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Research Paper

SKIN DISEASE PREDICTION USING CNN

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ABSTRACT

Skin disease among humans has been a common disease, millions of people are suffering from various kinds of skin diseases. Usually, these diseases have hidden dangers which lead to not only lack of self-confidence and psychological depression but also lead to a risk of skin cancer. Medical experts and high-level instruments are needed to diagnosis these skin diseases due to non-availability of visual resolution in skin disease images. The proposed framework includes deep learning techniques such as CNN architecture. A Dataset of images with TWENTY diseases has been taken for the Classification of Skin diseases. They include diseases like Melanoma, Nevus, Seborrheic Keratosis etc. The dataset was extended by adding images having cuts and burns, which were classified as skin disease by most of the existing systems. The usage of Deep Learning algorithms has reduced the need for human labor, such as manual feature extraction and data reconstruction for classification purposes.

Keywords: Skin Disease Prediction, Convolutional Neural Network (CNN), Deep Learning, Medical Image Classification, Skin Lesion Detection, Melanoma Detection, Nevus Classification, Seborrheic Keratosis, Image Processing, Computer-Aided Diagnosis (CAD), Dermatology, Artificial Intelligence (AI), Medical Image Analysis, Skin Cancer Detection, Disease Classification.

I. INTRODUCTION

Skin is one in every of the most important and quickest developing tissues of the human body. The burden of skin disease is regarded as a multidimensional concept that comprehends psychological, social and economic significance of the skin disease at the sufferers and their households and on society. It is a contamination that takes place in humans of all ages. Skin is regularly broken due to the fact it's far a touchy a part of the body. There are more than 3000 skin diseases. A cosmetically look spoiler disease will have a big effect and might reason extensive ache and everlasting injury. Most of the chronic skin conditions, along with atopic eczema, psoriasis, vitiligo and leg ulcers, aren't right now deadly, they may be diagnosed as an extensive problem on fitness popularity which include physical, emotional and economic outcome. On the other hand, skin cancers are potentially lethal and their trouble is associated with the temporality that they carry

One of the most frequent ailments among people all over the world is skin disease. Basal cell carcinoma (BCC), melanoma, intraepithelial carcinoma, and squamous cell carcinoma are examples of skin cancers (SCC). The occurrence of skin cancer is currently greater than the occurrence of other new kinds of lung and breast cancer [1]. Several skin illnesses have symptoms that can take a long time to treat since they can grow for months before being recognized. As a result, computer-based disease diagnosis comes into play since it can produce a result in a short period of time with more accuracy than human analysis utilizing laboratory procedures. Deep Learning is the most widely used technology for skin disease prediction. Deep learning models will use inferred data to identify and explore features in unexposed data patterns, resulting in significant efficiency even with low computational models. This study presents a robust mechanism for accurately identifying skin diseases using supervisory approaches that reduce diagnostic costs. This has prompted the researchers to consider using a deep learning model to categorize the skin disease based on the image of the affected region

II. LITERATURE SURVEY

TITLE: Towards Efficient Medical Lesion Image Super-Resolution based on Deep Residual Networks

AUTHOR: Sheng Ren, Deepak Kumar Jain, KehuaGuo, Tao Xu,Tao Chi

Super-resolution reconstruction helps doctors clearly observe the details of medical lesion images and increases the likelihood of the disease being diagnosed and cured. In this paper, we propose an efficient medical lesion image super-resolution method based on deep residual networks. First, a multi-scale super-resolution reconstruction model based on a deep residual network is trained. Second, an easy-to-use interface is designed. Third, a multi-scale super-resolution reconstruction model is used to reconstruct different types of medical lesion images with different scales and calculate their peak signal-to-noise ratios and structural similarity index values. The experimental results show that the proposed super-resolution reconstruction method achieves superior performance over the other methods compared in this work.

TITLE: Article Classification of Skin Disease Using Deep Learning Neural Networks with MobileNet V2 and LSTM.

AUTHOR: Parvathaneni Naga Srinivasu

Deep learning models are efficient in learning the features that assist in understanding complex patterns precisely. This study proposed a computerized process of classifying skin disease through deep learning based MobileNet V2 and Long Short Term Memory (LSTM). The MobileNet V2 model proved to be efficient with a better accuracy that can work on lightweight computational devices. The proposed model is efficient in maintaining stateful information for precise predictions. A grey-level co-occurrence matrix is used for assessing the progress of diseased growth. The performance has been compared against other state-of-the-art models such as Fine-Tuned Neural Networks (FTNN), Convolutional Neural Network (CNN), Very Deep Convolutional Networks for Large-Scale Image Recognition developed by Visual Geometry Group (VGG), and convolutional neural network architecture that expanded with few changes. The HAM10000 dataset is used and the proposed method has outperformed other methods with more than 85% accuracy. Its robustness in recognizing the affected region much faster with almost 2× lesser computations than the conventional MobileNet model results in minimal computational efforts. Furthermore, a mobile application is designed for instant and proper action. It helps the patient and dermatologists identify the type of disease from the affected region's image at the initial stage of the skin disease. These findings suggest that the proposed system can help general practitioners efficiently and effectively diagnose skin conditions, thereby reducing further complications and morbidity.

TITLE: Skin Disease Recognition Method Based on Image Color and Texture Features, Computational and Mathematical Methods in Medicine

AUTHOR: Quan Gan,1 and Tao Ji1

Skin diseases have a serious impact on people's life and health. Current research proposes an efficient approach to identify singular type of skin diseases. It is necessary to develop automatic methods in

order to increase the accuracy of diagnosis for multitype skin diseases. In this paper, three type skin diseases such as herpes, dermatitis, and psoriasis skin disease could be identified by a new recognition method. Initially, skin images were preprocessed to remove noise and irrelevant background by filtering and transformation. Then the method of grey-level co-occurrence matrix (GLCM) was introduced to segment images of skin disease. The texture and color features of different skin disease images could be obtained accurately. Finally, by using the support vector machine (SVM) classification method, three types of skin diseases were identified. The experimental results demonstrate the effectiveness and feasibility of the proposed method.

TITLE: Automatic detection and severity measurement of eczema using image processing.

AUTHOR: M. N. Alam, T. T. K. Munia, K. Tavakolian, F. Vasefi, N. MacKinnon and R. Fazel-Rezai,

Chronic skin diseases like eczema may lead to severe health and financial consequences for patients if not detected and controlled early. Early measurement of disease severity, combined with a recommendation for skin protection and use of appropriate medication can prevent the disease from worsening. Current diagnosis can be costly and time-consuming. In this paper, an automatic eczema detection and severity measurement model are presented using modern image processing and computer algorithm. The system can successfully detect regions of eczema and classify the identified region as mild or severe based on image color and texture feature. Then the model automatically measures skin parameters used in the most common assessment tool called “Eczema Area and Severity Index (EASI),” by computing eczema affected area score, eczema intensity score, and body region score of eczema allowing both patients and physicians to accurately assess the affected skin.

TITLE: Classification of Skin Disease Using Deep Learning Neural Networks with MobileNet V2 and LSTM

AUTHOR: Parvathaneni Naga Srinivasu

Deep learning models are efficient in learning the features that assist in understanding complex patterns precisely. This study proposed a computerized process of classifying skin disease through deep learning based MobileNet V2 and Long Short Term Memory (LSTM). The MobileNet V2 model proved to be efficient with a better accuracy that can work on lightweight computational devices. The proposed model is efficient in maintaining stateful information for precise predictions. A grey-level co-occurrence matrix is used for assessing the progress of diseased growth. The performance has been compared against other state-of-the-art models such as Fine-Tuned Neural Networks (FTNN), Convolutional Neural Network (CNN), Very Deep Convolutional Networks for Large-Scale Image Recognition developed by Visual Geometry Group (VGG), and convolutional neural network architecture that expanded with few changes. The HAM10000 dataset is used and the proposed method has outperformed other methods with more than 85% accuracy. Its robustness in recognizing the affected region much faster with almost 2× lesser computations than the conventional MobileNet model results in minimal computational efforts. Furthermore, a mobile application is designed for instant and proper action. It helps the patient and dermatologists identify the type of disease from the affected region's image at the initial stage of the skin disease. These findings suggest that the proposed system can help general practitioners efficiently and effectively diagnose skin conditions, thereby reducing further complications and morbidity.

TITLE: Skin disease detection and classification using deep learning algorithms

AUTHOR: Malliga, S. & Infanta, G. & Sindoora, S. & Yogarasi, S

Skin is one in every of the most important and quickest developing tissues of the human body. The burden of skin disease is regarded as a multidimensional concept that comprehends psychological, social and economic significance of the skin disease at the sufferers and their households and on society. It is a contamination that takes place in humans of all ages. Skin is regularly broken due to the fact it's far a touchy a part of the body. There are more than 3000 skin diseases. A cosmetically look spoiler disease will have a big effect and might

reason extensive ache and everlasting injury. Most of the chronic skin conditions, along with atopic eczema, psoriasis, vitiligo and leg ulcers, aren't right now deadly, they may be diagnosed as an extensive problem on fitness popularity which include physical, emotional and economic outcome. On the other hand, skin cancers are potentially lethal and their trouble is associated with the temporality that they carry. One of the most frequent ailments among people all over the world is skin disease. Basal cell carcinoma (BCC), melanoma, intraepithelial carcinoma, and squamous cell carcinoma are examples of skin cancers (SCC). The occurrence of skin cancer is currently greater than the occurrence of other new kinds of lung and breast cancer [1]. Several skin illnesses have symptoms that can take a long time to treat since they can grow for months before being recognized. As a result, computer-based disease diagnosis comes into play since it can produce a result in a short period of time with more accuracy than human analysis utilizing laboratory procedures. Deep Learning is the most widely used technology for skin disease prediction. Deep learning models will use inferred data to identify and explore features in unexposed data patterns, resulting in significant efficiency even with low computational models. This study presents a robust mechanism for accurately identifying skin diseases using supervisory approaches that reduce diagnostic costs. This has prompted the researchers to consider using a deep learning model to categorize the skin disease based on the image of the affected region.

III. EXISTING SYSTEM

One of the most frequent ailments among people all over the world is skin disease. Basal cell carcinoma (BCC), melanoma, intraepithelial carcinoma, and squalors cell carcinoma are examples of skin cancers (SCC). The occurrence of skin cancer is currently greater than the occurrence of other new kinds of lung and breast cancer. Several skin illnesses have symptoms that can take a long time to treat since they can grow for months before being recognized. As a result, computer-based disease diagnosis comes into play since it can produce a result in a short period of time with more accuracy than human analysis utilizing laboratory procedures.

IV. PROPOSED SYSTEM

Proposed system is a web application that acts as a preliminary step for the diagnosis of a disease where a person uploads the image of the affected area of the skin and then gets to know the type of the disease and few suggestions are given regarding the disease using this application. The proposed framework involves a deep learning-based method to detect skin diseases.

V. SYSTEM ARCHITECTURE

The proposed Skin Disease Prediction Using Convolutional Neural Network (CNN) system follows a simple and effective architecture for automatically identifying different types of skin diseases from skin images. The architecture consists of four major stages: Input Image, Feature Extraction, Skin Disease Classification, and Prediction Output. The system utilizes deep learning techniques to automatically learn disease-specific features from skin images without requiring manual feature engineering, thereby improving the accuracy and efficiency of diagnosis.

The process begins with the Input Image stage, where the user uploads a skin image captured using a digital camera, mobile phone, or dermoscopic imaging device. The uploaded image may contain healthy skin or skin affected by diseases such as Melanoma, Nevus, Seborrheic Keratosis, Warts, Molluscum, burns, cuts, or other skin abnormalities. Before being analyzed by the deep learning model, the image is resized to a fixed resolution and normalized to ensure consistency across all input samples. This preprocessing step reduces variations in image size and improves the learning capability of the CNN model.

The preprocessed image is then passed to the Feature Extraction stage, which represents the core functionality of the Convolutional Neural Network (CNN). Unlike traditional machine learning methods that require manually designed features, CNN automatically extracts important visual characteristics directly from the image. Multiple convolutional layers identify low-level features such as edges, colors, textures, and shapes, while deeper layers learn more complex features including lesion boundaries, pigmentation patterns, skin texture

variations, and disease-specific characteristics. Pooling layers reduce the dimensionality of the extracted features while preserving the most significant information, making the model more efficient and robust.

After feature extraction, the learned features are forwarded to the Skin Disease Classification stage. Fully connected layers analyze the extracted features and compare them with patterns learned during the training process. The CNN model determines the probability that the input image belongs to one of the predefined disease categories. Through repeated training on thousands of labeled skin images, the model learns to distinguish between healthy skin and various skin diseases with high accuracy.

Finally, the system generates the Prediction Output, where the input image is classified into one of several categories. As shown in the architecture, the model can identify whether the image represents Not a Disease (Healthy Skin), Systemic Skin Diseases, Warts/Molluscum, or other skin disease categories (Etc.), including diseases such as Melanoma, Nevus, Seborrheic Keratosis, and additional skin disorders included in the dataset. The predicted disease category is displayed to the user, allowing healthcare professionals or patients to obtain an initial diagnosis and seek appropriate medical treatment if necessary.

Overall, the proposed CNN-based Skin Disease Prediction System provides an intelligent, automated, and reliable framework for skin disease diagnosis. By integrating image preprocessing, automatic feature extraction, deep learning-based classification, and accurate disease prediction, the system significantly reduces manual diagnosis efforts, improves classification accuracy, enables early detection of skin disorders, and assists dermatologists in making faster and more informed clinical decisions.

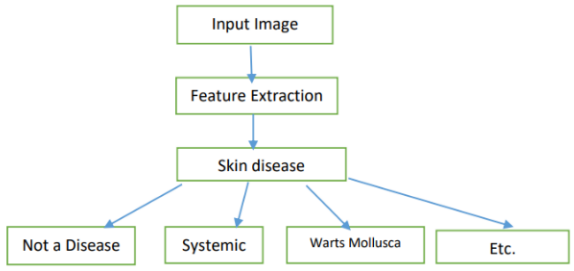


Fig 5.1: System Architecture

VI. IMPLEMENTATION

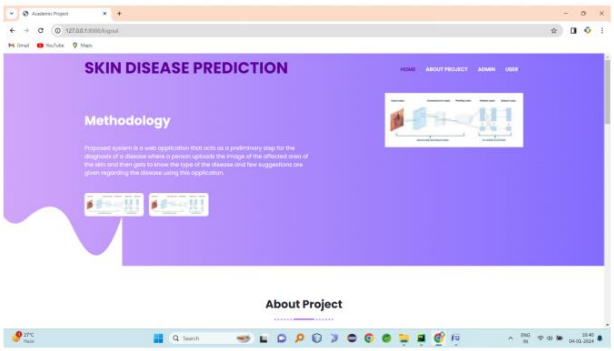


Fig 6.1 Index page

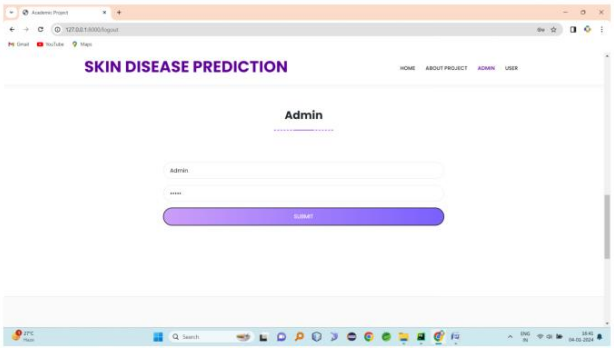


Fig 6.2 : Admin home

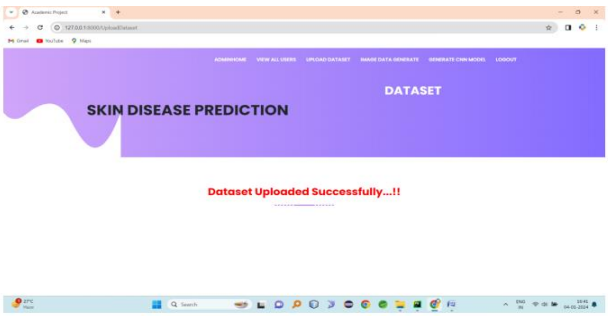


Fig 6.3: dataset

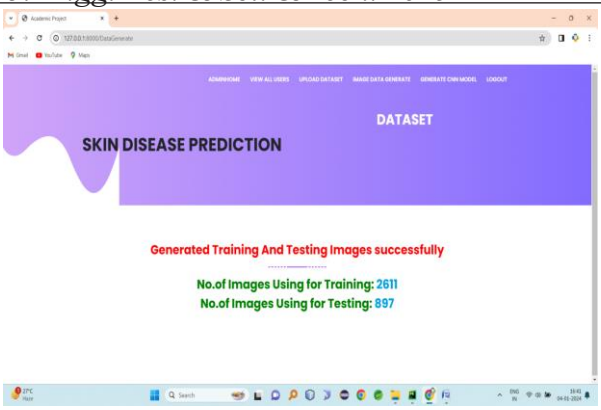


Fig 6.4: Preprocessing

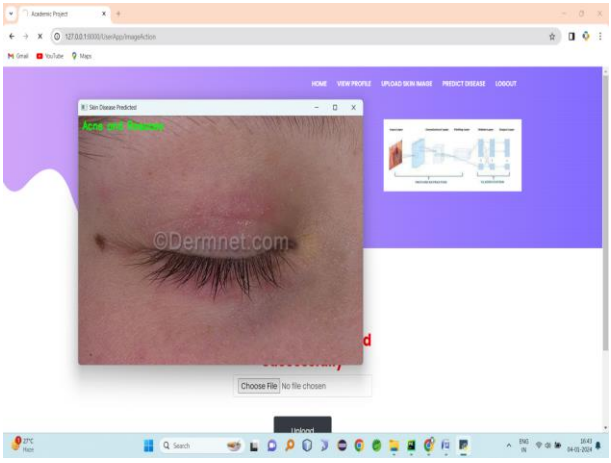


Fig 6.5: Results

VII. CONCLUSION

The feasibility of building a universal skin disease classification system has been investigated using CNN, Resnet, Alexnet and Inceptionv3. CNN has outperformed over training data but not on testing data. Better accuracy can be obtained by providing a training set with more variance and also by increasing its size. It is also found that Resnet has given better accuracy compared to other networks in the diagnosis of skin diseases.

VIII. FUTURE SCOPE

The proposed Skin Disease Prediction Using Convolutional Neural Network (CNN) system can be further enhanced by incorporating advanced deep learning models and emerging healthcare technologies to improve diagnostic accuracy, efficiency, and accessibility. Future work may involve integrating state-of-the-art architectures such as Vision Transformers (ViT), EfficientNet, DenseNet, and YOLO-based models for more accurate detection and localization of skin lesions. The system can also be expanded to classify a wider range of skin diseases, including rare dermatological conditions, by training on larger and more diverse datasets collected from different populations. Incorporating explainable artificial intelligence (XAI) techniques, such as Grad-CAM and attention maps, can help dermatologists understand the model's decision-making process, thereby increasing trust and transparency in AI-assisted diagnosis.

Additionally, the system can be deployed as a mobile application or cloud-based teledermatology platform, allowing patients to upload skin images remotely and receive instant preliminary assessments. Integration with electronic health records (EHRs) and hospital information systems can provide comprehensive patient management and support clinical decision-making. Future versions may also include severity assessment, disease progression monitoring, personalized treatment recommendations, multilingual support, and real-time consultation with dermatologists. By combining deep learning, cloud computing, and mobile healthcare technologies, the system has the potential to become a comprehensive, intelligent, and accessible solution for early skin disease detection, reducing diagnostic delays and improving healthcare outcomes worldwide..

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