hair removal. Here, the paper explains above techniques clearly for researchers who involves in pre-processing stages of automatic detections.

3. Image Enhancement

Image Enhancement is a crucial procedure to improve the visual appearance of the image; it is defined as provider of the “better” transform representation for further automated steps of detection [10].

Thus, the image enhancement can be categorized in three categories:

3.1. Image Scaling

Image scaling techniques are applied due to the lack of same and standard size of images. Since the skin cancer images may be gathered from different sources and sizes, the first step is to resize the images to have the fixed width pixels but variable size of height [11].

3.2. Color Space Transformation

Since color information plays an inevitable role in skin cancer detection systems, researchers try to extract the more corresponding color of images for further processing. Generally, the common color spaces include RGB, HSV, HSI, CIE-LAB and CIE-XYZ.

RGB is a color space which comprise the red, green, and blue spectral wavelength. The most frequently presentation of colors in image processing is RGB. Since RGB color space has some limitation in high level processing, other color space representations have been developed [12].

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