INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact Factor: 6.078
(Volume 7, Issue 6 - V7I6-1310)
Available online at: https://www.ijariit.com

Skin diseases analysis using a Machine Learning approach

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ABSTRACT

Dermatological illnesses are caused by flaws in the skin's components or layers. It has targeted individuals of various ages, genders, races, socioeconomic statuses, and backgrounds. When health priorities are established, skin disorders are often seen as minor players compared to the worldwide league of illnesses that cause significant mortality, such as HIV/AIDS, community-acquired pneumonia, and TB. On the other hand, skin issues are among the most often seen illnesses in tropical primary care settings (such as India). In this work I want to eradicate the practice of overlooking minor skin deformities as they may be the symptoms of something severe. Because ignoring a small red inflation spot on your chin may be okay, as it may be Acne, which does -practically- no harm to your body, but ignoring an ununiform black mole may be the biggest mistake of your life as there is a significant possibility that it may be the cause of Melanoma- the most severe type of skin cancer. This work gives the overall review of skin issue by predicting it using machine learning (ML) approach.

***Keywords*:** *Skin Diseases, Cancer, Human Body, Ml.*

1. INTRODUCTION

In a broader context, all interacting surfaces in relative motion may be studied in tribology research, expanding the application horizon of tribology. It is interdisciplinary, drawing on physics, chemistry, engineering, materials science, and biology. Skin Tribology is one area of study that has piqued the curiosity of several researchers worldwide. There are several circumstances in which skin interactions within a given system become problematic. Three sections summarise the authors' current interests and work in the field of skin: (1) Interactions between fabrics and skin and the comfort problem, (2) Skin cosmetic effects, and (3) Using suitable skincare products and cosmetics to treat skin diseases [1]. In the context of skin tribology, skin wear and tear appears as aging and skin diseases, while the advent of skincare and cosmetics provides a means of treating skin aging and disorders. Skincare solutions are used to lubricate the skin's surface the same way as oil lubricants minimize friction between interacting surfaces of machine components, resulting in more efficient system functioning [2]. Following figure show the some basic issue occurs on skin,

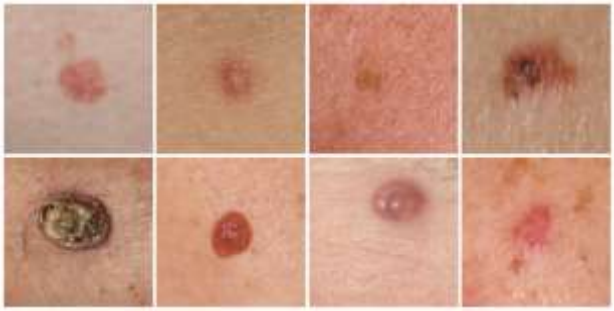

Figure 01: Examples of clinical images of typical skin diseases

A review of skin disorders are related to skin's components or layers defects of human skin. It has targeted all kinds of people regardless of age, gender, race, as well as social and economic status.

1.1 Problem statement

Skin conditions are common in young people, with acne vulgaris alone affecting approximately 85% of young adults aged 12–25 years old according to the Global Burden of Disease study. Being a teenager myself and that too belonging from a tropical

country [3], I understand our age group is most vulnerable to skin infections and hence increasing the probability that these may be caused due to a severe disease. The limited availability of dermatologists especially in the rural areas adds on to the difficulty of getting the skin checked up. I wanted to make a convenient method to identify the skin condition, alerting the person on how urgent it is to consult a doctor if needed [4].

2. RESEARCH PROGRESS AND SKIN FACTS

Analyzing the present state of research on skin diseases enables us to assess the topic's relevance and the research community's interests across time. Skin diseases are caused by malfunctioning skin components or flaws in the human skin's layers. Regardless of age, gender, or color, skin problems impact many individuals worldwide, including those who suffer and treat them. The research trend on skin diseases during the last two decades (1999–2019) is shown in Figure 1, which details the number of publications on the subject during that time [5]. The trend was generated using the Science Direct Search Engine with "common human skin problems" and was limited to peer-reviewed research publications. It is helpful to divide the trend in Figure 1 into three distinct periods: (1) 1999-2002, (2) 2003 to 2010, (3) 2011 to 2019. Overall publications decreased between 1999 and 2002, reaching 746, 710, 663, and 582 for the corresponding years. In the second era, total publications increased dramatically in 2003, reaching 715, but then fell to 675 in 2004. Two dimples were detected between 2003 and 2010, one in 2004 and the other in 2008 (676 publications) [6]. The remainder of this second period sees a gradual improvement. Between 2011 and 2019, there is a rising trend with a higher slope, suggesting a very productive research time. Between 2018 (1120) and 2019 (1421), a notable increase in publications of 301 is noticed. The development may indicate that more individuals seek treatment for skin diseases from competent practitioners such as dermatologists, aesthetic physicists, and beauticians [7]. Additionally, it may reflect an increasing awareness among people to be more beauty conscious in their lives as their economy grows. Section 4.0 discusses the data's split into the many primary skin conditions.

3. IMPACT OF SKIN DISEASE ON QUALITY OF LIFE

Skin diseases are a substantial danger to patients' well-being, mental health, ability to function, and social participation, a measure of disability defined generally by the World Health Organization as a person's capacity to be active and engaged in interpersonal relationships. Tools for assessing the influence of medical problems on these health determinants include quality of life (QoL) measures. Numerous QoL measuring instruments exist and may be tailored to various contexts, such as the Dermatology Life Quality Index (DLQI) and the Skindex [8].

Skin disorders have a substantial and well-documented impact on the quality of life in resource-rich environments. There is much less research investigating the quality of life of people with skin disorders in resource-limited settings. Fewer yet make direct comparisons between QoL in resource-scarce and resource-rich environments. Disabling symptoms such as pruritus are often associated with conditions that cause the most significant disability burden. Dermatitis, prurigo, and the more common urticaria are among these disorders. A study of quality of life among South African patients with skin complaints found that patients with these disorders had a considerably worse quality of life than controls in areas such as depression, anxiety, influence on job or study, wardrobe selection, and house maintenance [9].

4. IMAGE ACQUISITION AND DATASETS

Image acquisition

Obtaining images Dermatology is a visual specialty, meaning that most diagnoses may be made by visual examination of the skin. Dermatologists value equipment-assisted visual examination because it may provide critical information for the accurate early detection of skin disorders [10].

Dataset

The key criterion for developing dependable algorithms has always been high-quality data. A considerable quantity of labeled data is required for training a deep neural network in particular. As a result, it is critical to have high-quality skin disease data with trustworthy diagnostic labels when creating sophisticated algorithms. I trained my model using a collection of photographs of acne, hives, and melanoma-infected skin [11][12].

5. RESULT ANALYSIS

The main purpose of my machine learning model is to identify the type of skin disease. Currently my model can identify Acne, Urticaria-Hives and Melanoma (Skin Cancer). Just by taking a photo of the infected skin, our model can identify between these three-skin condition/diseases with an accuracy of 98.94%. Following figure show the confusion matrix of predicted analysis.

Figure 02: Confusion matrix of Skin diseases using ML approach

6. CONCLUSION

Between 2010 and 2013, skin disorders were the world's fourth most significant cause of non-fatal morbidity. This epidemiological birds-eye perspective reveals regional and conditional differences, with resource-poor regions bearing a disproportionate burden of infectious skin disorders and resource-rich areas bearing a disproportionate burden of malignancies. Due to the scarcity of high-quality studies in resource-limited settings, there is little data on dermatological disorders' effects in these countries. The scarcity of data demonstrating regional and cultural differences in the effect of dermatological symptoms, such as pruritus-related quality of life, emphasizes the need for setting-specific research. Extrapolating results from resource-rich countries is thus not recommended; further financing for dermatology research and services in resource-poor settings is required.
Dynamic solutions will be required to address this mismatch between resource requirements and allocation. One such option is provided by ML, which directs dermatological knowledge to regions in need. Optimum program design and testing we are able to get proper prediction to skin diseases to avoid the uncertain issue or diseases like cancer. Further we can able to increased commitment to delivering care to all patients, and able to give solution to seen and unseen skin diseases.

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