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Identification and Classification of Skin Diseases Using AI

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ABSTRACT:In recent days, skin diseases are increased in humans. Skin diseases are caused by bacteria or infections. Some skin diseases like ringworm, yeast infection, allergies, etc. are increasing and spreading over the skin day by day. So this type of disease should be identified in its earlier stage to avoid spreading. It can be identified using some factors like clinical parameters which are considered for identifying the disease. The possible skin diseases of different ages are dermatitis in ages 0-5 years, warts affect in 6-11 years age, and acne vulgaris in 12-16 years age. Dermatomyositis is a type of skin disease that affects children ages 5-15 and adults at 40-60 age. The analysis is made with the measurement of skin impedance over a wide frequency range from 100 Hz to 1MHz. The various types of bioimpedance methods include multiple frequencies, single-frequency, and Bioimpedance spectroscopy. SF-BIA is generally performed at a frequency of 50 kHz.

KEYWORDS:Skin disease analysis, frequency, KNN classification, Naïve Bayes' Algorithm, segmentation, and detection.

I. INTRODUCTION

There are different techniques to diagnose skin diseases like Malignant melanoma i.e., melanoma skin tumors, Nonmelanoma i.e., squamous cell carcinoma, basal cell carcinoma, Acne, Genetic Diseases i.e., Sickle-Cell Anaemia Genetic Skin Disorder, Fungal Diseases, Bacterial Diseases, Psoriasis, and Leprosy. There are different techniques to diagnose these skin diseases. But the most useful and non-invasive method for the diagnosis of different types of skin diseases is skin impedance measurement. The analysis is made with the measurement of skin impedance over a wide frequency range from 100 Hz to 1MHz. But this analysis for the infected skin and normal skin should be made at the same frequency because at different frequencies skin impedance can be different. The measured skin impedance at the same frequency of infected skin and normal skin is different, because of which we can diagnose skin disease. Above mentioned method used the non-invasive probe electrode system consisting of two concentric electrodes attached to a ceramic plate. The outermost electrodes drive the voltage and the inner sinking electrode gives the output. In which the source electrode provides a small amount of current to the skin and the sink electrode gives input to the microcontroller. The length of the outermost electrode is nearly 10mm. Measurement of skin impedance can be used for depression, anxiety, neurological diseases, and nerve lesions. It is also used for physiological measurements emotional disorders or lie detection. The various types of bioimpedance methods include multiple frequencies, single frequency, and Bioimpedance spectroscopy's-BIA is generally performed at a frequency of 50 kHz. At this frequency, the current passes through both extracellular and intracellular fluid. Bio-impedance obtained at the number of frequencies is analysed in multiple-frequency bio-impedance analysis.

The paper is organized as follows. Section II describes the literature survey. The flow diagram represents the step of the algorithm and after the detection of the disease, it indicates the level of danger, which is given in Section III. Section IV presents experimental results showing the required results. Finally, Section V presents the conclusion.

II. RELATED WORK

The concept of Segmentation and Classification of Skin Lesions for Disease Diagnosis was first introduced by Sumithra Ra, MahamadSuhilb, D.S.Guruc.[1]. Initially, skin images are filtered to remove unwanted hairs and noise and then the



segmentation process is carried out to extract lesion areas. For segmentation, a region-growing method is applied by automatic initialization of seed points. The segmentation performance is measured with different well-known measures and the results are appreciable. Extraction of Skin Lesions from Non-Dermoscopic Images Using Deep Learning proposed by Mohammad H. Jafari, Ebrahim Nasr-Esfahani, Nader Karimi, S.M. Reza Soroushmehr, Shadrokh Samavi, Kayvan Najarian. [2]. In [3], the authors have diagnosed skin diseases with intelligent systems using algorithms and queries. Automatic segmentation of skin lesions from dermatological images presented in [4]. In [5], a survey of skin texture analysis for medical diagnosis using image processing techniques. The authors in [6] have performed Automatic Detection and Severity Measurement of Eczema Using Image Processing.

The work in this paper is divided into two stages. 1) Text- Detection 2) Inpainting. Text detection is done by applying morphological open-close and close-open filters and combining the images. Thereafter, the gradient is applied to detect the edges followed by thresholding and morphological dilation, erosion operation. Then, connected component labelling is performed to label each object separately. Finally, the selection criteria are applied to filter out non-text regions. After text detection, text inpainting is accomplished by using an exemplar-based Inpainting algorithm.

III. METHODOLOGY

The main aim of this system, is early disease recognition, patient care, and community services. The analysis is made with the measurement of skin impedance over a wide frequency range from 100 Hz to 1MHz. But this analysis for the infected skin and normal skin should be made at the same frequency because at different frequencies skin impedance can be different. The measured skin impedance at the same frequency of infected skin and normal skin is different, because of which we can diagnose skin disease. Above mentioned method used the non-invasive probe electrode system consisting of two concentric electrodes attached to a ceramic plate. The outermost electrodes drive the voltage and the inner sink electrode gives the output. In which the source electrode provides a small amount of current to the skin and the sink electrode gives input to the microcontroller. The length of the outermost electrode is nearly 10mm. Measurement of skin impedance can be used for depression, anxiety, neurological diseases, and nerve lesions. It is also used for physiological measurements emotional disorders or lie detection. The various types of bioimpedance methods include multiple frequencies, single frequencies, and Bioimpedance spectroscopy's-BIA is generally performed at a frequency of 50 kHz. At this frequency, the current passes through both extracellular and intracellular fluid. Bio-impedance obtained at several frequencies is analysed in multiple-frequency bio-impedance analysis. The algorithm automatically takes the input, matches the query and the data, and gives the required details. The diagnosed skin disease is shown and the drug recommendation is also provided.

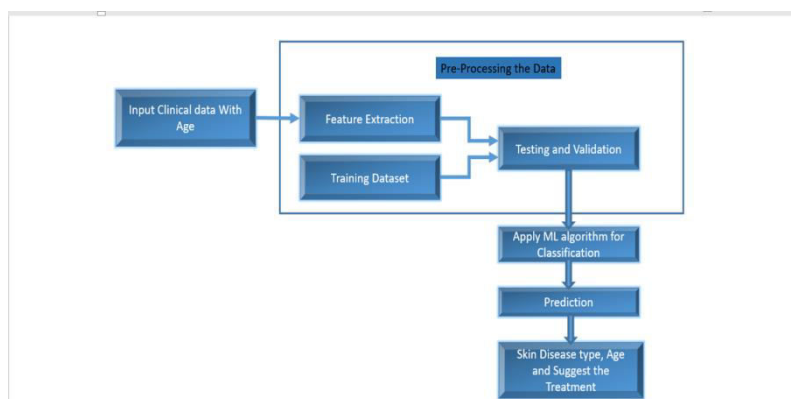


Fig. 3.1 Architecture



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IV. EXPERIMENTAL RESULTS

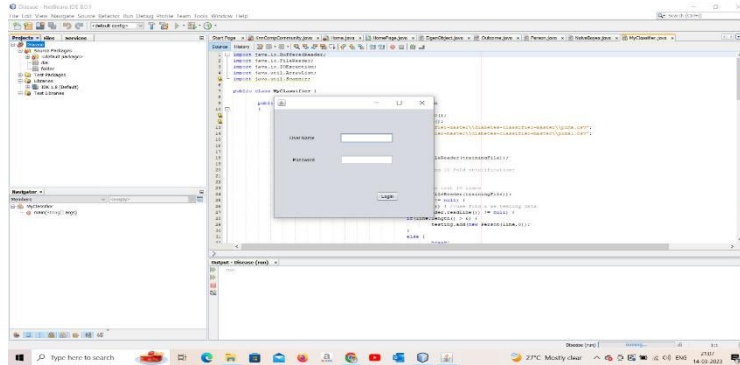


Fig. 4.1 Login Page

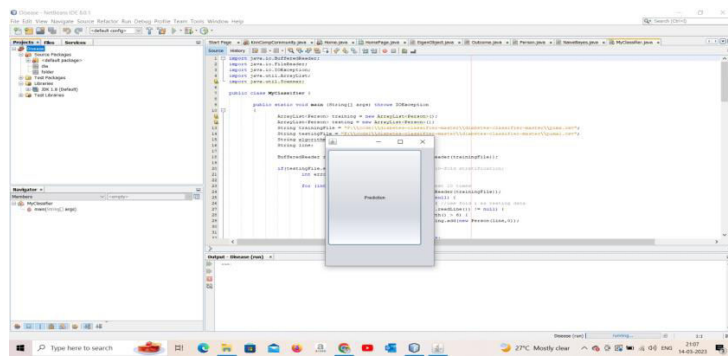


Fig. 4.2 Disease Prediction Page

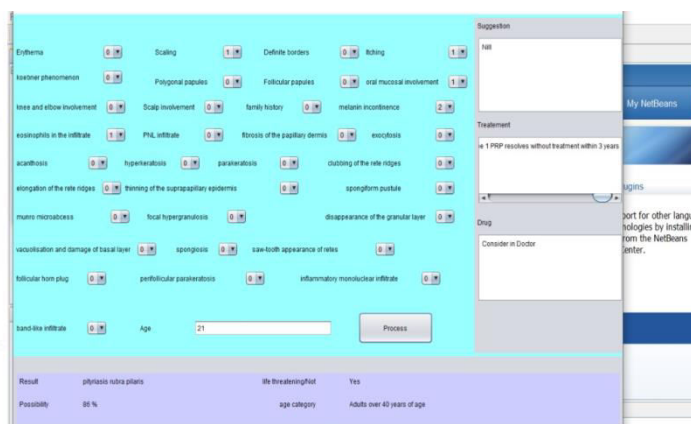


Fig. 4.3 Final Outcome of Disease Prediction

V. CONCLUSION

In this work, a model for the prediction of skin diseases is done using deep learning algorithms. It is found that by using the assembling features and deep learning we can achieve a higher accuracy rate and, we can go for the prediction of many more diseases than with any other previous models done before. As the previous models done in this field of



application were able to report a maximum of six skin diseases with a maximum accuracy level of 75%. By implementing a deep learning algorithm, we can predict as many as 20 diseases with a higher accuracy level of 88%. This proves that deep learning algorithms have a huge potential in real-world skin disease diagnosis. If even a better system with high-end system hardware and software with a very large dataset is used the accuracy can be increased considerably and the model can be used for clinical experimentation as it does have any invasive measures. Future work can be extended to make this model a standard procedure for preliminary skin disease diagnosis methods as it will reduce the treatment and diagnosis time.

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