FuturaFit – Smart Closet Organization

(PROTERNSHIP)

Internship Report submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

By

Kota Kameshwari Sripriya

22R11A0523

Department of Computer Science and Engineering

Accredited by NBA

Geethanjali College of Engineering and Technology

(UGC Autonomous)

(Affiliated to J.N.T.U.H, Approved by AICTE, New Delhi)

Cheeryal (V), Keesara (M), Medchal.Dist.-501301.

August - 2024

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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CERTIFICATE

This is to certify that the Internship Report entitled **FuturaFit – Smart Closet Organization** is a bonafide work done by **Kota Kameshwari Sripriya (22R11A0523)** in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in "Computer Science and Engineering" from Jawaharlal Nehru Technological University, Hyderabad during the year 2024-2025.

HOD - CSE

Dr. A Sree Lakshmi,

Professor

Examiner

Signature:

Name:

Designation:

CERTIFICATE:

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DECLARATION BY THE CANDIDATE

I, **Kota Kameshwari Sripriya**, bearing Roll No. **22R11A0523**, hereby declare that the Internship Report entitled **"FuturaFit – Smart Closet Organization"** is submitted in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering**. This is a record of bonafide work carried out by me in {**Cantilever Labs**} and the results embodied in this internship report have not been reproduced or copied from any source. Theresults embodied in this Internship Report have not been submitted to any other University or Institute for the award of any other degree or diploma.

Kota Kameshwari Sripriya

22R11A0523

CSE, GCET

ACKNOWLEDGEMENT

I would like to extend my sincere gratitude to Cantilever Labs and Geethanjali College of Engineering and Technology for giving me the opportunity to undertake this internship and work on the “FuturaFit – Smart Closet Organization” project. This experience has been highly rewarding, allowing me to expand my understanding and skills in smart wardrobe technology and AI applications.

My deepest appreciation goes to my mentors and supervisors at Cantilever Labs for their constant guidance, support, and valuable feedback throughout this project. Their expertise and commitment to helping me overcome challenges have been vital to achieving the project’s objectives.

I am also thankful to my college for facilitating this internship opportunity. The support from Geethanjali College of Engineering and Technology has been crucial in enabling me to translate theoretical knowledge into practical, real-world application.

Lastly, I want to acknowledge the contributions and collaboration of my team members. Working together has made this experience both insightful and productive, and I am grateful for their support along the way.

Kota Kameshwari Sripriya

22R11A0522

INTRODUCTION ABOUT INTERNSHIP ORGANISATION

Cantilever Labs

Cantilever Labs is an innovative organization focused on connecting academic learning with real-world industry experience through immersive internships. By providing hands-on opportunities, Cantilever Labs equips students with the practical skills and knowledge necessary for success in their careers. The company seamlessly integrates theoretical learning with practical application, preparing students to navigate the demands of a dynamic job market.

The organization prioritizes creating an environment that sparks creativity, encourages critical thinking, and fosters teamwork. Collaborating with educational institutions and industry leaders, Cantilever Labs crafts internship programs that challenge and engage participants. These programs allow students to gain real-world insights, contribute to live projects, and build both technical and interpersonal skills vital for today's competitive job environment.

Cantilever Labs' focus on excellence and innovation has established it as a top choice for students seeking to complement their academic experience with practical training. Its commitment to talent development and career advancement makes it a premier platform for aspiring professionals to start their careers.

TRAINING SCHEDULE

Internship Period 1st May 2024 - 13th June 2024

Mode of Training

1st May 2024 - 27th May 2024 Online

28th May 2024 - 13th June 2024 Offline at Geethanjali College of Engineering and Technology

Training Breakdown:

1. **Week 1 (1st May - 7th May 2024)**
   - Introduction and Orientation
   - Introduction to Python Programming
2. **Week 2 (8th May - 14th May 2024)**
   - Python Training
   - Introduction to Data Science Concepts
3. **Week 3 (15th May - 21st May 2024)**
   - Data Science Training
   - Data Analysis and Visualization Techniques
   - Introduction to Data Handling and Manipulation using Python
4. **Week 4 (22nd May - 27th May 2024)**
   - Introduction to Artificial Intelligence and Machine Learning
   - Overview of Machine Learning Algorithms
5. **Week 5 (28th May - 3rd June 2024)**
   - Project Initiation (Offline Mode)
   - Project Planning and Requirement Analysis for Project
6. **Week 6 (4th June - 10th June 2024)**
   - Initial Design and Development Phase
   - Project Development
7. **Week 7 (11th June - 13th June 2024)**
   - Finalization and Presentation
   - Project Documentation and Report Preparation
   - Final Presentation and Submission

ABSTRACT

FuturaFit is an innovative smart wardrobe application that revolutionizes the way users manage their clothing collections. Utilizing advanced image recognition technology, FuturaFit allows users to take pictures of their outfits and automatically categorizes them into predefined categories, such as tops, jeans, and frocks. This streamlined categorization process is made possible through a combination of machine learning models, specifically ResNet50, and a user-friendly interface. The backend infrastructure, built with Flask, ensures seamless handling and storage of user data, while the integration of TensorFlow and OpenCV facilitates accurate image processing and feature extraction.

Future iterations of FuturaFit aim to enhance user experience by incorporating additional features such as weather-based outfit recommendations, a calendar-based outfit planner, and personalized style suggestions. These enhancements will enable users to make informed wardrobe choices based on real-time weather conditions and planned activities, thereby maximizing convenience and ensuring optimal outfit selections for any occasion. FuturaFit represents a significant step forward in personal wardrobe management, offering users a smarter, more efficient way to organize and utilize their clothing collections.

LIST OF SCREENSHOTS

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INTRODUCTION

FuturaFit is a cutting-edge smart wardrobe application designed to transform the way individuals manage their clothing collections. By harnessing advanced image recognition technology, FuturaFit empowers users to capture photos of their outfits, which are then automatically categorized into various predefined groups such as tops, jeans, and frocks. This innovative categorization process is facilitated by machine learning models, particularly ResNet50, and a highly intuitive interface. The robust backend, developed with Flask, ensures smooth data handling and storage, while the integration of TensorFlow and OpenCV enhances the precision of image processing and feature extraction.

In its current prototype phase, FuturaFit focuses on core functionalities, providing a seamless experience for users to photograph and organize their attire. However, the vision for FuturaFit extends beyond these initial capabilities. Future developments will introduce features like weather-based outfit suggestions, a calendar-integrated outfit planner, and personalized styling advice. These planned enhancements aim to offer users a comprehensive wardrobe management solution that not only organizes their clothing but also provides practical and stylish outfit recommendations tailored to their daily needs and activities.

Project Objectives

1. **Efficient Image Categorization**: Develop a reliable system that accurately categorizes clothing items based on images captured by the user, ensuring each piece is placed in the correct predefined category.
2. **User-Friendly Interface**: Create an intuitive and seamless user interface that allows users to easily navigate the app, capture images, and view categorized outfits without any technical hurdles.
3. **Advanced Feature Integration**: Incorporate advanced features such as weather-based outfit recommendations, calendar-based outfit planning, and personalized styling suggestions to enhance the app's utility and user experience.
4. **Robust Data Handling**: Ensure the backend infrastructure is capable of handling and securely storing user data, including images and categorization information, while maintaining optimal performance and reliability.
5. **Scalable Architecture**: Design the application architecture to be scalable, allowing for the addition of new features and the handling of an increasing number of users without compromising performance.

Project Outcomes

1. **Automated Clothing Organization**: Users can effortlessly organize their wardrobes by simply taking pictures of their clothing items, with the app automatically categorizing each item into the appropriate group.
2. **Enhanced User Experience**: A seamless and intuitive user interface that makes it easy for users to interact with the app, capture images, and access categorized outfits, resulting in high user satisfaction.
3. **Smart Outfit Recommendations**: Users receive tailored outfit suggestions based on real-time weather conditions and their personal preferences, helping them make informed wardrobe choices.
4. **Personalized Styling Assistance**: The app provides personalized style advice and outfit planning features, allowing users to plan their attire according to their schedule and activities, thereby enhancing their overall styling experience.
5. **Scalability and Reliability**: A robust and scalable application infrastructure that can accommodate future growth, new feature integration, and a growing user base while maintaining high performance and data security.

TECHNOLOGIES USED

1. **Flask**: A lightweight Python web framework for creating web applications. Flask is used for developing the backend and managing the web server and routing.
2. **OpenCV (opencv-python)**: A powerful library for image processing and computer vision. It's used for capturing and analyzing images of outfits for categorization and style suggestions.
3. **TensorFlow**: A deep learning framework used for training and deploying machine learning models that assist in categorizing outfits and providing smart recommendations.
4. **NumPy**: A fundamental Python library for numerical computation, crucial for processing large datasets and performing calculations needed for image analysis.
5. **Pillow**: A Python imaging library that handles image manipulations such as resizing, cropping, and format conversions.

Hardware Specifications:

- **Processor:** Intel i5 (or equivalent) or better
- **RAM:** 8 GB minimum, 16 GB recommended
- **GPU:** NVIDIA GTX 1050 Ti or better (with CUDA support for TensorFlow)
- **Storage:** 20 GB free space (SSD preferred)
- **Camera:** HD camera for capturing outfit images (if using live capture features)

Software Requirements:

- **Operating System:** Windows 10/11, macOS, or Linux
- **Python:** Version 3.7 or higher
- **Web Browser:** Latest versions of Chrome, Firefox, or Edge
- **Python Libraries:** Flask, OpenCV, TensorFlow, NumPy, Pillow (can be installed via pip

WORK DONE

The project began with research into existing smart wardrobe systems to understand user needs and define project objectives. The system's architecture was then designed, with algorithms for recommendations developed using TensorFlow and Keras. Image processing was handled using OpenCV and Pillow, and feature extraction was performed with the ResNet50 model. The web application, built with Flask and HTML/Jinja2, included user authentication and a user-friendly interface. Quality assurance involved rigorous testing, followed by comprehensive documentation for both users and developers.

Step 1: Welcome Page with Brand Introduction

When the user first opens the website, they are greeted with a welcome page showcasing the brand name and tagline. This introductory page sets the tone for the smart wardrobe experience and provides an elegant transition to the main functionality.

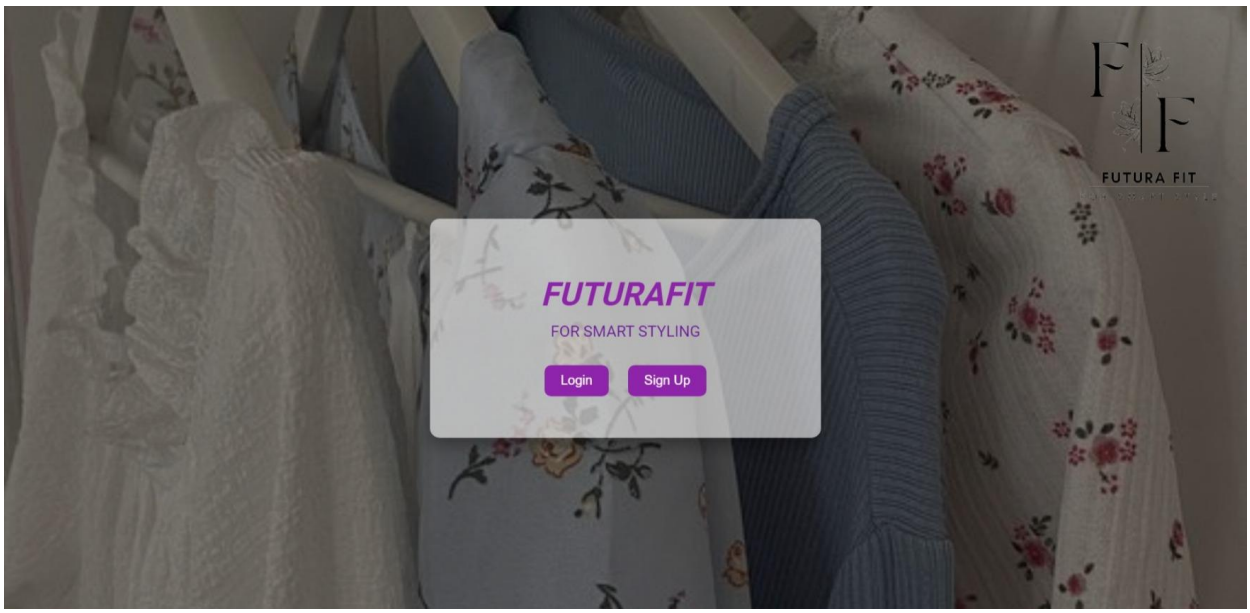

Fig.1: Welcome Page of FuturaFit

Step 2: User Login/Signup

Next, users are directed to the login or signup page where they can either register for an account or sign in. The page is styled to match the overall aesthetic of the brand while ensuring easy and secure user authentication.

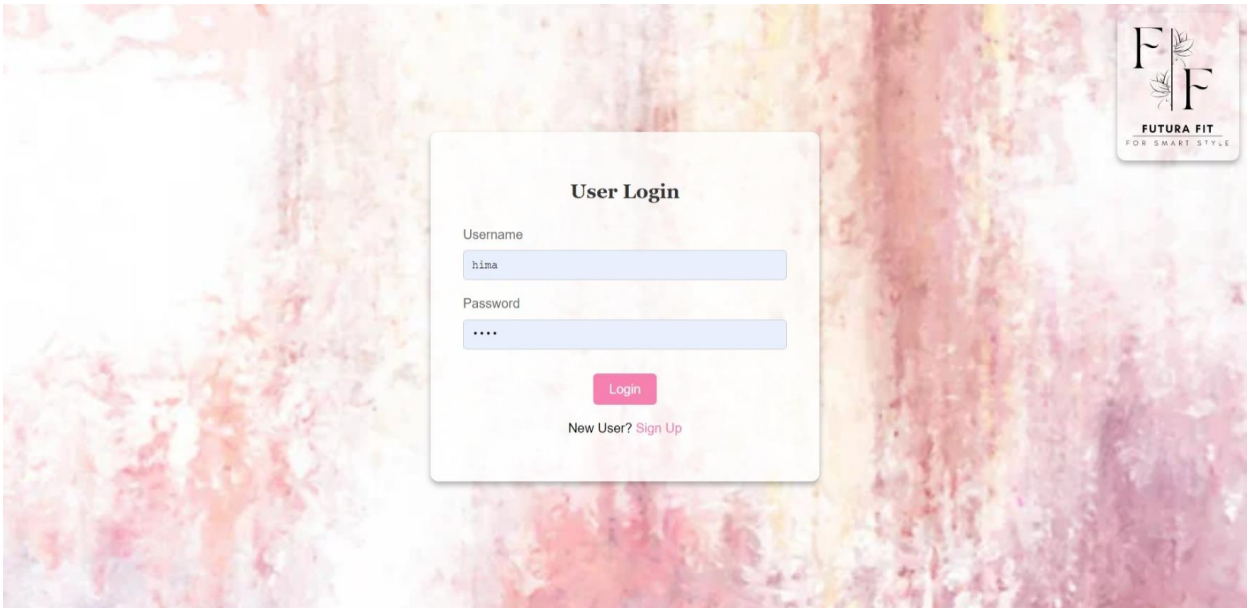

Fig.2: User Login

Step 3: Main Dashboard Overview

Once authenticated, users are taken to the main dashboard. This page provides access to core features like capturing outfit photos, uploading existing images, and managing their wardrobe. It acts as the central hub for all wardrobe-related activities.

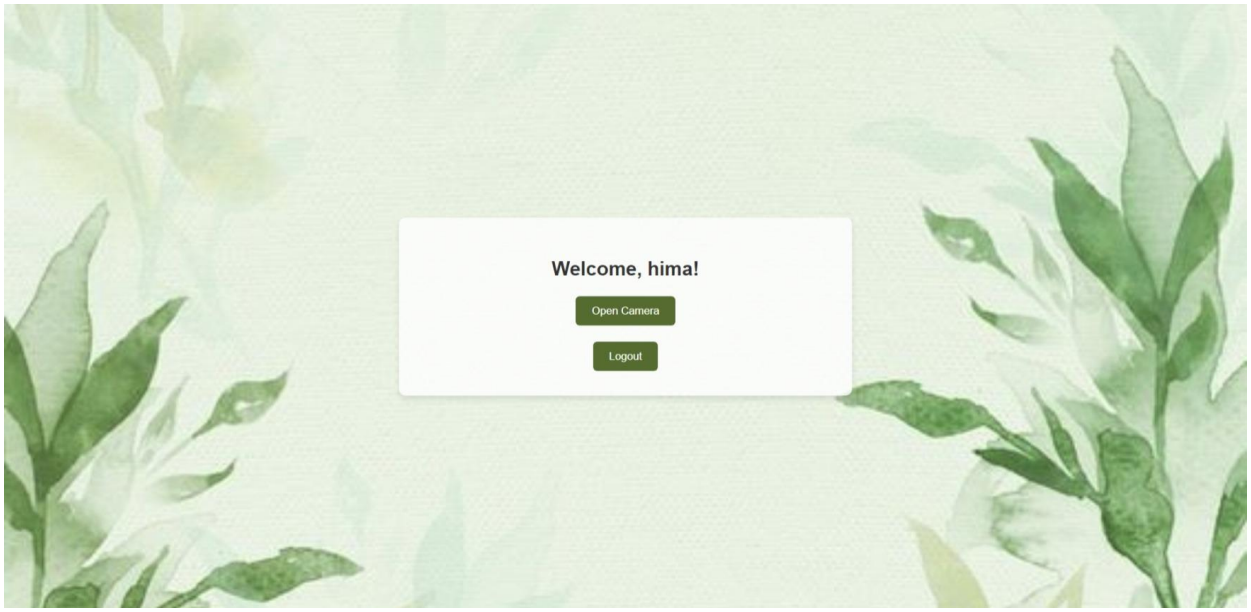

Fig.3 : Main Dashboard

Step 4: Taking Photos Using the Camera Feature

Users can use the camera feature to take live snapshots of their outfits. This feature utilizes OpenCV to access the webcam, allowing for seamless capture and integration into the wardrobe system. The captured images are then prepared for further categorization.

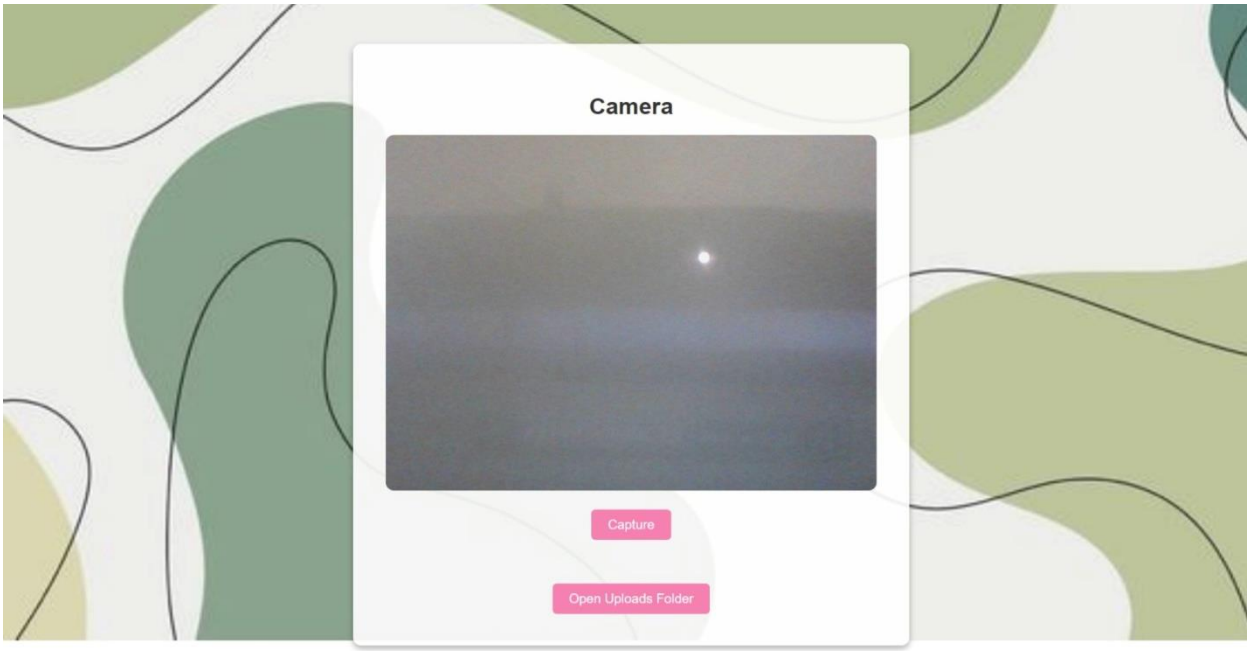

Fig.4 : Camera Feature

Step 5: Uploading Images for Wardrobe Management

Apart from taking photos, users can upload images of their outfits manually. These images are processed by TensorFlow to extract features that help categorize and organize them within the wardrobe. Pillow is used to handle image formatting during this process.

Fig.5: Uploading Images in Dresslocator>Server>Uploads>OtherBag

Step 6: Categorizing and Storing Outfit Data

The uploaded and captured images are analyzed and categorized using pre-trained machine learning models. NumPy and TensorFlow are used to store and retrieve these feature vectors.

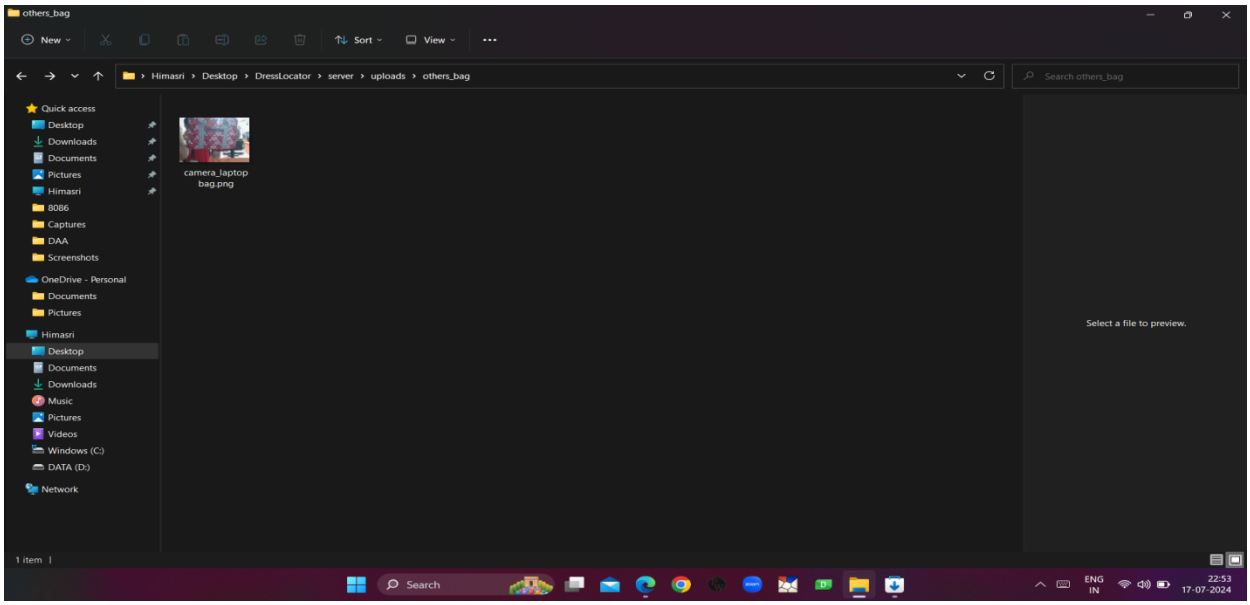

Fig.6: Categorizing the outfits

Future Enhancements

While the current version is a prototype showcasing the core functionalities of our smart wardrobe system, there are numerous exciting possibilities for future development. Below are some of the enhancements planned:

1. Outfit Recommendation System

Technology: Advanced AI Models, Machine Learning

- **Description:** Integrate weather-based and personalized outfit suggestions using AI algorithms. Technologies such as TensorFlow or PyTorch can be employed to develop machine learning models that analyze weather patterns and user preferences to suggest suitable outfits.

2. Calendar-Based Outfit Planner

Technology: Calendar APIs, Data Integration

- **Description:** Add a feature allowing users to plan outfits for upcoming events, incorporating weather and occasion data. Integration with calendar APIs (e.g., Google Calendar API) and weather services can provide relevant suggestions based on scheduled events and forecasts.

3. Virtual Try-On Feature

Technology: Augmented Reality (AR), 3D Modeling

- **Description:** Introduce AR for virtual outfit trials, enabling users to visualize how clothes fit without physically trying them on. Technologies such as ARKit (iOS) or ARCore (Android) and 3D modeling tools can be used for this feature.

4. Outfit Pairing Suggestions

Technology: AI-Driven Recommendations, Data Analytics

- **Description:** Implement AI-driven suggestions for accessories and complementary pieces. Machine learning algorithms and data analytics can help analyze existing wardrobe items to recommend suitable accessories and outfit combinations.

5. Social Sharing and Feedback

Technology: Social Media APIs, User Feedback Systems

- **Description:** Integrate a social media feature for users to share outfit choices and receive feedback. Utilizing social media APIs (e.g., Facebook, Instagram) and feedback systems can foster user engagement and interaction.

6. Seamless Multimodal Integration

Technology: Transportation APIs, Contextual Analysis

- **Description:** Enhance outfit suggestions by considering commuting modes. Integration with transportation APIs (e.g., Google Maps API) and contextual analysis can recommend comfortable attire based on users' travel routines.

7. User Behavior Analytics

Technology: Data Analytics, User Behavior Tracking

- **Description:** Analyze user preferences and behavior to make smarter, personalized suggestions. Technologies like Google Analytics or custom data analytics solutions can track user interactions and refine suggestions over time.

8. Integration with E-Commerce Platforms

Technology: E-Commerce APIs, Payment Gateways

- **Description:** Allow users to shop directly from the app by linking to e-commerce platforms. Integrating with e-commerce APIs (e.g., Shopify, WooCommerce) and payment gateways facilitates seamless in-app shopping experiences.

These features represent the potential for this project to evolve from a basic prototype into a comprehensive, intelligent wardrobe assistant offering a personalized and seamless styling experience.

System Architecture

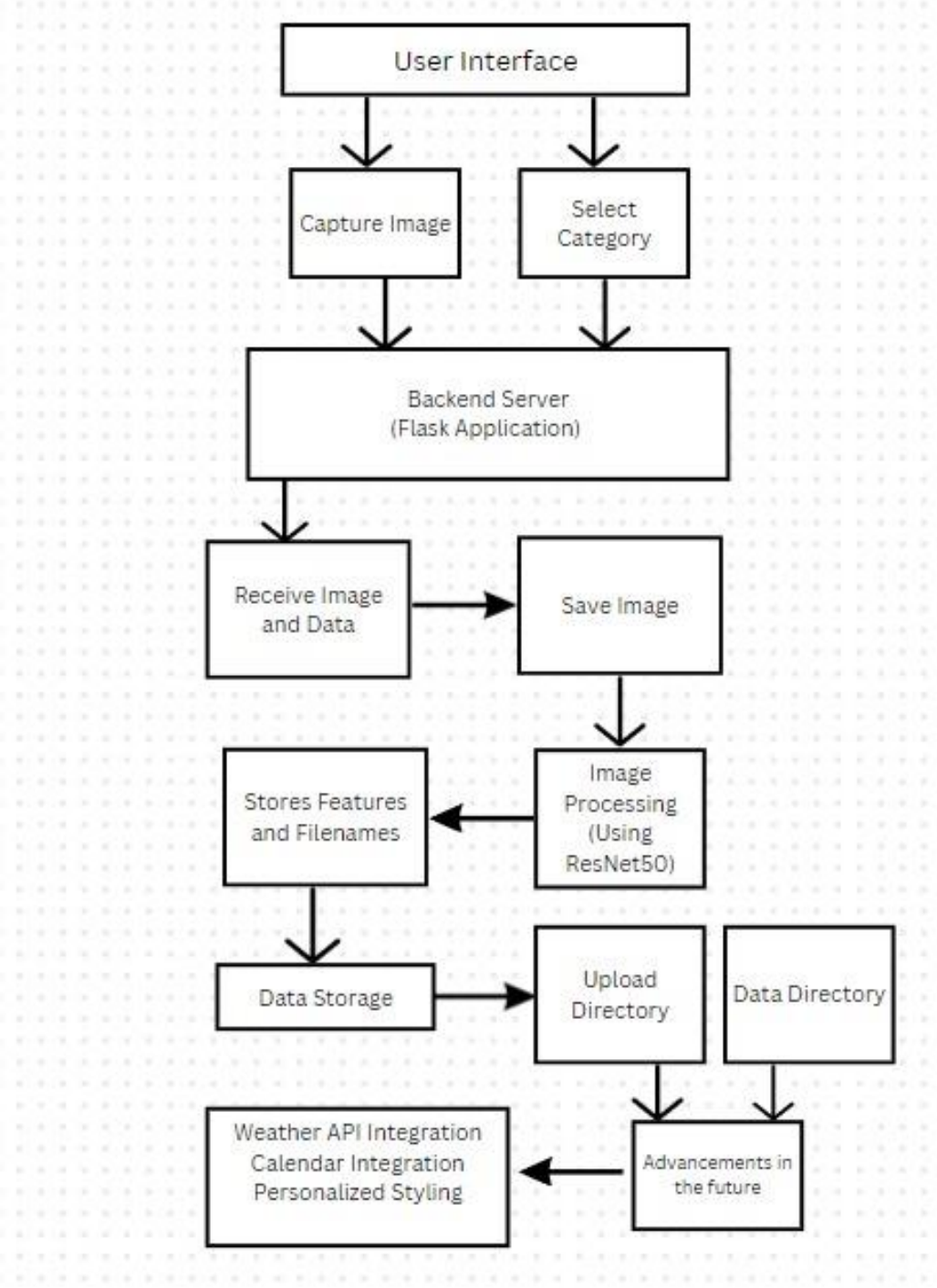

Fig. 7: System Architecture Flowchart

LEARNING AFTER INTERNSHIP

Through this process, I've learned a great deal about taking a project from a prototype to something more polished and functional. Figuring out future enhancements has given me a clear vision of how to make my smart wardrobe system even better. It's exciting to think about adding features like personalized outfit recommendations and virtual try-ons, and understanding how these improvements can make the system more useful and engaging for users.

I've also delved into how to use various technologies to bring these features to life. For instance, using AI for personalized outfit suggestions and AR for virtual try-ons are key to making the system stand out. Learning about these technologies has been eye-opening, and it's helped me make better decisions about which tools and methods to use in the development process.

Managing the project's scope and deciding which features to prioritize has been a valuable lesson. By choosing to focus on the most impactful features and setting aside others like voice control and security for now, I've been able to streamline the project. This has taught me how to be more strategic about where to invest my time and resources.

Finally, putting together a clear and organized plan for future enhancements has been crucial. It's not just about having great ideas but also about presenting them effectively. This experience has shown me the importance of good documentation and communication in keeping the project on track and ensuring that everyone involved is aligned with the goals.

CONCLUSION

FuturaFit represents a significant advancement in smart wardrobe management, utilizing cutting-edge technology to offer users an intuitive and efficient way to organize and categorize their clothing. By leveraging advanced image recognition and machine learning techniques, the application provides a streamlined approach to managing outfits, making it easier for users to maintain an organized wardrobe.

The system's design and configuration ensure reliable performance and scalability, accommodating both current needs and future enhancements. With a robust backend infrastructure and a user-friendly interface, FuturaFit stands poised to offer valuable features such as weather-based outfit recommendations and an integrated calendar planner. As the application evolves, it aims to further enrich the user experience by incorporating additional functionalities and improving its capabilities, ultimately transforming how users interact with their wardrobe.

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