A Cosmetic Product Recommendation System Based on Skin Type Using AI/ML

Prof. V. S. Kadam[1], Kalyani Dhande[2], Pradnya Kadam[3], Gayatri Chinchansure[4], Aishwarya Jadhav[5]

Professor, Department of Computer Engineering Students[1]
Students, Department of Computer Engineering Students[2,3,4,5]
Sinhgad Institute of Technology, Lonavala, Maharashtra, India

Abstract: *The environment around us has a direct and indirect impact on our health and skin. Pollution, climate change, and other factors contribute to premature aging and skin damage. Moreover, hectic schedules and time constraints often make it challenging to prioritize self-care. In this research paper, we propose a model to classify and localize different signs of aging such as puffy eyes, wrinkles, and dark spots on the face. The model can identify skin problems in an individual's face and recommend suitable products for an appropriate solution. This model can help individuals to take care of their skin and maintain healthy skin even with busy schedules*

Keywords: Deep Learning, Convolutional Neural Network, Skin Detection, Facial Analysis, Signs of Ageing, Skincare Products.

I. INTRODUCTION

Skin health is an important factor for overall well-being, as the skin serves as a protective barrier against various environmental factors such as pollution, UV radiation, and climate change. Exposure to these factors can cause premature aging and skin damage, which can affect an individual's physical appearance and mental health. However, individuals often have busy schedules, which can make it challenging to prioritize self-care and skin health.

To address this problem, we propose the development of a model that can classify and localize different signs of aging on the face. This model can help individuals identify their specific skin concerns and recommend appropriate products for an effective solution. The proposed model utilizes deep learning techniques to effectively classify and localize various signs of aging, such as wrinkles, fine lines, and age spots.

By utilizing this model, individuals can receive personalized recommendations for suitable skincare products that target their specific skin concerns. This can save individuals time and effort in finding the right products, as they no longer need to go through trial and error to find effective solutions. Additionally, the model can help individuals take a proactive approach to their skin health, leading to improved overall well-being. In conclusion, the proposed model offers an innovative solution to the challenges individuals face when it comes to prioritizing their skin health. By utilizing deep learning techniques to classify and localize different signs of aging on the face, the model can provide personalized recommendations for effective skincare products, leading to improved skin health and overall well-being.

II. MOTIVATION

It is widely known that each individual has a unique skin type and complexion, making it difficult to recommend a single skincare product that would suit everyone's needs. Additionally, busy schedules and limited access to information may hinder individuals from dedicating enough time to research and find appropriate skincare products that cater to their unique skin concerns.

To address this challenge, we propose the development of a model that is accessible, convenient, and cost-effective for individuals to use. This technology would enable individuals to receive personalized product recommendations based on their specific skin needs, regardless of their location or time constraints. This model would utilize advanced machine learning algorithms and techniques to analyze an individual's skin type and concerns and recommend suitable products.

The implementation of this model would make skincare more accessible and effective for individuals, regardless of their location or daily routine. This technology can help reduce the time and effort needed to find suitable skincare

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products and improve the overall efficacy of skincare routines. Moreover, it could also encourage individuals to take a more proactive approach towards their skin health. In conclusion, the development of this proposed model can revolutionize the skincare industry by making personalized recommendations accessible and convenient for all individuals, regardless of their lifestyle and location. By utilizing advanced machine learning techniques, this technology could provide an effective solution to the challenges faced by individuals seeking appropriate skincare products, ultimately improving the overall skin health of individuals.

III. OBJECTIVES

This research aims to develop a model that accurately identifies various features on the skin and provides personalized recommendations for suitable skincare products based on an individual's unique needs. To achieve this goal, the model employs advanced machine learning algorithms and natural language processing techniques, ensuring the accuracy and effectiveness of the products recommended to consumers.

The proposed model is designed to be user-friendly and time-saving, allowing consumers to navigate and use the website with ease. By utilizing advanced technology, the model can analyze an individual's skin type, complexion, and concerns, providing personalized recommendations for suitable skincare products that cater to their specific needs.

The implementation of this model has the potential to revolutionize the cosmetics industry, as it offers an innovative solution for individuals who struggle to find the right skincare products. With the ability to provide personalized recommendations, consumers can be assured that the products recommended to them will effectively address their skin concerns, leading to improved skin health and overall well-being.in conclusion, this research presents an innovative solution for individuals seeking appropriate skincare products. By employing advanced machine learning and natural language processing techniques, the proposed model offers accurate and personalized recommendations to consumers, saving them time and effort in finding the right skincare products. The implementation of this model has the potential to revolutionize the cosmetics industry, ultimately improving the overall skin health of individuals.

IV. PROBLEM STATEMENT

The task of identifying facial features and recommending suitable products is a common application of computer vision and machine learning models. This involves training a model on a dataset of labeled facial images, where each image is annotated with information about the location and size of various facial features, such as the eyes, nose, and mouth.

Once the model has been trained, it can be used to analyze new images of faces and predict the location and size of these features. This information can then be used to recommend products that are suitable for the user's specific facial features, such as makeup, skincare, or eyewear.

V. METHODOLOGY

The importance of health, maintenance, and skin protection cannot be overstated, especially in today's world, where pollution, stress, and other environmental factors can take a toll on our skin's health. To help users take care of their skin and provide tailored recommendations, our project has developed an online platform that uses advanced technology to analyze live images of the user's face.

The program provides personalized assistance to users who seek advice about their skin by offering recommendations for cosmetic products and reviews. This helps the user make informed decisions about what products to use and how to take care of their skin.

To develop this platform, we gathered a large dataset of random faces of people from various sources, such as Google, Kaggle, and other similar websites. This dataset is essential for the machine learning process, which involves training the model to recognize patterns and features in the facial images.

VI. LITERATURE SURVEY

Sr No.	TITLE	AUTHOR	LEARNING FROM THE PAPER	UNADDRESSED CHALLENGES
1	Research on Face Recognition Technology Based on Deep Learning	Zhou Chun-Rong,	In this paper, face recognition technology based on deep learning is studied, and the effectiveness of the method is verified by simulation experiments.	In the future research, it is necessary to increase the experimental training of light occlusion and light change to improve the robustness of recognition.
2	A method for leveraging artificial intelligence for facial detection	Vandana S. Bhat; Jagadeesh D. Pujari	This study suggests a technique that combines a Gabor filter with a neural network to find faces in an image.	Vestigial pixels are mistakenly identified as skin upon visual inspection since the source pictures' skin detection is inherently flawed.
3	Face Detection in Security Monitoring Based on Artificial Intelligence Video Retrieval Technology	Zuolin Dong; Jiahong Wei; Xiaoyu Chen; Pengfei Zheng	In this paper, we use the deep learning framework and image processing technology to propose an algorithm solution for face detection and face recognition in natural scenes.	Video monitoring system in the field of public security video monitoring mainly focuses on the pre-warning analysis of the collected video images, but the post video analysis wastes a lot of manpower and energy.
4	Face Recognition System Using Machine Learning Algorithm	Sudha Sharma; Mayank Bhatt; Pratyush Sharma	This paper aims at designing a face recognition approach utilizing machine learning algorithm and principal component analysis (PCA).	On future research, by reviewing other databases such as GTF and YALE dataset, more face detection difficulties such as orientation variation, lighting, poses, and facial expression variations will be found. Besides, other face detection techniques can be applied and tested to improve this research.
5	Deep convolutional neural network for face skin diseases identification	Rola EL SALEH ,SambitBakshi	In this paper, we propose an automated facial skin disease method using a pre-trained deep convolutional neural network (CNN). To increase the size of our database, the images are created utilizing some preprocessing image algorithms. They are gathered from various sources and downsized to fit the network..	The model achieves an accuracy of 88% and classifies successfully the facial skin images given for test with an accuracy of 98.5%. The accuracy of our model can be improved by increasing the size of our database and new deep neural network models can also be considered.

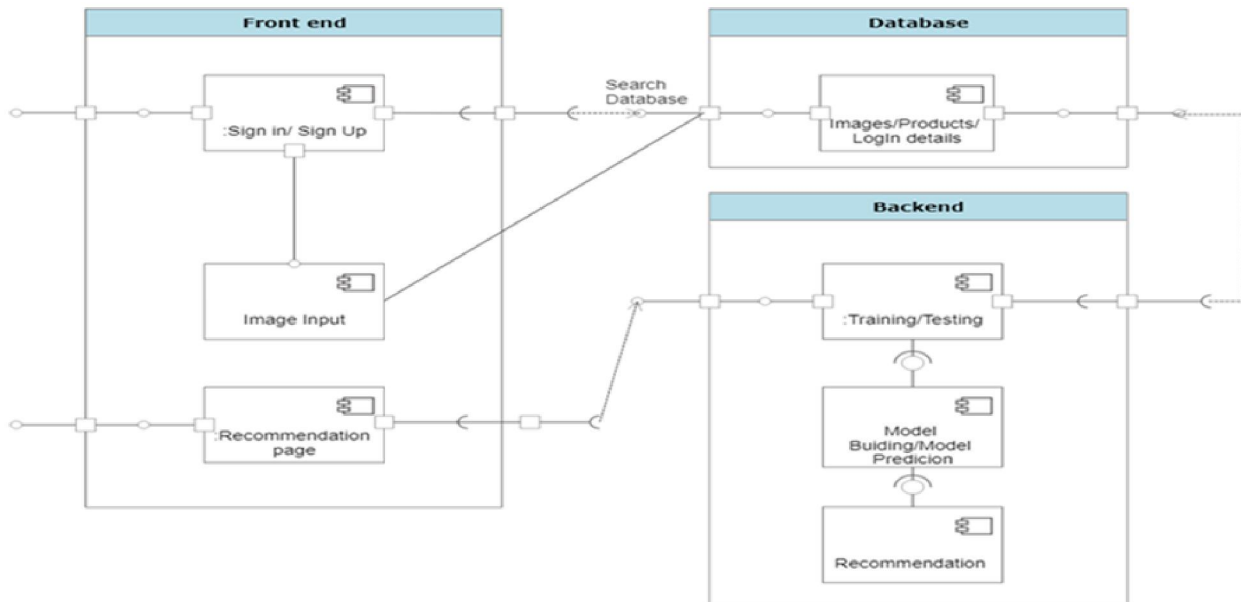| 6 | Studies on Different CNN Algorithms for Face Skin Disease Classification Based on Clinical Images | Zhe Wu, Shuang Zhao, Yonghong Peng, Xiaoyu He, Kai Huang,Xiang Chen, Yi Li, Weihong Huang | This study examined various CNN algorithms for classifying facial skin diseases based on clinical photos. First, we created an image collection of skin illnesses that includes 2656 face photos from six common skin diseases. To categorise these disorders in the dataset, we conducted tests using five widely used network methods and compared the outcomes. | The application of artificial intelligence techniques in the medical profession has to be improved, both in terms of number and quality of datasets. We think that in the future, patients will employ practical CNN-based applications to maintain the health of their facial skin. |

VII. SYSTEM ARCHITECTURE

Figure 7.1 System Architecture
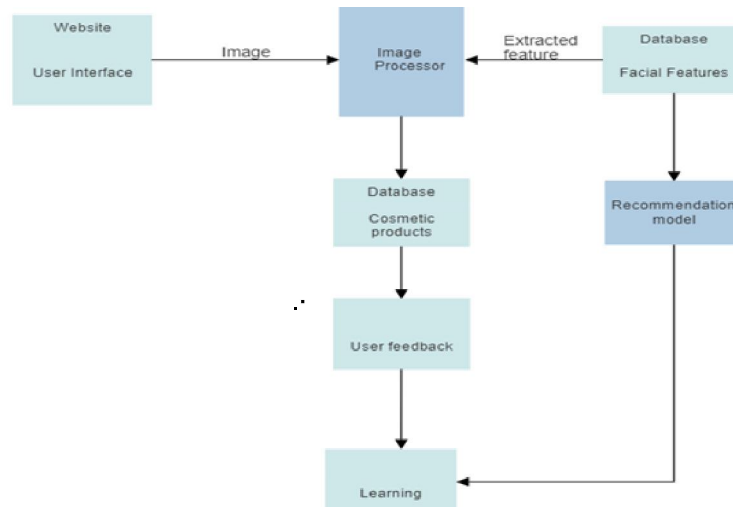
VIII. DATAFLOW DIAGRAM
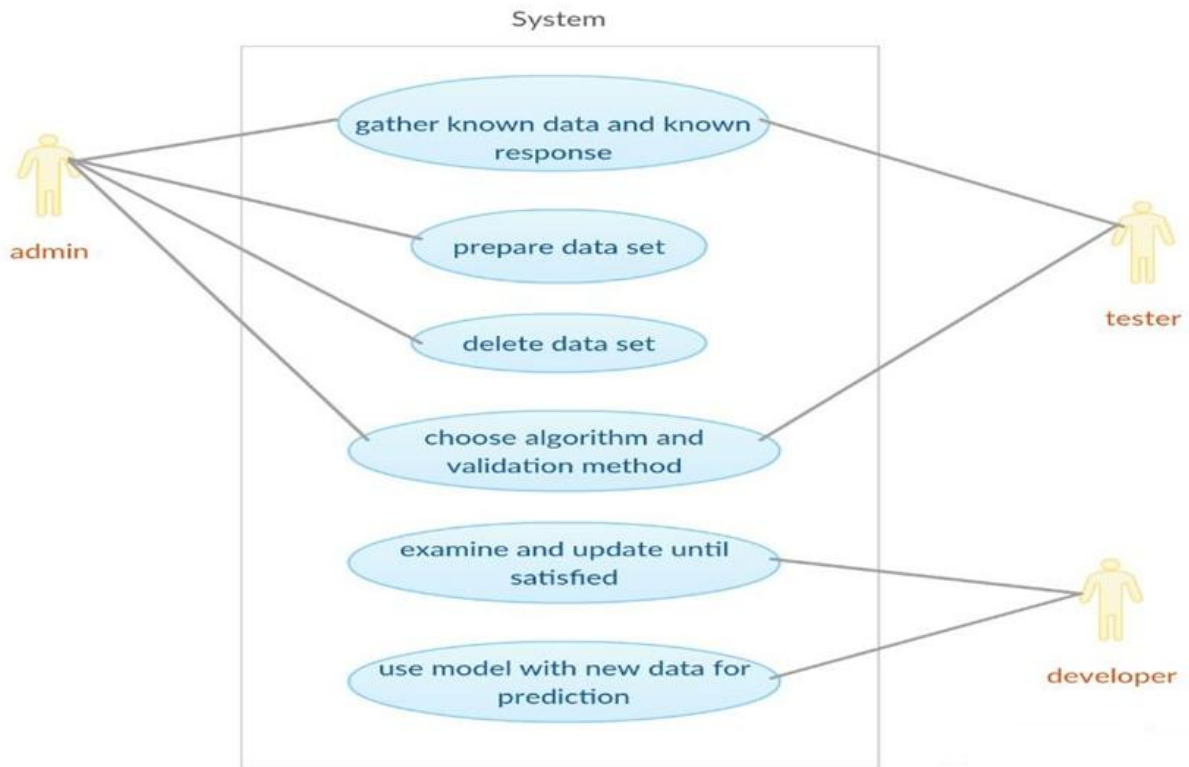

Figure 8.1 Data Flow Diagram

Figure 8.2 Use Case Diagram
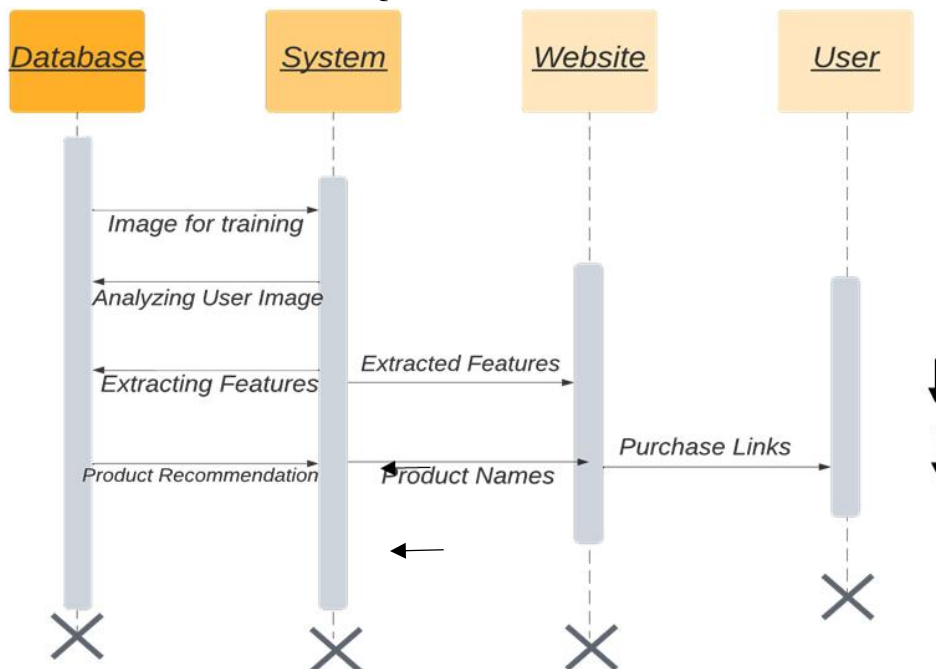
IX. SEQUENCE DIAGRAM

Figure 9.1 Sequence Diagram

X. TOOLS FOR DEVELOPMENT

10.1 Software Requirements Specification:

VS Code: Visual Studio Code, usually known as VS Code, is a source-code editor for Windows, Linux, and macOS that was created by Microsoft and uses the Electron Framework.

Jupyter: Jupyter Notebook makes it simple to present your intended audience the complete project's process by allowing users to compile all components of a data project in one location.

Google Colab: Designed for machine learning, data analysis, and teaching, Colab enables anyone to develop and run arbitrary Python code through a browser.

10.2 Hardware Requirements Specification:

PC or laptop with Windows 10 or above

The last version of Windows that supports devices with BIOS firmware and 32-bit processors is Windows 10. Windows 11 requires UEFI firmware and a 64-bit processor in any supported architecture on a device.

XI. ADVANTAGES

- Our project aims to help users by analyzing their skin texture and identifying any flaws or issues.
- To achieve this, we use advanced technology to extract facial features from the user's images and analyze them using machine learning algorithms.
- Based on the analysis, our platform can suggest products that are specifically tailored to the user's needs and address their unique skin concerns.
- To make the process easier for the user, we provide direct links to verified sources where they can purchase the recommended products.
- The user can also filter the products according to their specific budget, making it easier to find products that fit within their price range.
- By providing personalized recommendations and making it easy to purchase the recommended products, our platform aims to empower users to take control of their skin health and achieve their desired results.

XII. CONCLUSION

With the use of user image input, an AI/ML model has been designed for face recognition and personalized product recommendation. This model has the potential to improve the effectiveness and convenience of skincare recommendations for individuals by utilizing advanced technology to analyze and understand the unique characteristics of their skin. By leveraging this technology, individuals can receive tailored recommendations for skincare products that are specifically suited to their needs, ultimately leading to improved skin health and overall well-being

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