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CNN approach for skin disease classification

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ABSTRACT

Reinforced Concrete (RCC) buildings, though resilient, are subjected to degradation over time due to various factors such as environmental conditions, design deficiencies, and inadequate maintenance. To ensure their longevity and structural integrity, effective repair and retrofitting methods are essential. This abstract presents an overview of suggested approaches for repairing and retrofitting RCC buildings. Repair methods primarily address localized damages such as cracks, spalling, and corrosion of reinforcement. Techniques like epoxy injection, cementitious grouting, and polymer-modified mortars are commonly employed to restore the structural integrity of damaged elements. Furthermore, carbon fiber reinforced polymer (CFRP) wrapping and steel plate bonding are effective solutions for strengthening weakened members.
Keywords: Retrofitting, Structural Audit, NDT

Abstract -Skin is the largest organ of the human body, serving as a protective barrier between the internal organs and the external environment. Skin plays a crucial role in protecting the vital organs of the human body. There are number of diseases that affect the people's skin and the uncertainty surrounding their diagnosis .The variation in diseases can indeed be influenced by a combination of environmental factors, genetic factors, and geographical location. The human body can be affected by serious infections caused by various pathogens, including fungus, viruses, and even environmental factors like dust. Inthe world, many people suffer from various skin diseases. Diagnosing skin diseases often involves a variety of pathological laboratory tests for the identification of the correct disease among them skin cancers are some of the worst. The Convolutional Neural Network system proposed in this paper aims at identifying seven skin cancers: Melanocytic Nevi, Dermato fibroma, Melanoma, Actinic keratoses, Benign keratosis-like lesions, Basal cell carcinoma and Vascular lesions. The dataset used is "Skin Cancer: HAM50000" and was obtained from Kaggle.

Key Words: Skin Disease, Cancer, Convolutional Neural Network, HAM50000.

INTRODUCTION

The Skin cancers can be dangers if not treated at the initial stage. Skin cancer is a significant health concern worldwide, with early detection being crucial for effective treatment and prognosis. However, diagnosing skin cancers accurately, especially in regions with limited access to specialized medical facilities, can be challenging. To address this issue, we propose the development of an automatic skin cancer classification system leveraging convolutional neural networks (CNNs). This system aims to identify seven types of skin cancers, facilitating early diagnosis and prompt medical intervention.

The process begins with capturing a photo of the skin lesion, which is then stored in an H5 file format. This file is then transferred to the CNN-based classification system. Utilizing a dataset sourced from Kaggle, which provides a diverse range of skin lesion images labeled with their corresponding cancer types, our system is trained on this data to accurately classify skin lesions. To ensure robust performance and prevent overfitting, we employ a classification approach that divides the data into training and testing sets. The training data is used to train the CNN model, while the testing data is used to evaluate its performance and generalization ability. By iteratively adjusting the model's parameters and architecture, we aim to optimize its accuracy and reliability in classifying skin lesions.

The CNN architecture enables accurate and automated recognition of objects within images, making it well-suited for the task of skin cancer classification. Through the use of convolutional layers, pooling layers, and fully connected layers, the

CNN can effectively extract features from the input images and learn complex patterns associated with different types of skin cancers. The proposed system enhances accessibility to skin cancer diagnosis, particularly in regions where traditional laboratory tests may be unavailable or inaccessible. By simply capturing a photo of a skin lesion, individuals can obtain a rapid and reliable assessment of its potential malignancy, empowering them to take proactive steps towards seeking timely medical intervention.

Early detection facilitated by our system has the potential to save lives by enabling prompt treatment initiation and improved prognosis. By providing an accessible and automated solution for skin cancer diagnosis, we aim to reduce barriers to healthcare access and contribute to improved outcomes for individuals at risk of skin cancer.

LITERATURE REVIEW

Sr.No	Paper Name/Year	Author Name	Strengths	Limitations
1.	Skin Disease Classification from Image (2020)	Tanvi Goswami , Vipul K. Dabhi , Harshad kumar B. Prajapati	automated computer based system for skin disease identification and classification through images to improve the diagnostic accuracy	Many skin diseases have Highly similar visual characteristics, which add more challenges to the selection of useful features from the image.
2.	Image Analysis Model For Skin Disease Detection(2019)	Alaa Haddad, Shihab .A Hamid	automated computer based system for skin disease identification and classification through images to improve the diagnostic accuracy	The data set is not sufficient in order to recognize distinct classes.
3.	Deep convolutional neural network for face skin diseases identification (2019)	Rola EL SALEH LISSI , Sambit BAKHSH	automated computer based system for skin disease identification and classification through images to improve the diagnostic accuracy	Size of our database limited.
4.	Diagnosis of skin diseases using Convolutional Neural Networks (2018)	Jainesh Rathod, Vishal Waghmode, Aniruddh Sodha, Dr. Prasenjit Bha_x0002_vathankar	TResolve difficulties that's created from challenges faced from the dermatologist to recognize the different skin diseases easily	Lots of training data is required.
5.	Dermatology Disease De_x0002_tection Using Image Processing and Machine Learning (2018)	Sujay S Kumar Varun Saboo.	The mobile application is developed using ANN, KNN and Decision Tree algorithm.	complexity of KNN
6.	Diagnosis of skin diseases using Convolutional Neural Networks (2018)	Jainesh Rathod, Vishal Waghmode, Aniruddh Sodha, Dr.Prasenjit Bhavathankar	TResolve difficulties that's create from challenges faced from the Dermatologist to	Lots of training data is required.

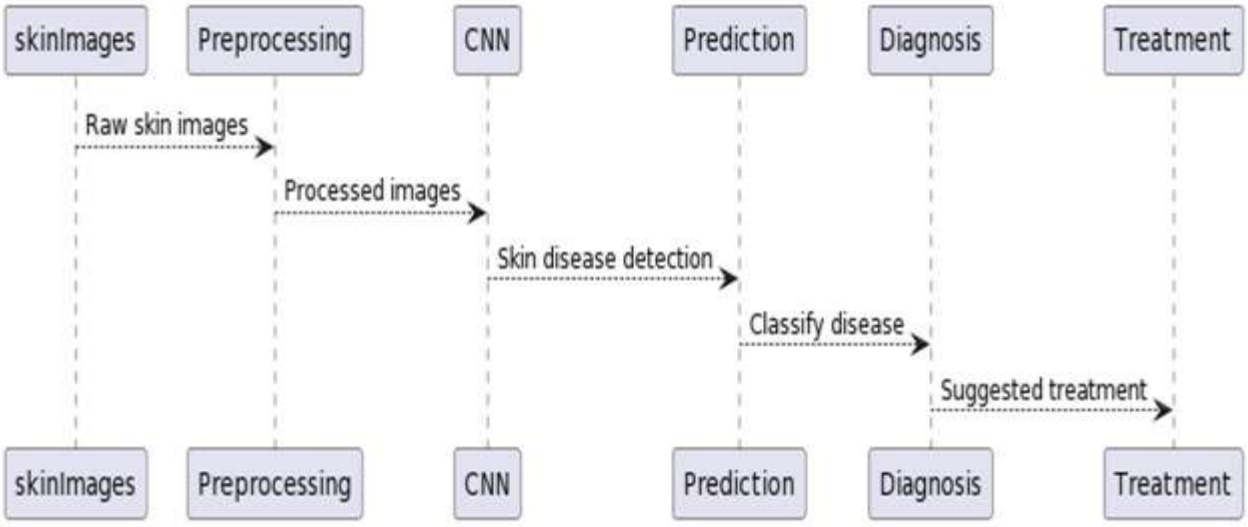
			recognize the Different skin diseases easily.	
7.	Proposed Automatic Detection and Severity Measurement of Eczema Using Image Processing computer system(2016)	Alam, N. Munia, T., Tavakolian, K., Vasefi, V., MacKinnon, N., & Fazel-Rezai, R.	It automatically detects eczema and determines its severity	Complex Design.
8	Dermatological Disease Detection Using Image Processing and Machine Learning system(2016)	Kumar, V., Kumar, S., & Saboo, V.	It extract the features from the image while the machine learning is used to detect skin diseases and the system was tested on six types of skin diseases	Required Lots of training data.

METHODOLOGY

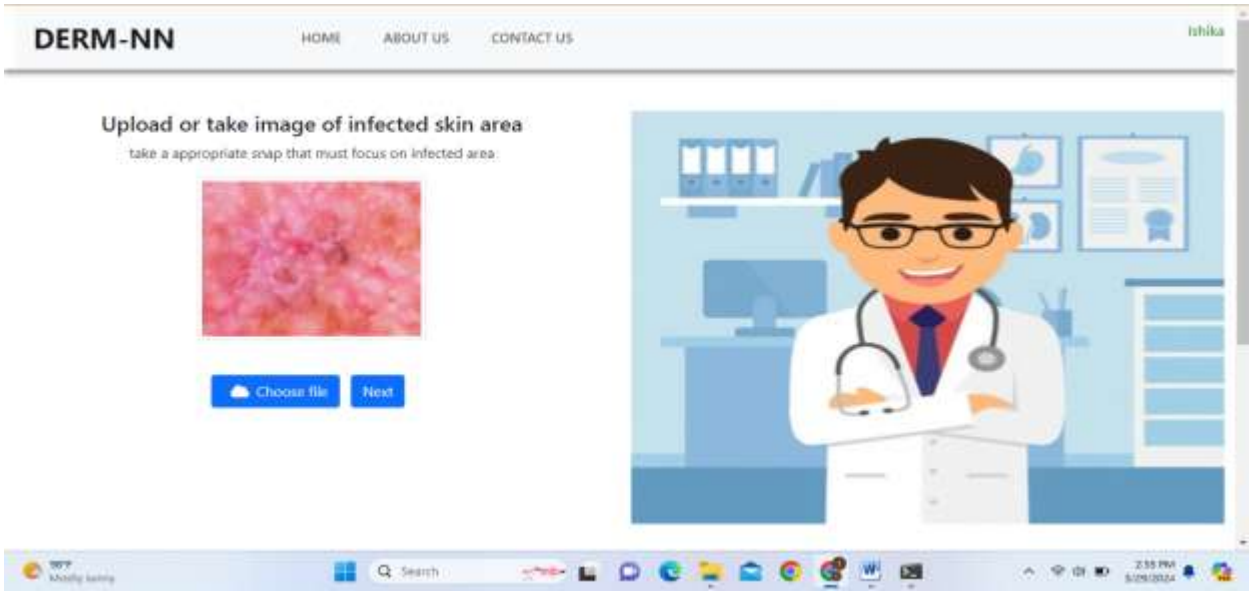
We begin with capturing the raw skin image. After that resizing the images to 28,28 for better learning. Then we proceed to add the names and labelsafter which the plot parameters are set. The target label isstored as an independent feature and the image pixelsare stored as a dependent variable. The data is divided into training set and testing set and it is reshaped to avoid the overfitting (it only handled if the data is 2Dimensional).The Random Over sampler handling the imbalance. This data is fit on the training set and the new shape is checked. To test the classification model stability the cross validation performed for all created models.

If the shape is acceptable then the Convolutional Neural Network model is defined and subsequently the first layer of the CNN is plotted. Max pooling extracts the most prominent features detected by convolutional filters in a neural network. After this, Batch Normalization is use to make the Artificial Neural Network faster and more stable by normalizing the inputs layer's through re-scaling and re-centering. The Convolutional Neural Network is accurate and automated to recognizing the object within image. After that, first Artificial Neural layer is defined. Softmax is utilized as the activation function for the output layer comprising 7 neurons to produce a probability distribution over the possible classes.

The model is compiled with accuracy as the metric and sparse categorical cross-entropy as the loss function due to multiple outputs, followed by training the data using a validation. Then model is predicted on the test set and the predicted probability is converted to classes. After that, the model classify the disease. Then finally Diagnosis guides the appropriate treatment for the condition.



RESULTS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Upload or take image of infected skin area
take a appropriate snap that must focus on infected area
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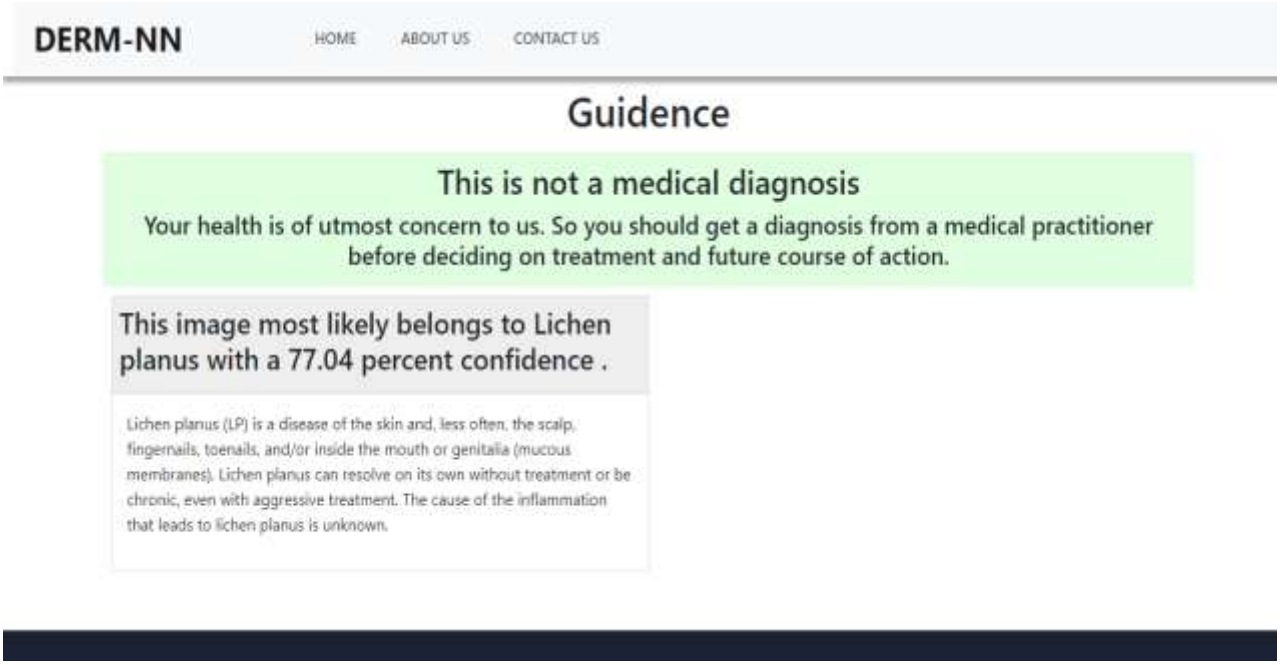
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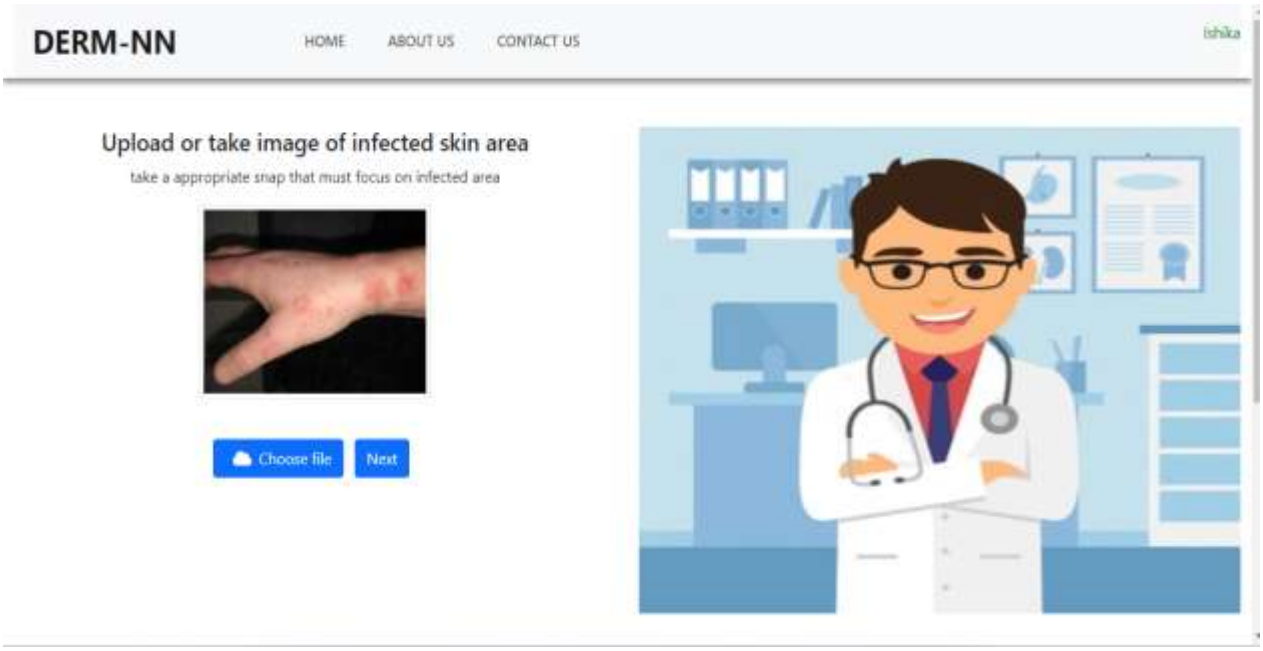
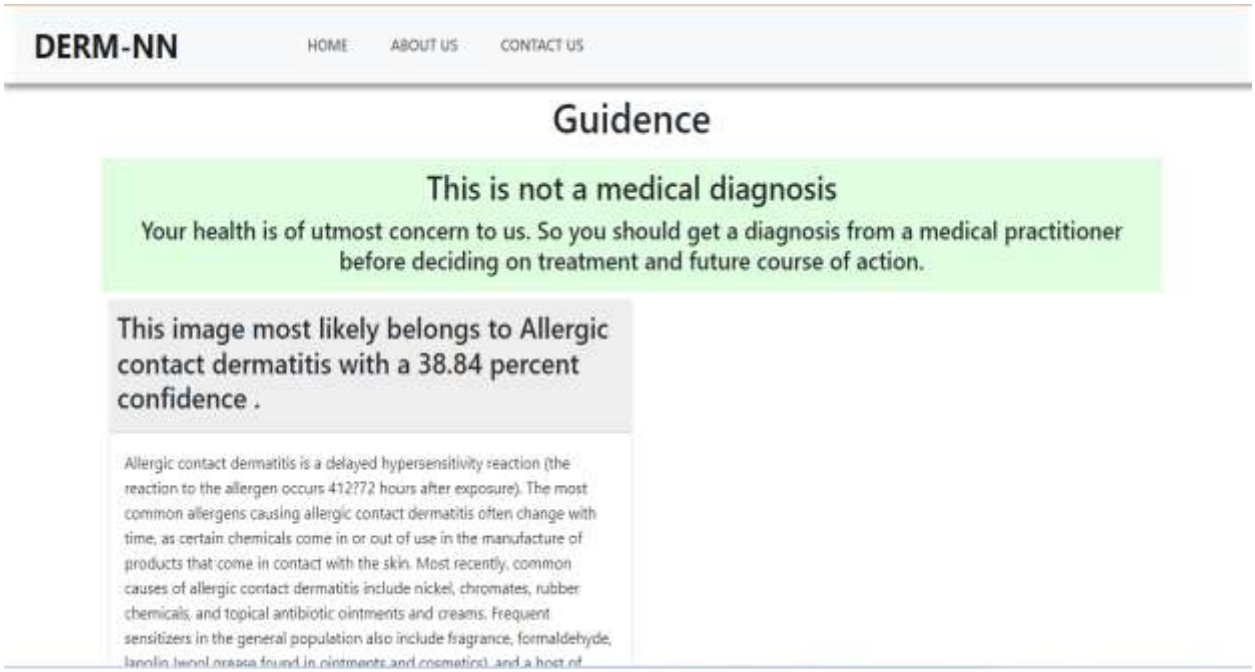
Guidence
This is not a medical diagnosis
Your health is of utmost concern to us. So you should get a diagnosis from a medical practitioner before deciding on treatment and future course of action.
This image most likely belongs to Lichen planus with a 77.04 percent confidence .
Lichen planus (LP) is a disease of the skin and, less often, the scalp, fingernails, toenails, and/or inside the mouth or genitalia (mucous membranes). Lichen planus can resolve on its own without treatment or be chronic, even with aggressive treatment. The cause of the inflammation that leads to lichen planus is unknown.





CONCLUSIONS

Observing the CNN model's moderate accuracy, we foresee potential improvement through meticulous refinement and a more dependable dataset. The image acquisition process is executed using the HAM50000 dataset which provides a clear overview of the types of skin diseases present. Images taken by digital cameras, generally include noises and lighting effects that should be eliminated before processing the image. Image acquisition is use to retrieving the image from a source, usually a hardware-based source. Segmentation involves partitioning an image into its constituent parts or objects. After that ,Gaussian filter is applied on the normal regions of the skin and this is done to smooth the area outside the lesion, hence reducing this area effect on the classification. Storing results in an H5 file enables the development of an application providing swift predictions to users who upload skin lesion images. With careful scrutiny and iteration, the model can achieve higher accuracy. This approach offers convenient diagnostic assistance on-the-go, facilitating early detection and

treatment of skin diseases, while emphasizing the importance of continuous enhancement to meet evolving user needs and ensure reliable performance in real-world scenarios.

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