

Differential Diagnosis of Eczema and Psoriasis Using Categorical Data in Image Processing

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Abstract - A number of attempts have been made at using image processing and machine learning to automate the diagnosis process of dermatological diseases. Psoriasis and eczema are two conditions that are usually misdiagnosed, and were selected after an investigation. The reason for this high rate of misdiagnosis is due to the margin of error present in the method doctors use to perform a diagnosis. This method consists of using the visual aspects of the disease along with non-visual patient history questions. This method is not as effective when certain diseases do not have definitive answers to these history questions and the doctors have to base the diagnosis almost entirely on the visual aspects displayed on this skin. The proposed solution addresses this problem by combining both the visual as well as non-visual feature vectors into a single classifier, a support vector machine, which once trained, enables diagnosing to a reliable level of accuracy at 84%.

Keywords - image processing; machine learning; statistical processing

I. INTRODUCTION

The misdiagnosis of dermatological diseases is a very common occurrence throughout the world, and a great number of people needlessly suffer due to the lack of accurate treatment. A common cause for the problem of misdiagnosis is due to the lack of distinct answers that patient history questions produce and therefore doctors usually base the entire diagnosis on the visual appearance of the lesions.

Eczema and psoriasis are two diseases that not only look visually similar, but also produce very similar answers to the questions that doctors can ask the patients to confirm the diagnosis. This makes an accurate first time diagnosis very difficult, and often result in the patient needlessly suffering and making several medical visits to finally arrive at an accurate diagnosis [7]. Existing attempts at solving similar problems have involved using image processing and classification to perform a diagnosis using the visual aspects of the disease.

This method proves effective given that the lesions are textbook style cases, which is often not the case with these two diseases. The following research aims to address this problem and presents a novel method for the differential diagnosis of these two diseases. In the case of psoriasis and eczema, two important non-visual attributes were selected, which include the location where the lesions are located as well as the lesion's itch factor. The proposed solution looks at an approach to use the visual properties seen on the lesions as well as the non-visual properties to make a more accurate diagnosis between the two diseases.

II. AIM

Research, design, implement, test and evaluate a software system which can perform a differential diagnosis between psoriasis and eczema, incorporating both visual and non-visual attributes, to a reasonable degree of accuracy.

III. BACKGROUND

Dermatological diseases are usually some of the toughest medical conditions to accurately diagnose the very first time, due to the fact that a majority of the diagnosis is based on the appearance of the patient's skin. Unfortunately, this appearance can differ for reasons unrelated to the disease. These reasons include the patient's skin colour, environment, and other variables based on the disease [3]. Due to these factors it is very common to see doctors, as well as dermatologists, often misdiagnose certain types of dermatological diseases. This problem is not valid for all existing dermatological diseases; diseases such as leprosy and foot ulcers are diseases that are more commonly accurately diagnosed by most doctors and are rarely misdiagnosed due to their distinct visual and non-visual properties. This is partly because of their easily distinguishable visual features as well as due to the easily distinguishable points in the patient's history.

On the other hand, there are some dermatological diseases that look very similar to each other. A fraction of these diseases do not have easily discernible answers to the questions that doctors ask from patients, with regards to their