

OPALINE Smart Fashion with AI Powered Style Assistant

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Abstract - Choosing the right outfit can be difficult because suitable colours and clothing styles can vary from person to person. OPALINE is a smart fashion assistant developed to help users make suitable fashion choices based on their appearance and preferences. The system analyses an uploaded image to identify features such as face shape, body proportions, skin tone, and undertone using Media Pipe, OpenCV, and machine learning. These results are combined with user preferences to provide suitable colour and outfit recommendations. OPALINE also includes Aura Chat for fashion related questions and Fashion Map for finding fashion services. User profile details and analysis results are stored in MongoDB so that they can be used again when the user returns. The main aim of OPALINE is to bring image analysis, fashion recommendations, and conversational assistance together in one platform.

Keywords - Artificial Intelligence; Fashion Recommendation; Computer Vision; Media Pipe; OpenCV; Machine Learning; Personalized Fashion; Aura Chat

I. INTRODUCTION

Fashion is a part of our daily life, but choosing an outfit that suits us can sometimes be confusing. The choice of clothes and colours can depend on factors such as face shape, body structure, skin tone and personal preference. Most fashion applications mainly provide clothes based on categories, trends or user choices. They do not always consider these factors together while giving suggestions.

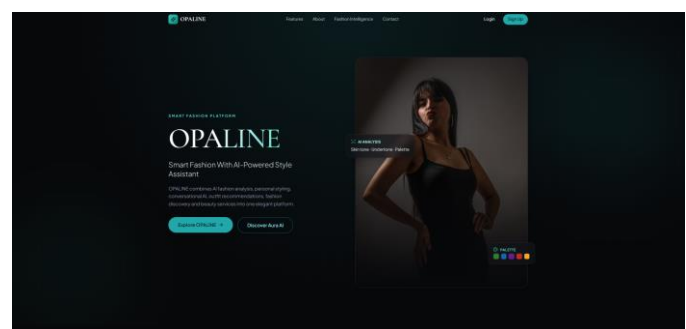
To address this, we developed **OPALINE**, a smart fashion assistant that gives suggestions based on the user. The system takes an image from the user and analyses features such as face shape, body proportions and skin-related information using **Media Pipe**, **OpenCV** and **machine learning**. These results are considered along with the user's preferences to suggest suitable colors and outfits. OPALINE also includes **Aura Chat** for fashion-related questions and **Fashion Map** for finding fashion services. The project focuses on making the process of choosing suitable outfits easier and more personalized.

II. TECHNOLOGIES USED

A. Frontend Technologies

OPALINE uses **React.js** to develop the main user interface. HTML and CSS are used for the structure and design of the different pages. The frontend

allows users to upload images, enter their preferences, view analysis results, and access the different features of the application.



B. Backend Technologies

Node.js and **Express.js** are used to handle backend requests and communication between the frontend and other services. Python with FastAPI is used separately for the AI and image analysis operations.

C. Database

MongoDB is used to store user information, profile details, analysis results, and other required application data. This allows the saved information to be accessed when the user returns to the application.

D. AI and Computer Vision Technologies

OpenCV is used for image preprocessing and skin-related analysis. **Media Pipe Face Mesh** is used for analysing facial landmarks, while **Media Pipe Pose** is used to obtain body landmarks and body proportions.

Media Pipe Face Mesh-We used Media Pipe Face Mesh to find the important points on the user's face. These points help us understand the face structure and are used to identify the face shape.

Media Pipe Pose-We used Media Pipe Pose to find the main points of the body from the uploaded

image. These points help us understand the body proportions and are used for body shape analysis.

E. Recommendation System

The recommendation part uses the analysed user features along with user preferences to provide suitable colour and outfit suggestions.

F. Aura Chat

Aura Chat provides conversational assistance for fashion-related questions. It uses the **Gemini API** to generate responses based on the user's fashion requirements and profile information.

Gemini API-We used the Gemini API for the Aura Chat feature in OPALINE.

G. Fashion Map

Fashion Map helps users find fashion-related services and locations. It is included as a separate feature within the OPALINE application.

III. RESARCH GAP

While looking at different fashion recommendation systems, we noticed that most of them give suggestions based on clothes, trends, or what the user likes. They usually do not look at things like **face shape, body shape, and skin tone together**. Because of this, the same type of recommendation may not work for every person.

In OPALINE, we have included **image analysis, colour and outfit recommendations, Aura Chat, and Fashion Map** along with user preferences. This makes the application more useful for getting fashion suggestions and other fashion-related help in one place.

IV. PROPOSED METHODOLOGY

The proposed methodology of OPALINE consists of different processing stages that work together to generate personalized fashion recommendations. The main stages are image preprocessing, facial analysis, body analysis, skin analysis, profile creation, recommendation, and conversational assistance.

A. Image Preprocessing

The image uploaded by the user is first processed using **OpenCV**. The image is prepared for further analysis by handling basic image-processing operations such as reading the image and preparing the required image data for the analysis modules.

B. Face Shape Analysis

Media Pipe Face Mesh is used for facial landmark detection. It provides facial landmarks from the uploaded image. These landmarks are used to analyze the structure of the face and determine the user's face shape.

C. Body Shape and Proportion Analysis

Media Pipe Pose is used to detect body landmarks from the image. The detected landmarks are used to obtain information about the user's body structure and proportions. This information is then used for body-shape analysis.

D. Skin Tone and Undertone Analysis

OpenCV is used to process the skin region obtained from the image. The processed image information is used along with the machine-learning based analysis to determine the user's skin tone and undertone. These results are added to the user's style profile.

E. User Style Profile Creation

The results obtained from face-shape, body-shape, skin-tone, and undertone analysis are combined with the information provided by the user. **Python and Fast API** are used to handle the AI processing service and return the analysis results to the main application.

F. Color Recommendation

The color recommendation method uses the user's **skin tone, undertone, and preferences** to identify suitable colors. The system checks these details and selects colors that can suit the user. These colors are then used while generating outfit recommendations.

G. Outfit Recommendation

The outfit recommendation method uses the user's **face shape, body shape, skin characteristics, color preferences, occasion, and mood** as inputs. These details are processed by the recommendation logic to generate suitable outfit suggestions.

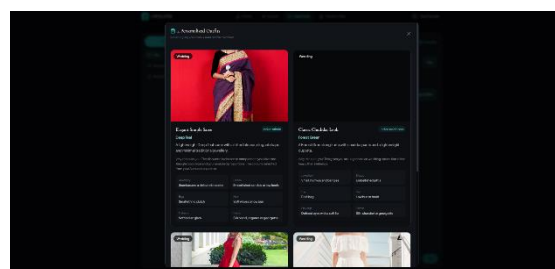


Fig.2. Personalized outfit recommendation .

H. Conversational Assistance

Gemini API is used for the conversational part of OPALINE. The user can enter fashion-related questions, and the system sends the query to the AI service to generate a response.

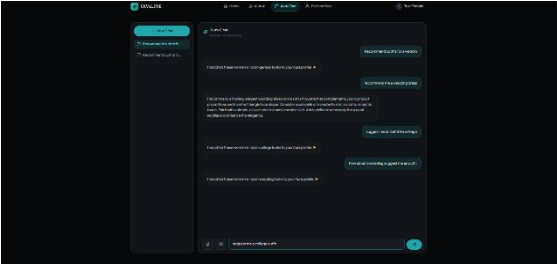


Fig 3.Aura chat in OPALINEe.

I. Data Storage

MongoDB Atlas is used to store the user profile and the results generated during the analysis. The stored information can be retrieved when the user returns to the application, allowing the previous profile and analysis results to be used again.

J. Overall Methodology Flow

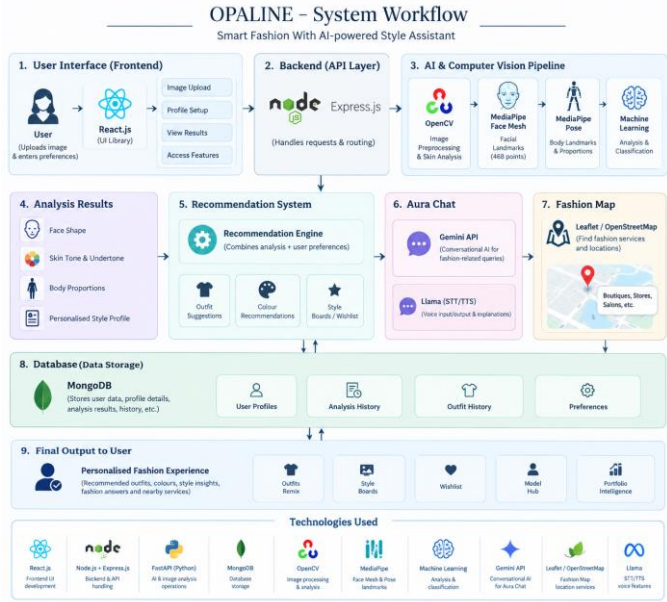


Fig 4.Methodology workflow of OPALINE

IV. RESULT AND DISCUSSION

After implementing OPALINE, we tested the system with different user details and images. **OpenCV, MediaPipe Face Mesh, and MediaPipe Pose** were used to analyse the image and obtain face, body, and skin-related results. These results were combined with user preferences to provide colour and outfit suggestions.

We also tested **Aura Chat** and **Fashion Map** as part of the application. During testing, we noticed that clear images with proper lighting gave better results, while poor-quality images affected the analysis. Overall, the main features worked together and provided the expected fashion-related results.

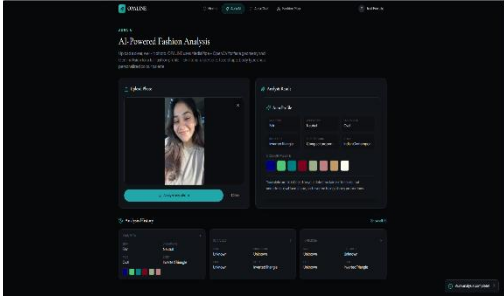


Fig 5.Sample output of Aura AI image analysis.

V.FUTURE SCOPE

In the future, we would like to test OPALINE with more users and different types of images. We can also add more types of clothes and styles so that users get more options while choosing an outfit. The recommendations can be made better by also considering the **occasion, season, and current fashion trends**.

We would also like to work on features such as **virtual try-on and AI Twin** in the future. These features can help users get an idea of how a particular outfit may look on them. More improvements can be made based on the feedback we get from users while using the application.

VI. CONCLUSION

OPALINE was developed as a fashion assistant that helps users get outfit and colour suggestions based on their own details and preferences. We used **OpenCV, MediaPipe, machine learning, Gemini API, React.js, FastAPI, and MongoDB** to develop the different parts of the system. The main features such as image analysis, outfit suggestions, Aura Chat, and Fashion Map were implemented and tested. Through this project, we were able to understand how these technologies can be used together to build a fashion application. There is still scope to improve the system by adding more features and testing it with more users._

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