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Skin Disease Analysis and Prediction using Machine Learning

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Abstract: *A number of patients all over the world suffer from skin diseases; detection in the early stages is very important for curing such disease. For diagnosing skin conditions however, several factors make this very difficult, these include the multitude of skin diseases, their similar symptoms and dependence on expert dermatological evaluation. In this case, adopting machine learning (ML) is quite a suitable approach as it can help improve the accuracy of diagnosis and its availability. Therefore, the focus of the project is on the developing of a machine learning based skin disease detection system. The problem in consideration is the high demand for efficient and effective mechanisms that can be used in skin disease identification/ detection, whereby such tools should also be able to be used in low income areas. To tackle this, we use a machine learning model which classifies different forms of skin diseases through the use of dermatoscopic images*

Keywords: Machine Learning, Crop Recommendation, Random Forest, Gradient Boosting, AdaBoost, Sustainable Agriculture, IoT Integration, Data-Driven Agriculture

I. INTRODUCTION

Skin diseases have emerged as a significant globalhealth concern, impacting a considerable portion of the population across various demographics. This rise can be attributed to numerous factors, including increasing environmental pollution, lifestyle changes, genetic predispositions, and the widespread use of certain medications. Prevalent conditions such as actinic keratosis, Melanoma, Psoriasis, and Eczema highlight the urgent need for effective diagnostic methods that can facilitate timely interventions. Traditional diagnostic approaches oftencome with high costs and limited accessibility, creating barriers to prompt treatment and comprehensive management of these conditions. This challenge underscores the necessity for innovative solutions that can bridge the gap in current healthcare practices. In light of these issues, the proposed research project titled "Skin Disease Detection using Image Processing and Machine Learning" seeks to develop a highly effective and cost- efficient computerized screening system utilizing advancedimage processing techniques. This study adopts a two-stageapproach, aiming not only to detect the presence of skin diseases but also to classify their severity levels. By employing machine learning algorithms, particularly the CNN and RNN, the research aspires to enhance the accuracy of skin disease identification. The importance of this research is amplified by the global context in which wefind ourselves. Rapid industrialization and urbanizationhave significantly escalated exposure to environmental pollutants, further exacerbating skin health issues. As societies continue to evolve and adapt, the increasing prevalence of skin diseases necessitates a shift towards more accessible, accurate, and efficient diagnostic tools. Byleveraging modern technology and machine learning, this research study aims to make a meaningful contribution to public health by improving the identification and classification of skin diseases, ultimately promoting better health outcomes for affected individuals. The findings of this study could hold immense potential for global applicability, addressing a critical need for innovative healthcare solutions in the face of evolving environmental challenges [2]

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II. LITERATURE SURVEY

The literature survey presented in the paper" Skin Disease Detection using Image Processing and Machine Learning" reviews various methodologies and techniques employed in the field of skin disease classification and detection. It highlights several key studies and approaches that have contributed to the development of automated systems for identifying skin disorders.

Feature Extraction Techniques: The survey discusses the use of Local Binary Patterns (LBP) for feature extraction, which is a crucial step in the classification process. LBP hasbeen effectively utilized in various studies to capture texture features from images of skin lesions, aiding in the differentiation of skin diseases [1].

Classification Algorithms: The paper references the use of different classifiers, including the Naive-Bayes classifier (NBC) and Support Vector Machine (SVM). For instance, a study by Kumar et al. suggested SVM for categorization due to its ability to handle dynamic classes with high accuracy and computational efficiency. This study achieved a notable accuracy of 90% using a dataset of 1700 training images for melanoma and non-melanoma skin disorders [1].

III. METHODOLOGY

Image Acquisition: Image acquisition is a critical first step in any image processing system, particularly in the context of skin disease detection. If the image is not acquired satisfactorily, the subsequent components of the system may be rendered ineffective, leading to unsatisfactory or inaccurate results. To ensure optimal performance, the system begins by resizing the images, as properly scaled images facilitate better analysis and processing. A significant part of this stage involves converting RGB images into grayscale images. This conversion is crucial because grayscale images simplify the data without sacrificing essential features, making it easier for the system to analyze key attributes related to skin conditions.

Noise Removal: Quality images devoid of noise are essential for achieving accurate results in skin disease detection. Noise in images can stem from various sources, including environmental factors and limitations in the imaging equipment. To address this, an effective image denoising model is employed to remove unwanted noise while preserving critical image features, such as edges and textures. The median filter is particularly effective in this regard, as it smoothens the images by replacing each pixel's value with the median value of its neighboring pixels. This technique minimizes the impact of noise while maintaining important structural details, ensuring that the processed images are of high quality for subsequent analysis.

Feature Extraction Once the images are denoised and prepared, the next phase is feature extraction. In biomedical image processing, particularly in skin disease detection, the quality of the images directly influences the accuracy of the results. However, images obtained in clinical settings often vary in quality, ranging from low to medium due to various factors such as lighting conditions, camera specifications, or patient movement. To address these challenges, advanced image enhancement algorithms are applied to improve the overall quality of the images. This enhancement may include techniques such as histogram equalization, contrast stretching, and edge enhancement, all aimed at highlighting critical features that are indicative of various skin conditions

Classification: The classification stage is where the system assesses the extracted feature determine the presence and severity of specific skin diseases. In this research, the performance of the Naïve Bayes classifier is analyzed using a feature matrix derived from the processed images. The Naïve Bayes Algorithm is particularly suited for this task due to its simplicity and effectiveness in handling large datasets with multiple features. The classifier evaluates the feature matrix and computes the probability of each class, enabling it to assign a label to the input image based on the most likely diagnosis. The performance of the Naïve Bayes classifier is further studied through various metrics, including accuracy, sensitivity, and specificity. Accuracy measures the proportion of correctly identified cases among all evaluated instances, while sensitivity (also known as recall) indicates the model's ability to correctly identify true positive cases. Specificity assesses the classifier's ability to correctly identify true negative cases. By analyzing these performance metrics, researchers can evaluate the effectiveness of the classification system and make necessary adjustments to improve its reliability. The overall goal of this phase is to create a robust system that can provide accurate and timely diagnoses, ultimately contributing to better patient care in dermatology

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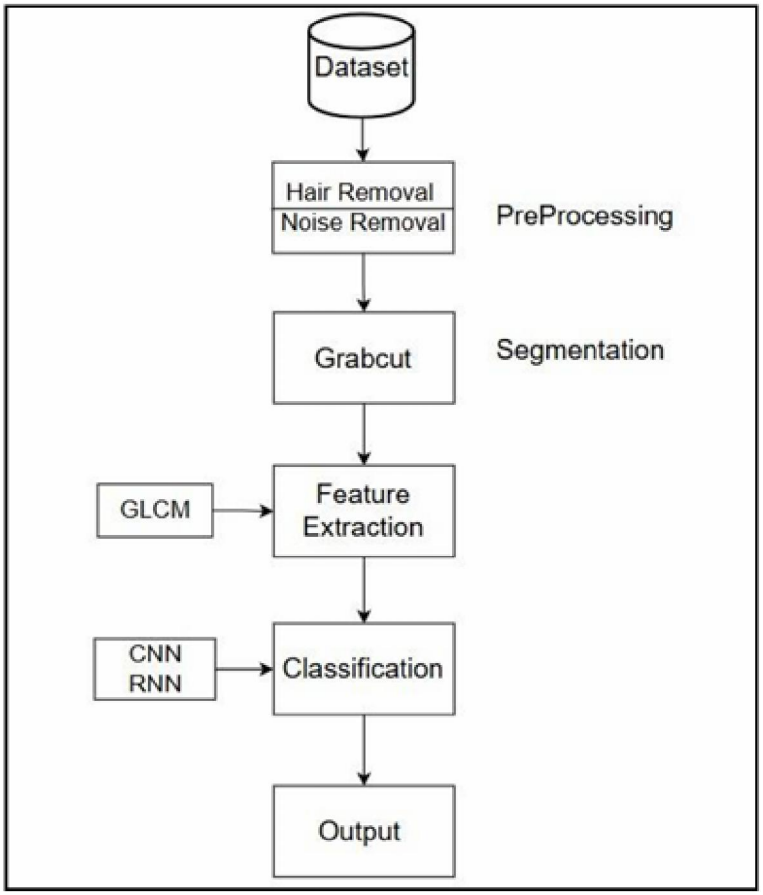
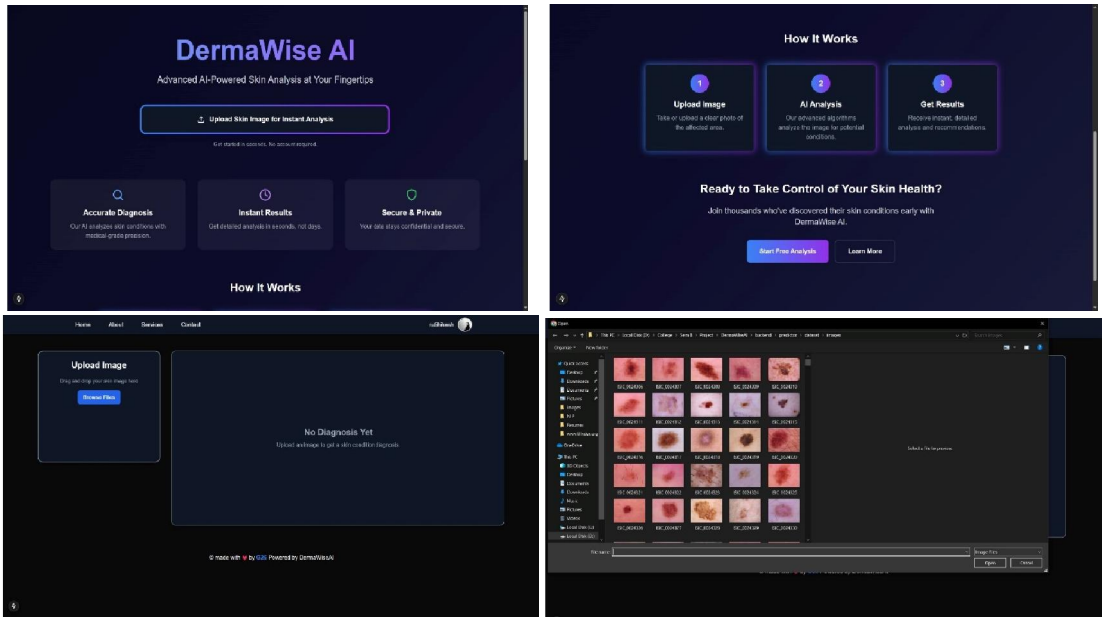


IV. EXPERIMENTAL RESULTS



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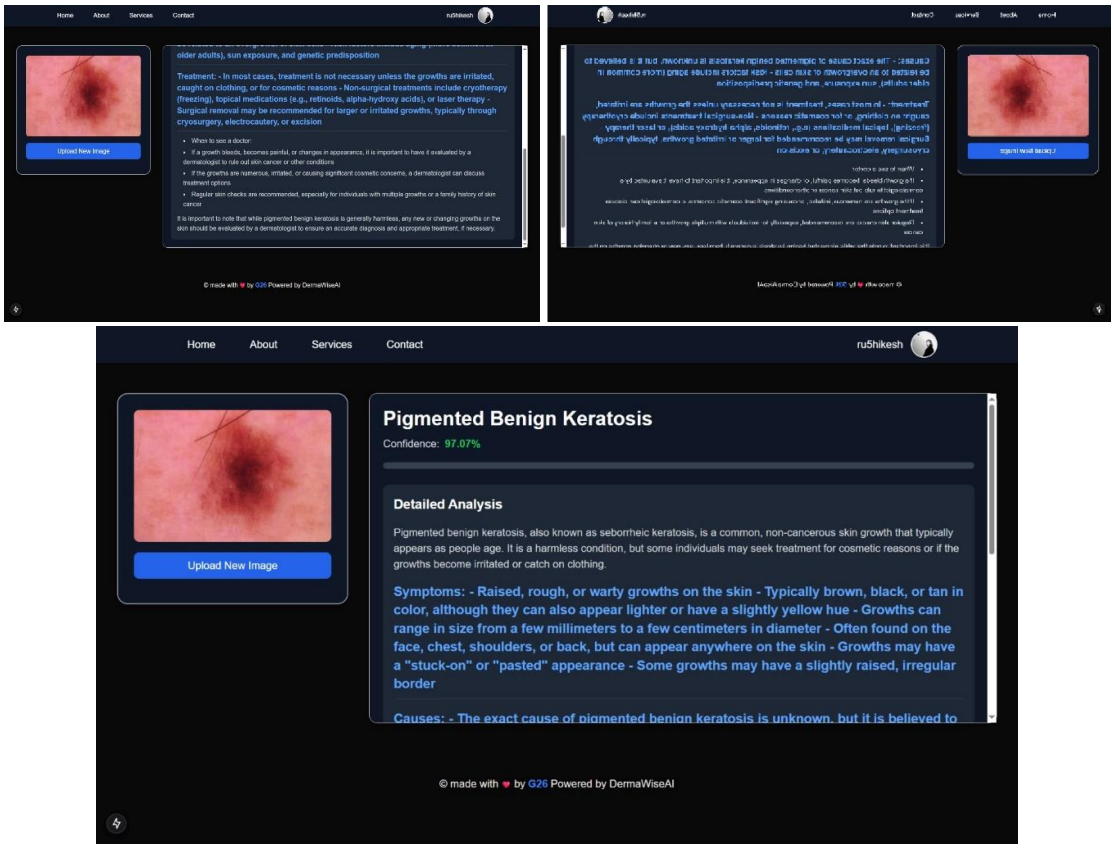

V. CONCLUSION

This research work concludes that the Naive Bayes machine learning algorithm demonstrates high accuracy as a multi-class classifier for skin disease detection. The model achieves impressive results when combined with advanced feature extraction techniques, such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN), which are applied to the segmented portions of the input images. These techniques help focus on the most critical features of the images, enhancing the classifier's ability to Distinguish between different types of skin diseases. In this project, tools such as Matplotlib and TensorFlow were used for data visualization and model implementation. The TensorFlow library was particularly effective for building and training CNN and RNN models, which provided a deep feature representation of the input images. The segmented skin disease images were processed through these networks, extracting meaningful features that were later fed into the Naive Bayes classifier for final classification. The use of Matplotlib allowed for visual analysis of the results, including plotting learning curves, confusion matrices, and other performance metrics, offering insights into the model's accuracy and efficiency. The Naive Bayes model, coupled with CNN and RNN feature extraction, achieved a remarkable 97.5% accuracy in predicting skin diseases on testing datasets. This high accuracy emphasizes the strength of combining traditional machine learning algorithms with deep learning techniques, particularly in medical image classification tasks. The research shows that Naive Bayes, when enhanced by deep learning features, provides a reliable solution for skin disease detection, significantly reducing the need for expensive traditional diagnostic methods Additionally, the model's performance was evaluated using metrics such as sensitivity, specificity, and precision, which are crucial in medical diagnostics to ensure the accurate identification of both diseased and healthy cases. By achieving high values across these

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REFERENCES

[1] A. Ajith, V. Goel, P. Vazirani and M. M. Roja, "Digital dermatology: Skin disease detection model using image processing," 2017 International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India.

[2] Siva S Sinthura, K. R. Sharon, G. Bhavani,L. Mounika, B. Joshika less Published 1 July 2020 Medicine, Computer Science 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC).

[3] R. K. M. S. K Karunanayake, W. G. M. Dananjaya, M. S. Y Peiris, B. R. I. S. Gunatileka, S. Lokuliyanaand A. Kuruppu, "CURETO: Skin Diseases Detection Using Image Processing And CNN," 2020 14th International Conference on Innovations in Information Technology (IIT), Al Ain, United Arab Emirates, 2020, pp.

[4] N. V. Kumar, P. V. Kumar, K. Pramodh and Y. Karuna, "Classification of Skin diseases using Image processing and SVM," 2019 International Conference on Vision Towards Emerging Trendsin Communication and Networking (ViTECoN), .Vellore, India, 2019, pp.

[5] M. S. Mim, M. Das, Md. Adnan Kiber Published 1 February 2018 Computer Science 2018 International Conferenceon Computer, Communication, Chemical, Material and Electronic Engineering (IC4ME2).

[6] B. Md Abdur Rahim, M. Najmul Hossain, T. Wahid, M. Shafiul Azam, and M. Abdur Rahim, "Face Recognition using Local Binary Patterns (LBP)," Glob. J. Comput.Sci. Technol. Graph. Vis., vol. 13, no. 4, 2013.

[7] N. Akmalia, P. Sihombing, and Suherman, "Skin Diseases Classification Using Local Binary Pattern and Convolutional Neural Network," in Int. Conf. on Electrical, Telecommunication and Computer Engineering, 2019, pp.