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ENHANCING SKIN DISEASE DETECTION: A FOCUS IN COMMON SKIN CONDITIONS IN THE PHILIPPINES USING COMPUTER-VISION AND MACHINE LEARNING

Rationale/ Introduction

Skin diseases are common in the Philippines; they may be caused by fungal infection, bacteria, allergies, or viruses, impacting a large portion of the population, especially those with poor hygiene. In the Philippines, skin diseases such as acne, eczema (atopic dermatitis), psoriasis, keratosis pilaris, leprosy, and warts are among the most prevalent (Recio, 2020). According to 7 Common Types of Skin Rashes in the Philippines, which are miliaria, rosacea, vitiligo, contact dermatitis, medication rash, psoriasis, and hives (Cabigao, 2023). However, the existing research titled "Recognizing Common Skin Diseases in the Philippines Using Image Processing and Machine Learning Classification" did not include the skin conditions stated. These diseases range in severity and appearance, making diagnosis and management difficult. Diagnosis costs are still limited and expensive. Moreover, according to research entitled "Epidemiology of Dermatologic Conditions Among Elderly Patients at the Ambulatory Care Service of a Tertiary Hospital in Metro Manila from 2014 to 2018: A Five-year Review," which showed that elderly patients comprised 16.76% of the total patients who sought dermatological consultation at the ambulatory care service of the hospital, the majority of the patients were female. Xerosis/xerotic eczema (10.02%) was the most frequently encountered skin disease. The top 10 diseases were irritant contact dermatitis (7.00%), lichen simplex chronicus (6.67%), psoriasis (5.56%), seborrheic dermatitis (5.24%), allergic contact dermatitis (4.37%), tinea pedis (3.51%), herpes zoster (3.49%), seborrheic keratosis (3.23%), and milia (2.54%). Based on the nature of the disease, inflammatory conditions were the most commonly seen. In accordance with the results, three of the top ten disorders stated are included in the scope of this suggested research. Benedetti (2024) also mentioned that there are two types of medication/drug rashes which are allergic and non allergic drug rashes. Allergic drug rashes occur when the immune system comes into contact with a substance and becomes sensitive to it. Sometimes a person becomes sensitized to a substance after only one exposure, while other times it takes several exposures. Once a person becomes sensitized to a substance, subsequent exposure to that drug causes an allergic reaction, such as a rash or hives. Meanwhile, non allergic drug rashes indicate that certain medicines increase the skin's

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susceptibility to the effects of sunshine or other sources of UV light. These medications include antipsychotics, tetracyclines, sulfa antibiotics, hydrochlorothiazide, and nonsteroidal anti-inflammatory medicines (NSAIDs). When the medicine is administered, no rash emerges; nevertheless, later exposure to the sun while taking the drug may produce photosensitivity.

The proposed research seeks to implement computer-vision and machine learning techniques to further improve the scope of skin disease detection, with a particular focus on miliaria, rosacea, vitiligo, contact dermatitis, medication rash, psoriasis, and hives. According to the study of Nawal, Soliman, ALKolifi, and ALEnezi from Department of Computer Science and Engineering at Umm AL-Qura University, Saudi Arabia, image processing techniques help build an automated screening system for dermatology at an initial stage. The extraction of features plays a key role in helping to classify skin diseases. Computer vision has a role in the detection of skin diseases using a variety of techniques. This method takes a digital image of the affected skin area and then uses image analysis to identify the type of skin disease (A Method of Skin Disease Detection using Image Processing and Machine Learning, 2019). This research proposal aims to use a Python-based computer-vision and machine learning system for skin disease recognition and diagnosis.

Furthermore, it demonstrates the impact of technology in the medical field. The proposed research offers improved and efficient diagnosis of skin diseases. This also leads to cost savings within the healthcare system as it streamlines the diagnostic process and reduces the need for multiple visits or specialized tests. It will also provide more effective and precise care to patients by providing them with new tools and ways for diagnosing skin diseases. This promotes professional growth and raises the standard of care given by healthcare professionals in the Philippines. Additionally, it extends the reach of dermatological expertise to underprivileged areas where it is most needed, promoting equity in healthcare access.

In conclusion, the proposed research offers an innovative approach to dermatological care in the Philippines through the use of computer-vision and machine learning approaches for skin disease detection. By improving diagnostic accuracy, efficiency, and access to dermatological knowledge, the created system has the potential to significantly improve the experience of patients, eliminate inequalities in healthcare, and optimize resource use within healthcare systems. Moreover, the proposed research offers advancements in dermatological care, aligning with Sustainable Development Goals as well

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as promoting equal access to quality healthcare for individuals affected by skin conditions that are common in the Philippines.

Significance of the Study

The proposed research holds importance for dermatological care in the Philippines, offering an innovative approach to identifying and detecting common skin diseases with the use of image processing and machine learning. The proposed research contributes to universal access to medical care and encourages equity in healthcare delivery, especially for individuals in underprivileged areas that are affected by common diseases in the Philippines. By addressing the misconceptions about skin diseases by identifying them, it reduces the inequalities for individuals. Furthermore, this research proposal aims to improve the existing research entitled "Recognizing Common Skin Diseases in the Philippines Using Image Processing and Machine Learning Classification" by broadening the scope of skin diseases. Moreover, this research promotes innovation and education in digital health technology and equips medical practitioners with new tools and strategies for efficient disease management. This research aims to identify further skin diseases such as miliaria, rosacea, vitiligo, contact dermatitis, medication rash, psoriasis, and hives through computer-vision and machine learning.

The proposed research aligns with Smart Engineering, ICT and Industrial Competitiveness as it contributes to the advancement of digital health technology in dermatology. It fosters innovation and competitiveness in the healthcare sector as it promotes the adoption of advanced ICT solutions in clinical practice. It also aligns with Public Health and Welfare, as it improves public health outcomes and enhances the welfare of individuals affected by skin conditions in the Philippines. Moreover, it aligns with Societal Development and Equality, by reducing healthcare inequities and increasing equitable access to diagnosis and treatments.

Scope and Limitations of the Study

This study focuses on developing a computer-vision and machine learning system to detect and classify common skin diseases in the Philippines, specifically miliaria, rosacea, vitiligo, contact dermatitis, medication rash, psoriasis, and hives. The system will use image processing techniques and deep learning models to analyze skin images and provide diagnostic insights. It aims to improve the accuracy and accessibility of dermatological

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assessments, particularly in areas with limited access to specialists. The research will also build upon previous studies by expanding the number of skin conditions recognized and integrating a user-friendly interface for healthcare professionals and patients.

However, the study has certain limitations. The system's accuracy depends on the quality and diversity of the image dataset used for training, which may affect its ability to correctly identify less common or atypical cases. While it provides diagnostic support, it is not intended to replace professional medical evaluation but rather to serve as an assistive tool. Additionally, the model's performance may be influenced by image quality, lighting conditions, and variations in skin tones, which could impact its reliability across different user demographics.

Another limitation is that the system does not provide treatment recommendations beyond general information about the detected conditions. It also does not account for underlying health factors, such as immune disorders or genetic predispositions, that may contribute to skin diseases. Furthermore, the research focuses on common skin conditions and does not cover rare or highly specialized dermatological cases. Data privacy and security will be prioritized, but users must still ensure proper handling of sensitive medical information. Despite these constraints, the study aims to contribute to more accessible and efficient skin disease detection, benefiting both healthcare providers and patients.

Objectives of the Study

To enhance and develop skin disease detection using Computer-vision and machine learning to identify the common skin conditions in the Philippines. It also aims to bridge the gap of the existing research entitled "Recognizing Common Skin Diseases in the Philippines Using Image Processing and Machine Learning Classification," by broadening the scope of common skin diseases in the Philippines, such as miliaria, rosacea, vitiligo, contact dermatitis, medication rash, psoriasis, and hives. Additionally, the purpose of the proposed research is to give assistance to healthcare practitioners in dermatology and the advancement of digital health technology. Once the proposed research is implemented, it intends to greatly enhance diagnostic accuracy, efficiency, and access to specialized care for those suffering from common skin disorders in the Philippines.

Expected Outputs

The proposed research aims to deliver accurate diagnosis of skin conditions,

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particularly miliaria, rosacea, vitiligo, contact dermatitis, medication rash, psoriasis, and hives. The research will use Python-based computer-vision and machine learning system for skin disease recognition and diagnosis. Furthermore, we will have a data set that consists of 1000+ images, these images will represent skin diseases and will be gathered from public dermatologists datasets as well as self-collected sources. Additionally, the proposed research will use Keras, TensorFlow, and OpenCV to process images and build Convolutional Neural Network (CNN) models, to demonstrate skill in deep learning and machine learning approaches. The research will have these specific features: *User friendly interface,* which makes it accessible and simple for health professionals and patients to use, *Treatment Responsiveness,* based on the identified disease, the suggested study gives useful information on the treatment, allowing healthcare practitioners to make more educated judgments, and lastly *Data Privacy and Security,* ensure that patient information will be handled with confidentiality. Moreover, this research will further enhance the existing research, aiming to broaden the skin conditions that they have included.

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