Skin Disease Diagnosis using CNN Algorithms

S. Periyasamy[1], Dr.R.Sri Devi[2]

[1,2] *Department of Computer Applications (PG) Hindusthan College of Arts and Science Coimbatore Tamilnadu India*

Abstract—**A skin disease diagnosis involves identifying and understanding various conditions affecting the skin, which may include infections, inflammatory diseases, autoimmune disorders, or skin cancers. Accurate diagnosis is essential for effective treatment and management. The machine assisted approach for detection of disease is at the same time more efficient. Deep learning is an artificial intelligence operation that emulates the working of human brain in organizing data and designing patterns for decision making. Most modern deep learning models are based on artificial neural networks categorically convolutional neural networks. In this paper we developed a unique deep learning architecture which focuses in the timely evaluation of skin Disease. The model could classify the Ezema, Urticaria and Normal class with 70%accuracy. The proposed deep CNN model could classify the melanoma types into benign class or malignant class. In this work, a less complicated model is used and the accuracy obtained was around 70%. The future extension to this work includes improving the prediction accuracy by parameter tuning, remodeling the network to multiclass case, which could detect different categories of skin Disease.**

Index Terms—**Convolution Neural Network, Deep Learning, Skin Disease Prediction**

I. INTRODCUTION

The uncontrolled growth of abnormal epidermal cells leads to a several skin diseases, which like any other malignancy proves to be baneful if not treated at an early stage. Prior prognosis of whichever type of skin diseases urges the possibility of betterment. But the present-day technique used to recognize skin disease is a tedious process. The process typically begins with a thorough patient history and physical examination to assess symptoms, duration, and possible triggers. Clinical signs such as rashes, lesions, pigmentation changes, or skin texture alterations are closely examined. In some cases, further diagnostic tools, including laboratory tests, skin biopsies, and imaging, may be necessary to confirm the diagnosis. For instance, skin scraping, cultures, or PCR testing can identify infections caused by bacteria, fungi, or viruses. Histopathological analysis from a biopsy can provide insights into more complex conditions, such as eczema, psoriasis, or malignancies like melanoma. Ultimately, the goal of skin disease diagnosis is to tailor appropriate treatments, which may include topical or systemic medications, lifestyle modifications, or surgical interventions. Early and accurate diagnosis significantly improves patient outcomes and reduces the risk of complications, emphasizing the importance of timely medical consultation for skin-related issues. The system which is put forward is to a great extent an effective tool that helps in the timely as well as lively evaluation of the disease. The system further has an integrated user-friendly and user accountable form of GUI.

II. REVIEW OF LITERATURE

Skin diseases encompass a wide range of conditions, from infections and allergic reactions to chronic diseases and cancers. Effective diagnosis is crucial for determining appropriate treatments and improving patient outcomes. The diagnostic process typically involves clinical examination, laboratory tests, and, in some cases, imaging techniques. Several key studies and advancements have contributed to the current understanding of skin disease diagnosis.

The foundational method of diagnosing skin diseases is through a detailed patient history and physical examination. According to *Bolognia et al. (2012)*, a comprehensive history includes the onset, duration, triggers, and family history of skin conditions, which are essential for identifying common dermatological disorders such as eczema, psoriasis, or acne. Physical examination focuses on the appearance, distribution, and morphology of skin lesions, which provide clues to specific diagnoses.

Many skin diseases require confirmatory tests, especially when clinical signs are nonspecific. *Robinson et al. (2014)* emphasized the role of skin biopsies and histopathological analysis in

distinguishing between benign and malignant conditions, such as distinguishing basal cell carcinoma from benign lesions. Additionally, laboratory tests like blood cultures or PCR for identifying pathogens are crucial for diagnosing infections such as fungal or viral skin diseases

Recent advancements in imaging technologies and artificial intelligence (AI) have improved the speed and accuracy of diagnoses. *Hamarneh et al. (2019)* explored the application of AI in dermatology, noting the potential of AI models to accurately classify skin lesions and detect melanoma, sometimes outperforming dermatologists in specific cases. Furthermore, dermoscopy and reflectance confocal microscopy allow for non-invasive examination of skin lesions, providing better insight into the structure of lesions without the need for biopsy

Telemedicine has emerged as a valuable tool in the remote diagnosis of skin conditions. According to *Kaliyadan et al. (2019)*, teledermatology allows patients to submit images of skin conditions, which are then reviewed by dermatologists, making dermatological care more accessible in underserved areas. This approach has shown promise in diagnosing common conditions like acne, eczema, and fungal infections, though challenges remain regarding the accuracy and standardization of image-based diagnoses.

III. PROPOSED WORK

The purpose of working on skin disease diagnosis is to enhance the accuracy, efficiency, and accessibility of identifying various skin conditions. By improving diagnostic methods, healthcare providers can offer timely and appropriate treatments, which is crucial for managing symptoms, preventing disease progression, and minimizing complications. Effective diagnosis also helps in differentiating between benign and malignant conditions, ensuring that patients receive the right care. Additionally, advancements in diagnostic technologies aim to make dermatological services more accessible, especially in underserved areas, and support early detection, which is key to improving overall patient outcomes.
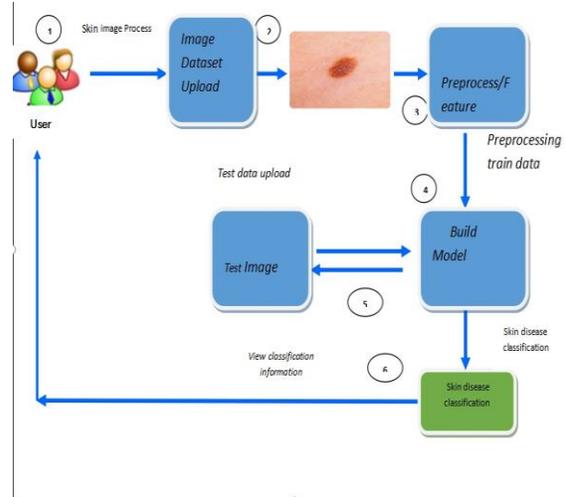

Fig.1 Architecture Design for Diagonsis

A. Methodology

The datasets have been collected from kaggle, the various types of skin disease as Vascularlesion, Tinea ringwormcandidiasis, Squamouscellcarcioma, Actinickeratosis are taken for diagonsis. The flow chart is given in Fig.2
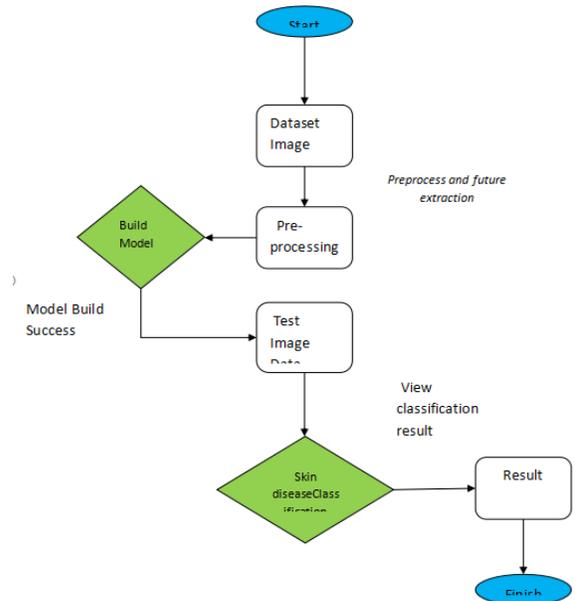

Fig.2 Methodology of Workflow

B. Performance Evaluation Analysis

Performance evaluation in the context of skin disease diagnosis focuses on assessing the accuracy, reliability, and efficiency of diagnostic methods and tools used in dermatology. These evaluations ensure that healthcare professionals can identify skin

conditions effectively, leading to better patient outcomes.We used a platform of Intel Core i3 processor 2.10 GHz with 4GB RAM. The key faetures of performance evaluation in skin disease diagnosis include clinical examination, diagnostic tools (e.g., histopathology, imaging), and newer technologies like artificial intelligence (AI) and telemedicine. CNN algorithms are used to analysis the skin disease.

IV. RESULT AND DISCUSSION

The result of a skin disease diagnosis involves identifying the specific condition affecting the skin based on clinical evaluation, patient history, diagnostic tests, and advanced tools like imaging or artificial intelligence. Common skin conditions, such as acne, eczema, or dermatitis, are often diagnosed through visual examination and patient history, leading to symptom management through topical treatments or medications. For infections, lab tests like cultures or PCR confirm the pathogen, guiding targeted treatment. In cases of suspected skin cancer, biopsy results confirm the type and stage of the cancer, directing appropriate treatment options.
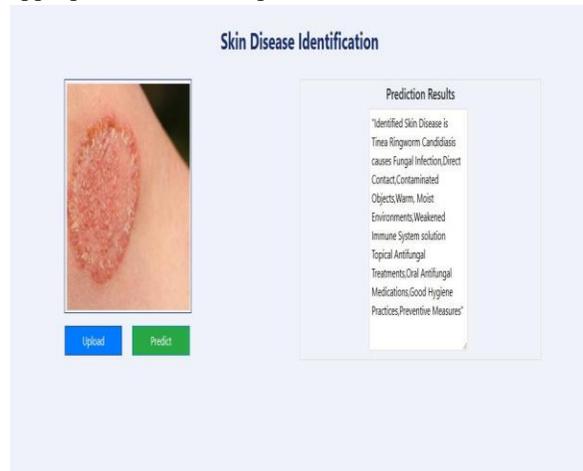

Fig.3 Skin Disease Identification

V. CONCLUSION

In conclusion, the diagnosis of skin diseases is a multifaceted process that combines clinical examination, patient history, laboratory tests, and advanced diagnostic technologies. Accurate and timely diagnosis is crucial for effective treatment, whether for common conditions like acne or eczema,

infectious diseases, or more serious conditions like skin cancer. Advances in tools such as dermoscopy, reflectance confocal microscopy, and artificial intelligence are enhancing diagnostic accuracy and enabling early detection, which improves patient outcomes. Additionally, telemedicine is making dermatological care more accessible, particularly in underserved areas. Overall, a thorough and well-executed diagnostic approach ensures appropriate treatment, helping to manage symptoms, prevent disease progression, and improve quality of life for patients. The CNN model is used and the accuracy obtained was around 70%. The future extension to this work includes improving the prediction accuracy by parameter tuning, remodeling the network to multiclass case, which could detect different categories of skin Disease.

REFERENCES

[1] The Python Language Reference Manual for Python Version 3.2 By Guido Van Rossum, Fred L. Drake · 2021
[2] Hands-On Machine Learning with Scikit-Learn, Keras, and Tensor Flow" Author: Aurelian Géron 2022
[3] Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron 2020.
[4] Python Machine Learning" by Sebastian Raschka and Vahid Mirjalili."Machine Learning Yearning" by Andrew Ng 2019.
[5] Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville 2018.
[6] Python for Data Analysis" by Wes McKinney."Building Machine Learning Powered Applications: Going from Idea to Product" by Emmanuel Ameisen 2017.