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# DESIGN AND DEVELOPMENT OF SKIN CANCER DETECTION USING VGG16 MODEL IN CONVOLUTIONAL NEURAL NETWORK

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**Abstract:** Skin cancer is one of the most deadly types of skin cancer. If it is not recognised and treated right away, it is not anticipated to spread to other body parts. It also occurs when the tissue is exposed to sunlight, mostly as a result of the fast division of skin cells. A precise automated system for skin lesion recognition is crucial for early diagnosis since it can save time, effort, and human lives. Deep learning and image processing are both utilised in the effective treatment of skin cancer. The research proposes a computerised approach for categorising skin cancer. The seven main types of skin cancer have been classified in this study. Convolutional neural networks (CNN) with deep layers exhibit both efficacy and capacity. Seven clinical forms of skin cancer are represented in the dataset, including nevus, actinic keratosis, benign keratosis, dermatofibroma, and melanoma. The objective is to develop a model that can recognise skin cancer and classify it into several categories using a convolution neural network. The diagnostic approach makes use of deep learning and the idea of image processing. Through the use of different picture enhancing techniques, the amount of photographs has also grown. The accuracy of the classification tasks is then further improved by using the transfer learning technique. Accuracy rates are about 98 percent, according to the suggested CNN technique.

**Keywords:** Deep Learning, Convolution Neural Network, Melanoma or benign, Skin Cancer.

## I. INTRODUCTION

In the past, skin cancer has been the most prevalent illness worldwide.The incidence of both nonmelanoma and melano ma skin cancer has grown throughout the next decades.According to figures from the Skin Cancer Foundation has found, one of the five Americans may eventually get skin cancer. According to the World Health Organisation (WHO), skin cancer occurs in one of every three cancer cases. In nations like the United States, Canada, and Australia, the prevalence of skin cancer has progressively climbed over the past several centuries. It appears that skin disorders have a considerable negative impact on world health. A 2017 study found that skin cancer represents 1.79 percent of the worldwide sickness burden, expressed in years of life with illness of a limitation. 7 to 8 % of new cancer cases globally found is skin cancer at a cost of more than $8 billion to the US Medicare initiative in 2011. Racial inequalities in skin cancer outcomes are supported by clinical data. While people with darker skin tones are around 20–30% less likely to acquire melanoma than those with lighter skin, they have also been found to have a reduced or greater death risk for particular melanoma forms.

Skin disease recognition and observing is a major challenge looked by the medical industry. Because of expanding contamination and utilization of lousy nourishment, the tally of patients experiencing skin related issues is expanding at a quicker rate. Well-being isn't the main concern, however unfortunate skin hurts our certainty. The article discusses the use of machine learning methods for skin disease recognition and observation, which is a major challenge faced by the medical industry due to increasing pollution and unhealthy food consumption. The authors explore potential applications for this technology beyond medical diagnosis.

Convolutional neural networks have been utilised extensively in recent years for a variety of classifications as well as to categorise skin cancer lesions. Numerous CNN models have significantly outperformed highly qualified healthcare practitioners in the classification of skin malignancies. Many methods, including transfer learning with large datasets, have improved the performance of these models even further. There are 16 and 19 convolutional layers in the convolutional networks VGG-16 and VGG-19, respectively. The pretrained network could recognise images of objects in 1000 object levels, including a keyboard, mouse, pen, and creatures.

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## II. ORGANIZATION

The 1st section of this paper gives the introduction about the technological trends and need for skin cancer detection. In the 3rd section we discuss about the survey on various related works. 4th section provides problem statement.5th section hardware, various tools and the libraries used for implementing. 6th section provides the design and implementation of the system followed by the conclusion and future enhancements and references used.

## III. LITERATURE SURVEY

A. Julia Hohn a , Eva Krieghoff-Henning a , Tanja B collectively provides s a comparative analysis of five different machine learning algorithms for skin disease detection, providing insights into their accuracy rates. It also discusses the potential applications of machine learning beyond medical diagnosis. The disadvantages are it is limited to specific research topic of skin disease detection using machine learning algorithms and does not provide information on other related topics.[1]

B. Ahmad Naeem1 and Muhammad Shoaib Farooq1 proposes a non-invasive, accurate, and cost-effective system for detecting and classifying skin diseases using image processing and machine learning techniques. It is also easy to use and can quickly analyze large amounts of data.[2]

C. Shuchi Bhadula, Sachin Sharma, Piyush Juyal and Chitransh Kulshrestha proposed stacked ensemble framework for detecting melanoma skin cancer at earlier stages using CNN models. It also discusses the use of explainable AI techniques to make the model's predictions more interpretable for clinical settings.[3]

D. Kemal Polat and Kaan Onur presents a promising method for detecting skin diseases from dermoscopy images using a combination of Convolutional Neural Network and Oneversus-All approach. The proposed method achieves significantly higher accuracy than using CNN alone and can handle multi-class classification problems effectively.[4]

E. Mohammad Shorfuzzaman in his paper provides a comprehensive review of deep learning techniques for melanoma detection and proposes a taxonomy and model for melanoma detection that can serve as a useful framework for researchers. The disadvantages are it may not include all relevant research on deep learning techniques for melanoma detection, as it is limited to the studies that were available at the time of publication.[5]

## IV. PROBLEM STATEMENT

The most frequent disease to be identified in Americans is skin cancer, and the majority of instances are avoidable. Skin cancer can be disfiguring or even fatal, and it has a significant impact on quality of life. For individuals, families, and communities, medical treatment for skin cancer results in significant health care expenses. and the country. According to estimates, more Americans than all other cancers combined have experienced skin cancer at some point in the past three decades, and skin cancer incidence rates have been rising in recent years. Nearly 5 million Americans receive treatment for all forms of skin cancer annually, at an estimated cost of $8.1 billion.

In recent decades, deep learning has completely changed the machine learning environment. We have developed a web application to identify skin cancer in its early stages. It is regarded as the most advanced area of artificial neural network techniques in machine learning. The structure and operation of the human brain served as an inspiration for these algorithms. Deep learning techniques are used in a variety of fields, including bioinformatics, pattern identification, and speech recognition. In these areas, deep learning systems have shown excellent outcomes when compared to other traditional machine learning methods. In recent years, a variety of deep learning techniques have been used to computer-based skin cancer screening. Deep learning-based methods for detecting skin cancer are covered in-depth in this report. This essay focuses on the presentation of a thorough, organised survey of the literature on traditional deep learning techniques, including convolutional neural networks (CNN) and neural networks for skin cancer diagnosis.

## V. REQUIREMENTS

*A. Hardware Requirements:*

TABLE I : HARDWARE REQUIREMENTS

| | |
|---|---|
| Processor | Intel(R) Core (TM), Ryzen |
| RAM | 4GB and above |
| HDD / SSD | 20GB and above |
| Graphics | GPU |

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*B. Software Requirements:*

TABLE II : SOFTWARE REQUIREMENTS

| | |
|---|---|
| Operating system | Windows 7 and above. |
| Platform | Python Django framework |
| Coding Language | Python, HTML, CSS, Bootstrap |

## VI. METHODOLOGY

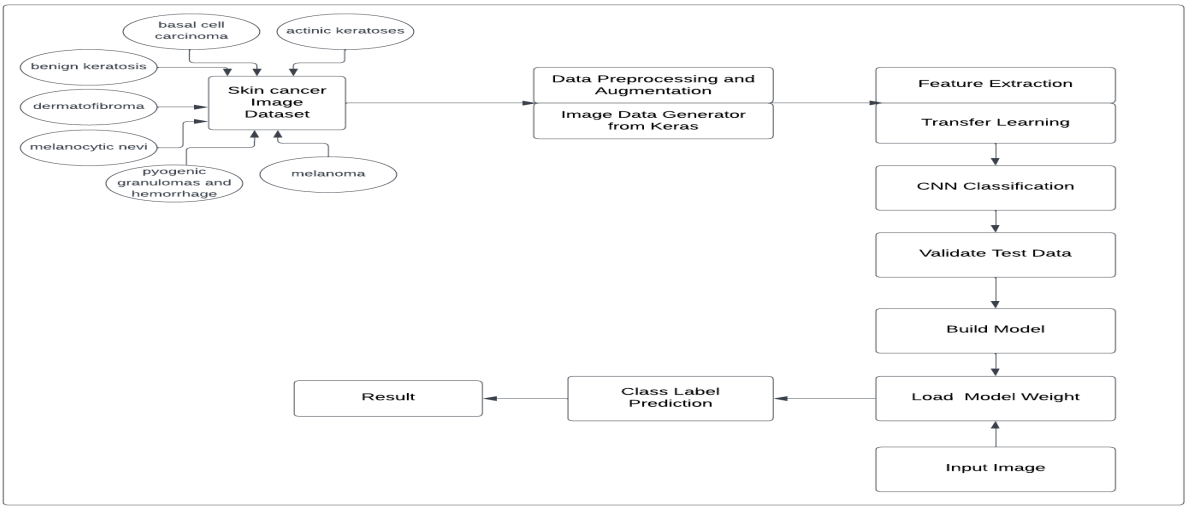


**Fig 1**.Block Diagram of Proposed System for Skin Cancer Detection

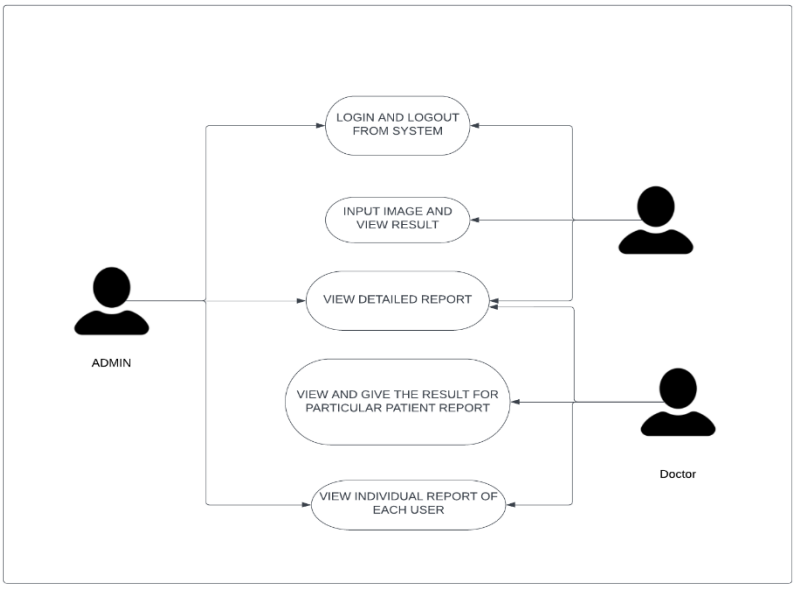


**Fig 2 :** Use Case Diagram for both Admin, Doctor and User

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Working Principle

Fig 4.1 depicts the skin cancer datasets consist of superficial partial, and full thickness images. Images are pre- processed and augmented using Image data generator. The feature extraction is carried out by using transfer learning techniques for classify cancer. Classification is done using Convolutional Neutral Network (VGG16 Model) and validate the test data and then build a model in raw file. The Model is load in backend of website using Django framework then whenever user give input in frontend of website it predicts the type of cancer and give the result.

In Fig 4.2 Use Case Diagram, User can login and logout the system, can input the skin cancer image to get the result then view them in detailed and even can ask the question regarding the individual result report whereas Admin and Doctor can also login and logout of the system, can view individual report for each user and even answer the question of user regarding the result report.

## VII. RESULTS

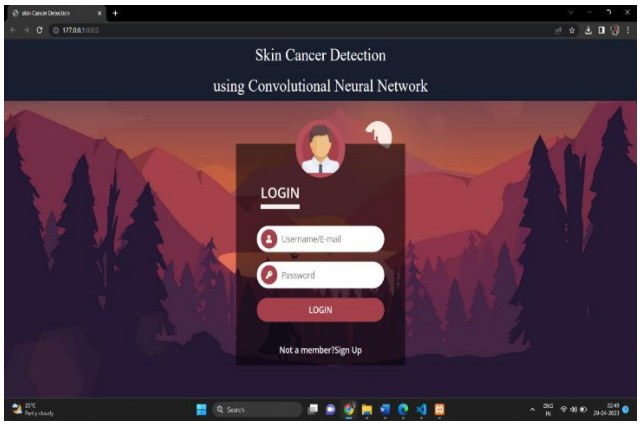


Fig 3 Login Page

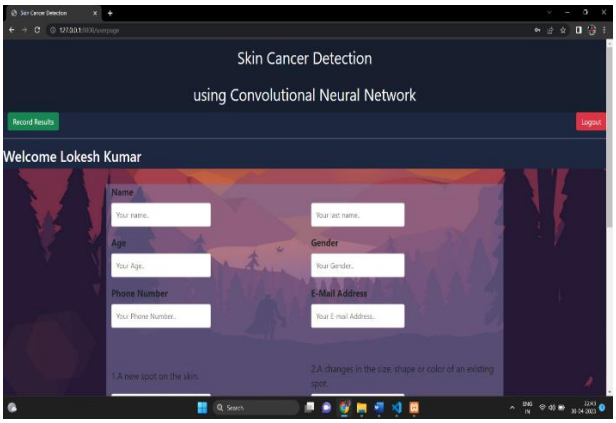


Fig 4: Patient Form

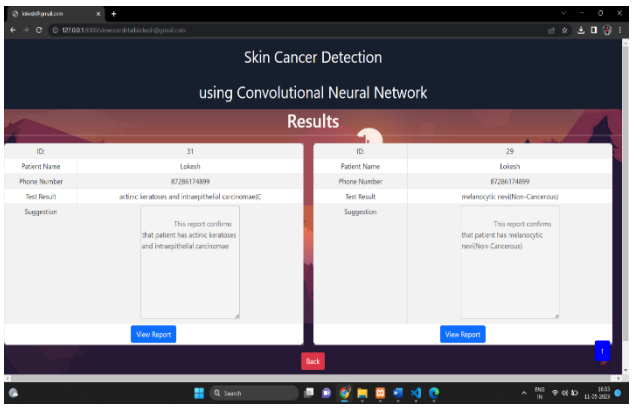


Fig 5: Result Page

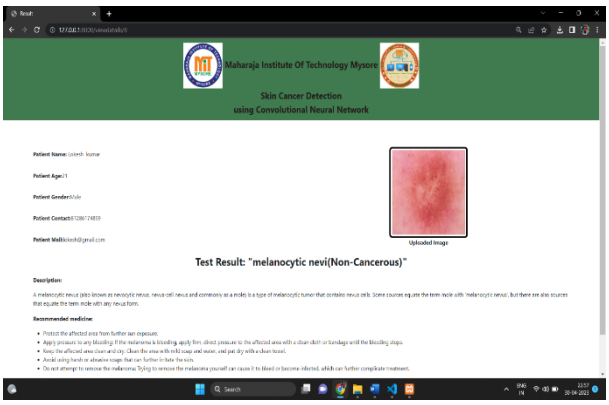


Fig 6: Detailed Report

## VIII. CONCLUSION

We considered seven classes here. We performed pre-processing, data oversampling and image classification. After all these procedures we will classify the skin cancer as actinic keratoses, basal cell carcinoma, benign keratosis, dermatofibroma, melanocytic nevi, pyogenic granulomas and melanoma. In our project, we were able to get a good result. And it is successfully performing the cancer datasets estimation and classification. In the proposed system, Image Pre-Processing and Image Classification steps are performed for categorizing skin lesion images into melanoma or benign.

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## IX. FUTURE ENHANCEMENT

In the view of future enhancement, the algorithm can be tested with significantly huge number of datasets and check for better accuracy. The Enhancement to the project by designing the reference of doctors and the names of hospitals can be suggested according to the type of cancer in an android application. The system can be developed to find the healing time of the skin cancer.

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