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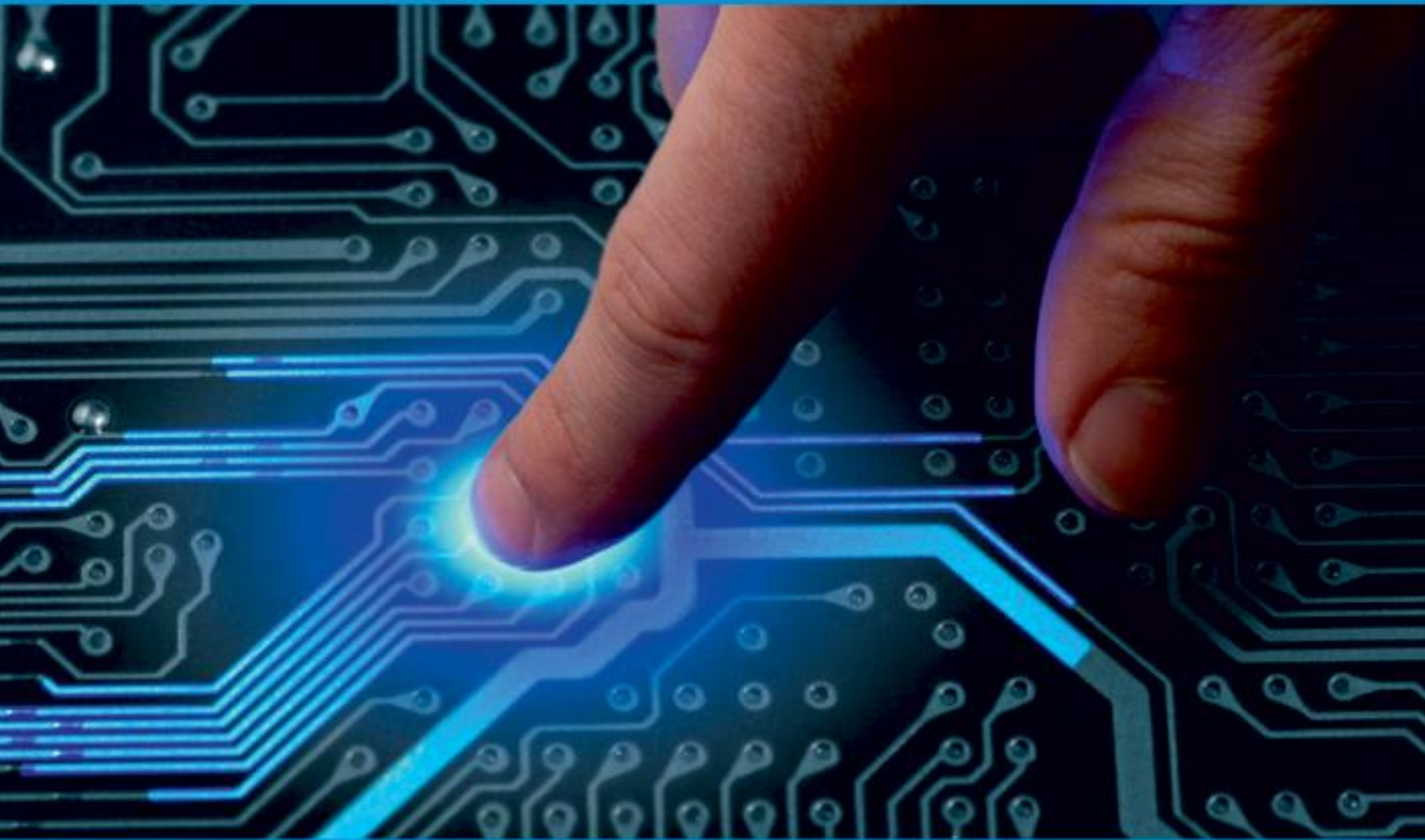

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Design And Analysis of AI Powered Image Processing Techniques for Early Detection and Classification of Face Skin Cancer

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ABSTRACT: Developing an AI-powered image processing technique for early detection and classification of facial skin cancer addresses a critical need in dermatology. By leveraging deep learning, the project aims to enhance speed and accuracy in identifying lesions, crucial for timely intervention. Traditional methods face limitations in scalability and accuracy, making AI integration vital for overcoming interpretability challenges and biases. The technique utilizes a diverse dataset to train the model in recognizing various skin tones and lesion types. Successful implementation promises improved clinical workflows and a paradigm shift in dermatological diagnostics, offering clinicians valuable insights for effective patient care.

KEYWORDS: Skin cancer· Deep learning · Early detection · Dermoscopy · Lesion parameter

I. INTRODUCTION

Skin is the most important organ in the human body and performs numerous tasks. such as security, controlling temperatures, and sensing. Skin problems are common in modern society. Skin ailments can be a result of a variety of reasons, including an imbalanced and contaminated diet, numerous types of contaminants, and possibly familial heredity. Skin illness is a relatively prevalent disease in living beings. Skin disease tracking and classification is a difficult task in the medical world recognizing the specific type can be difficult due to the variety of each person's skin colours and the near visible effect of diseases. Skin disorders are quite frequent in humans and may impact people of many different cultures and ages.

Cancer is produced by cancerous changes in cells that routinely form malignant cells. Genetic traits such as fair hair, eyes, and pores, as well as skin colour patterns, are all associated with risks for cancer. Every year, the disorder caused 55,500 cancer cases, which constitutes 0.7% of all cancer cases. of the total mortality worldwide on average. Early detection and treatment are crucial for successful outcomes in skin disease cases. Skin cancer, including melanocytes, basal cell carcinoma, and squamous cell carcinoma, occurs when abnormal growth of skin cells takes place. Melanoma is discovered in only 1% of instances, and approximately 75 percent of cases result in death. If not recognized and treated in a timely manner, this could lead to the spreading of malignancy to numerous areas of the human body are affected. Melanoma is caused by the presence of melanocytes throughout the body of a person. Early on, though, diagnosis 90% healing rates for malignant infections are possible. Timely diagnosis can significantly increase the chances of successful treatment and reduce the risk of complications or death. Currently, machine learning algorithms perform an important play an important part in the identification of various illnesses in the domain of medical technology. One of the skin cancers found in the scientific area. Machine learning algorithms can categorise them based on their characteristics. Algorithms for deep learning convolutional neural network are being used for skin cancer imaging, which can help clinicians diagnose various types of skin cancer using this algorithm technique, the doctor just takes a picture of the patient and runs it through convolutional neural network to demonstrate or aid the doctor in detecting the type of skin cancer. Machine learning is becoming more prevalent in a variety of technical disciplines, and the application of machine learning technologies in medical diagnosis is a new trend.

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II. LITERATURE SURVEY

In order to get required knowledge about various concepts related to the present application, existing literature was studied. Some of the important conclusions were made through those are listed below.

Nazia Hameed et al [1]: Multi-Class Skin Diseases Classification Using Deep Convolutional Neural Network and Support Vector Machine [1]. The research conducted by Nazia Hameed et al. focuses on the classification of skin lesions from images into five distinct categories: normal, eczema, acne, innocuous, and malignant melanoma. Their proposed method utilizes a convolutional neural network (CNN) and employs the widely recognized AlexNET model for feature extraction. The study involves experimentation with a diverse range of materials, likely representing various skin lesion types.

Sambit Bakhshi [2]: Automated Identification of Facial Skin Problems using Deep CNN: A Pre-trained Approach with High Accuracy [2]. Sambit Bakhshi has contributed to the realm of dermatological diagnostics by developing a pre-trained, fully-automated method for identifying facial skin problems using a deep convolutional neural network (CNN). The research begins with an initial phase of image pre- processing, employing various algorithms to enhance image quality and expand the database's size.

Yasir, R., Rahman A., et al [3]: A Method of Skin Disease Detection Using Image Processing And Machine Learning [3]. In their study encompassing nine distinct types of skin illnesses, Yasir, R., Rahman A., et al., shed light on the critical implications of early detection and treatment for melanoma, a highly perilous form of skin tumor that can lead to fatal outcomes if not addressed promptly. Employing machine learning techniques, the researchers aimed to identify and classify various skin diseases, emphasizing the role of algorithms in model training and testing. The study acknowledges the dynamic nature of machine learning accuracy values, attributing variations to the selection of different algorithms.

R. Bhardwaj et al [4]: Empowering Skin Health Diagnosis [4]. This study, based on the research conducted by R. Bhardwaj et al., delves into multiple methodologies for autonomously diagnosing skin conditions from color photographs. The framework of the study comprises two distinct phases, each contributing to the comprehensive diagnostic process. Initially, color image processing techniques are employed for segmentation, enabling the identification of damaged areas on the skin. Subsequently, various machine learning algorithms, including decision trees, support vector machines, and artificial neural networks, are utilized to classify the specific type of skin illness present in the identified areas.

Govinda Samy et al[5]: Insights into Medical Vision: A Comparative Analysis of Convolutional Neural Networks for Predicting Skin Infections[5]. In their study, as documented by Govinda Samy et al., the prediction of a doctor's field of vision was explored using a convolutional neural network (CNN) model. The research specifically investigated the influence of feature extraction and fully connected layers within the CNN architecture. The study adopted a comprehensive approach, comparing features manually crafted with those extracted using a CNN-feature extraction technique.

K. Veera Swamy et al[6]: Color and Texture-Based Skin Disease Classification: A Comparative Analysis of Decision Tree and Support Vector Machine Approaches[6]. In the study conducted by K. Veera Swamy et al., the focus is on elucidating the methods employed for the classification of skin diseases based on their visual appearance, specifically considering color and texture attributes. The research capitalizes on the observable distinction in shade between diseased and healthy skin, and it explores the determination of softness, coarseness, and regularity from skin photographs.

III. LITERATURE REVIEW SUMMARY

In this review, we delve into the evolving landscape of face skin cancer, tracing its historical roots and outlining the major advancements that have shaped the field. Despite significant progress, a critical knowledge gap exists in problem. This review aims to systematically examine the existing literature to address this gap, providing a comprehensive synthesis. By doing so, we seek to not only consolidate current knowledge but also to identify emerging trends and propose avenues for future research.

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IV. PROPOSED SYSTEM

A proposed system uses AI to detect skin cancer or diseases from dermoscopic images uploaded by doctors. The system preprocesses these images by eliminating noise, resizing, and enhancing features before analysis. It utilizes the Inception v3 model, trained to identify various skin conditions such as Basal Cell Carcinoma (BCC), Squamous Cell Carcinoma (SCC), and Intraepithelial Carcinoma (IEC), among others. Following preprocessing, the model assigns probabilities to each potential condition.

The system then generates a detailed report, listing the patient's details (name, age, gender), the predicted skin condition (cancerous or non-cancerous), and the specific diagnosis. Doctors review the AI report in conjunction with the patient's medical history and their clinical judgment. This review helps ensure that the AI's recommendations are considered within the broader context of patient care. Ultimately, the doctor makes the final diagnosis and determines the appropriate treatment plan, which may include further tests or treatments. This integration of AI aims to enhance diagnostic accuracy and support doctors in providing timely and effective patient care.
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V. METHODOLOGY

Image processing:
Image processing plays a pivotal role in the realm of dermatology for skin cancer detection. Dermatological images, particularly those obtained through dermoscopy, undergo various image processing techniques to extract valuable information and enhance diagnostic accuracy. In the context of skin cancer detection, image processing algorithms analyze dermoscopic images to identify and characterize specific features associated with malignant lesions. These features include pigment distribution, structural patterns, and vascular formations. By employing advanced image processing methods, such as segmentation and texture analysis, the algorithms can highlight subtle nuances in the images that might be indicative of skin cancer.

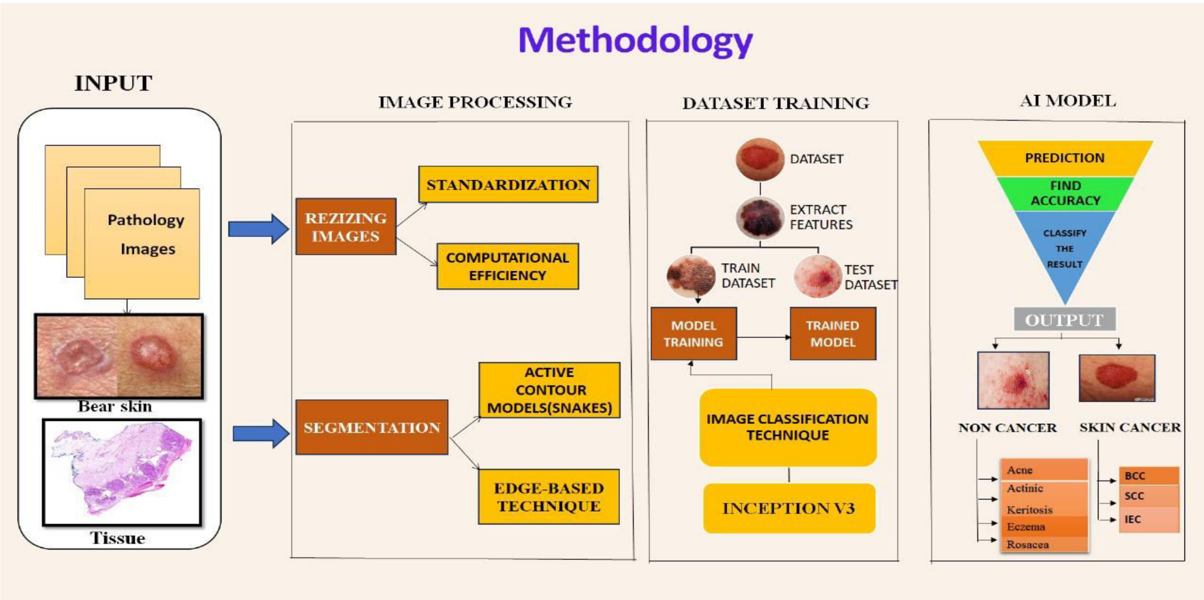

Fig 5.1: Methodology diagram

Resizing images:
Resizing images is a fundamental step in image processing for skin cancer detection, especially when working with dermoscopic images. Dermatological images may vary in resolution and size, and resizing helps standardize the input for further analysis and computational efficiency.

Segmentation:
In skin cancer detection through image processing, segmentation plays a pivotal role by isolating the regions of interest from the surrounding tissues.

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Dataset Training :
In skin cancer detection, training a dataset involves using labeled images to teach a machine learning model to recognize patterns that distinguish between benign and malignant lesions. Techniques like CNNs are used to teach the model to spot visual cues indicating potential malignancy, such as asymmetry or irregular borders. A diverse, high-quality dataset is crucial for accurate and generalizable results. Continuous updates to the dataset help the model stay effective in detecting skin cancer.

Image classification:
Image classification using Inception V3 model:

Inception v3:
A convolutional Neural Network is described as a technique for classifying data in images , with a particular focus on image recognition problems. The strength of the CNN model lies in its hierarchical learning layer, which can be intensely trained once the model topology matches the input features. By leveraging the spatial relationship of visual patterns, the model efficiently reduces the number of parameters, thereby improving performance accuracy. Inception V3, developed by Google, is a convolutional neural network architecture specifically designed for image classification tasks. It is the third iteration of the Inception architecture and was introduced in 2015. Inception V3 builds upon the concepts of its predecessors and aims to enhance both the performance and efficiency of image classification tasks.

VI. WEB APPLICATION WORKING FLOW

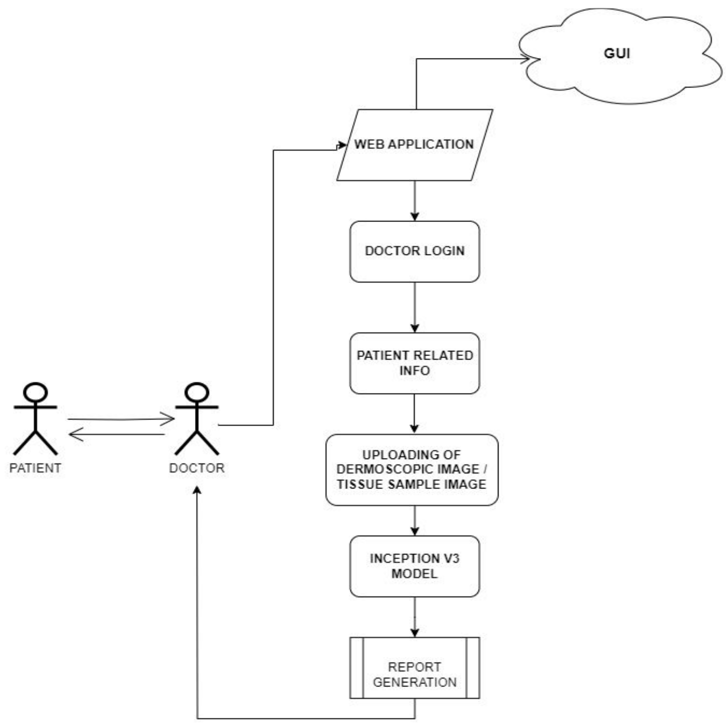

Fig 5.1: Working flow of web application

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VII. RESULTS

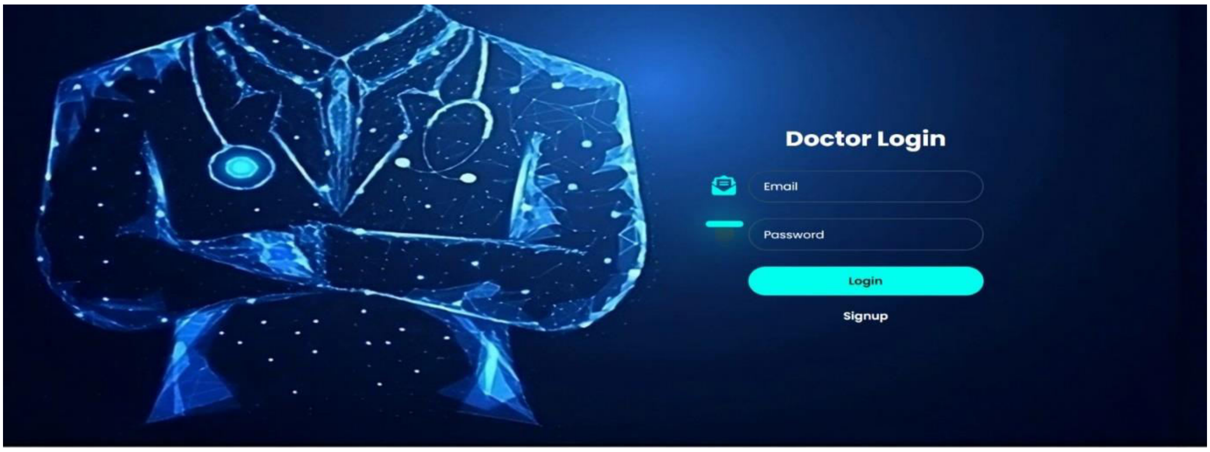

FIG 7.1: DOCTOR'S LOGIN PAGE

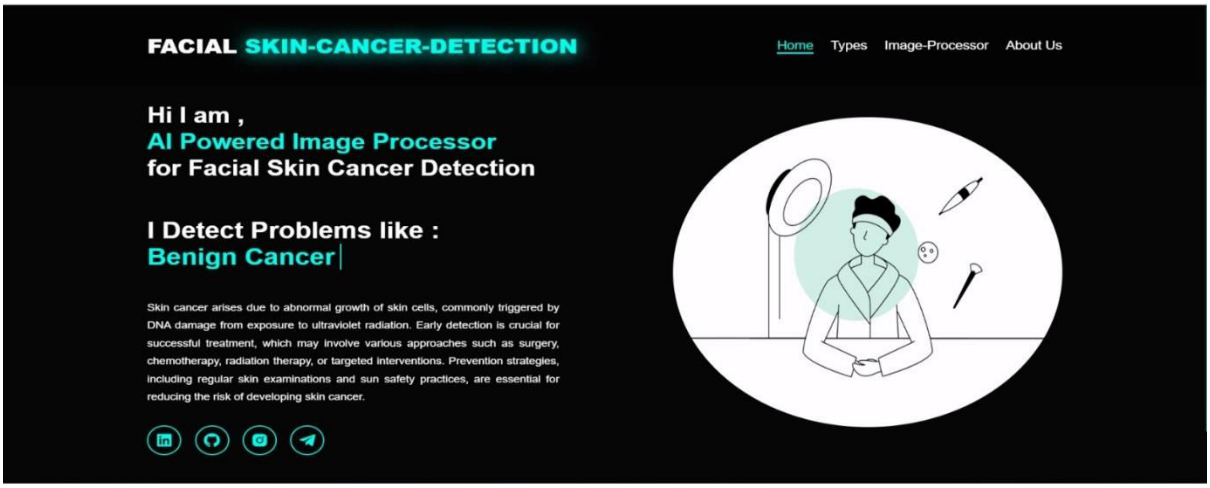

FIG 7.2: HOME PAGE

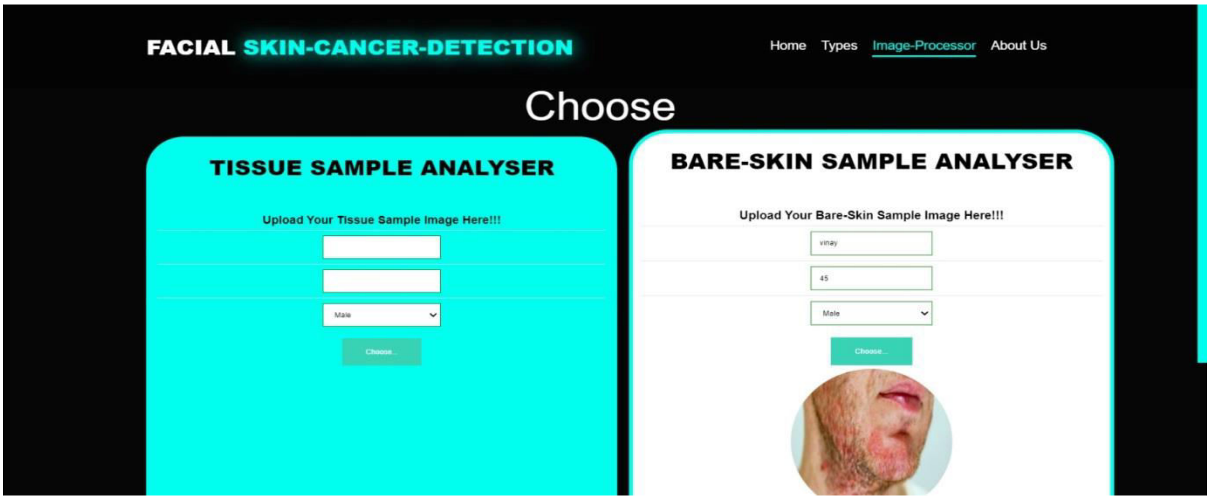

FIG 7.3: IMAGE PROCESSING PAGE

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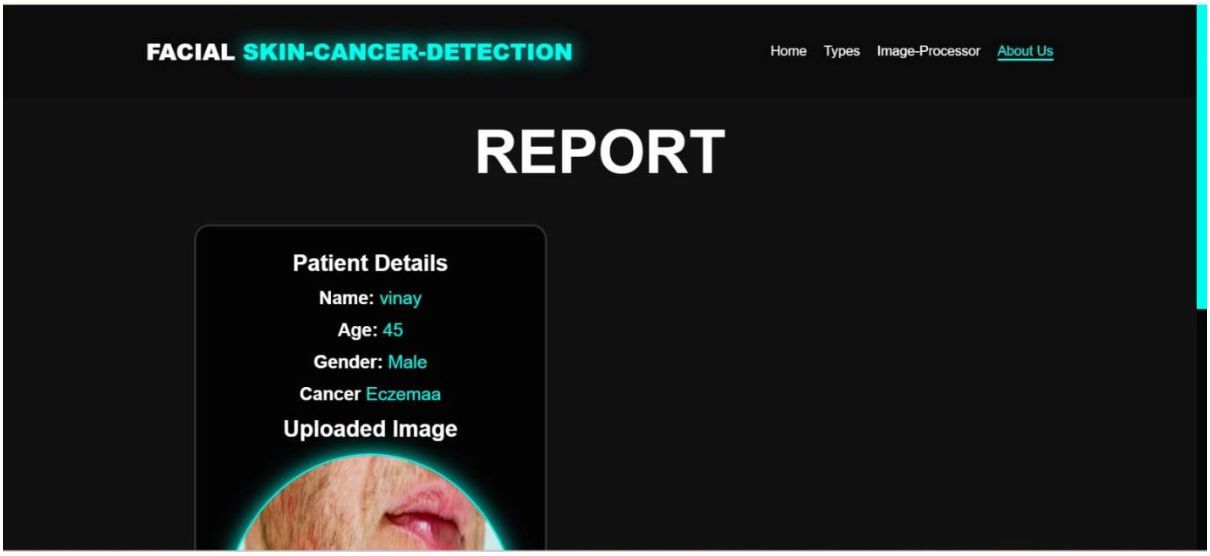

FIG 7.4: REPORT GENERATION PAGE

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VIII. CONCLUSION

This paper aims to create a reliable approach for detecting skin diseases, particularly various cases of skin cancer. The existing system faces challenges such as time consumption and repetitive processes involving multiple devices. To address these issues, our solution integrates advanced deep learning methods, including Inception V3 and the VGG16 architecture. By employing these techniques, we strive to streamline the diagnostic process, significantly reducing time constraints and minimizing repetitive tasks associated with the current system. The implementation of Inception V3 and VGG16 enhances the accuracy and efficiency of skin cancer detection, providing a more robust and reliable diagnostic framework. This innovative approach harnesses the power of deep learning to revolutionize skin disease diagnosis, promising a more effective and time-efficient solution for healthcare practitioners.

REFERENCES

1. Nazia Hameed, Antesar Shabut, Alamgir Hossain "Multi-Class Skin Diseases Classification Using Deep Convolutional Neural Network and Support Vector Machine" International Conference on Software, Knowledge, Information Management & Applications (SKIMA), 2018
2. Sambit BAKHSHI , Gautam Kumar, Arun Kumar, Pankaj K Sa "Automated Identification of Facial Skin Problems using Deep CNN: A Pre- trained Approach with High Accuracy" National Institute of Technology Delhi 2018
3. Yasir, R., Rahman A, M. S. I. Nibir, and N. Ahmed. "A Method Of Skin Disease Detection Using Image Processing And Machine Learning", Global Science and Technology Journal,2019
4. R. Bhardwaj, Neha Bhardwaj, Prasoon Purwar, "Empowering Skin Health Diagnosis" Springer, Singapore,2019
5. Govinda Samy, M. Kalaiyarivu1 , Dr. N. J. Nalini, "Insights into Medical Vision: A Comparative Analysis of Convolutional Neural Networks for Predicting Skin Infections", 2022
6. K. Veera Swamy, Samiksha Prachand1, Nisha Patil2, Neha Badoge3, Vaibhavi Chaudhari,"Color and Texture-Based Skin Disease Classification: A Comparative Analysis of Decision Tree and Support Vector Machine Approaches" International Research Journal of Engineering and Technology,2023