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WearWise: An AI-Driven Weather-Based Clothing Suggestion System

Dr. Ramya BN[a], Aditi Vasanth[a], Akash Verma[a], Harsh Kumar[a]*

[a] Department of Computer Science and Engineering, Jyothy Institute of Technology (JIT), Bengaluru – 560082, Karnataka, India

ABSTRACT

Weather plays a crucial role in determining daily clothing choices. Incorrect choices often lead to discomfort, inconvenience, and safety issues (e.g., wearing light clothes during harsh winters or heavy layers during humid weather). This project, WearWise, presents an intelligent weather-aware clothing recommendation system that analyzes real-time weather data and provides suitable outfit suggestions using an AI-based logic engine.

The system is built using FastAPI for the backend, PostgreSQL for structured data storage, and HTML/CSS/JavaScript for an interactive user interface. The model processes parameters such as temperature, humidity, weather conditions, and planned user activities to generate tailored clothing suggestions. WearWise improves user convenience by automating decision-making and enhancing daily planning.

Keywords: Weather Analysis, AI Recommendation System, FastAPI, PostgreSQL, Clothing Suggestion, Web Application

Introduction

Weather plays a significant role in determining daily clothing preferences, comfort, and safety. Traditional weather forecasting applications provide temperature, humidity, and condition data, but they do not translate these values into actionable guidance for users. As a result, individuals often struggle to select appropriate outfits—especially for events, outdoor travel, or uncertain weather conditions. Recent advancements in artificial intelligence and context-aware systems have made it possible to build intelligent recommendation engines that can interpret raw weather data and convert it into meaningful insights. WearWise is designed to bridge this gap. It is an AI-powered system capable of generating personalized clothing suggestions based on real-time weather data, user-inputted event details, and contextual parameters such as time of day and duration of activity. The system utilizes an integrated approach combining FastAPI, PostgreSQL, and a lightweight HTML/CSS/JavaScript frontend to deliver seamless and fast recommendations. By using rule-based AI logic, WearWise ensures accurate and user-friendly suggestions without requiring heavy machine learning models. This makes the solution cost-efficient, easy to deploy, and suitable for future scalability.

Structure of the System

WearWise follows a modular client–server architecture designed for performance, scalability, and clarity.

The system architecture consists of four core components working together to deliver intelligent clothing recommendations. The backend layer, built with FastAPI, manages routing, API endpoints, weather data processing, and execution of the AI rule engine while maintaining low-latency responses and enforcing structured data validation through Pydantic. The PostgreSQL database layer stores event metadata, clothing categories, user history, and weather interaction logs, ensuring secure and consistent data handling through SQLAlchemy and providing a scalable foundation for future AI model training. On the client side, a lightweight frontend built with HTML, CSS, and JavaScript offers a clean and modern interface for entering city and event details, sending asynchronous requests to the backend using the fetch API, and presenting the generated clothing suggestions in an intuitive visual layout. At the core lies the AI rule engine, which evaluates temperature ranges, humidity, weather conditions, and event context to generate relevant outfit recommendations, combining general weather-based logic with specialized conditions for different times of day and event types such as formal, casual, outdoor, morning, or evening scenarios.

Literature Overview

Recommendation systems have gained significant attention in modern computing, especially in e-commerce, entertainment, and lifestyle applications. Existing research identifies the value of context-awareness—systems that use real-time conditions to tailor outputs.

Research on weather-based systems shows that environmental conditions significantly influence human behavior, clothing choices, and overall comfort, yet most existing applications only present raw numerical weather data without offering personalized suggestions. Traditional fashion recommendation systems typically rely on collaborative filtering or machine learning classification models, but these approaches often ignore environmental context, reducing their usefulness in real-world scenarios. Although a few AI–weather fusion models attempt to combine meteorological data with rule-based logic, they tend to suffer from limited scope or lack real-time integration. WearWise advances the field by integrating real-time weather information, user-specific event context, and AI-driven rule-based personalization, forming a unique and less-explored combination that enhances practicality and supports better day-to-day decision-making.

Methodology

WearWise follows a structured workflow that integrates weather APIs, business logic, and UI interaction.

System Architecture

The operation of the WearWise system begins when the user enters a city name or event-specific details through the web-based interface. Once the user submits this information, the frontend initiates an API request to the FastAPI backend. The backend then retrieves real-time meteorological data from an external weather service such as OpenWeather. After receiving the weather parameters, the AI logic module processes the temperature, humidity, weather conditions, and event-related inputs to generate context-aware clothing recommendations. Finally, these personalized suggestions are sent back to the frontend and are displayed to the user in a clear and intuitive format.

Weather Processing Module

This module is responsible for extracting key meteorological parameters required for generating accurate clothing recommendations. It retrieves the actual temperature along with the feels-like temperature to better represent human-perceived conditions. Additionally, it collects humidity levels, detailed weather conditions such as rain, cloudiness, storms, or clear skies, and the current wind speed. These parameters collectively enable the system to assess the overall climate and produce contextually appropriate outfit suggestions.

AI Clothing Recommendation Engine

The rule engine incorporates multiple contextual factors to generate accurate clothing recommendations. It applies temperature-based rules that classify weather into categories such as cold, mild, warm, and hot, ensuring that outfit suggestions align with the thermal conditions. Precipitation-related rules are also included to recommend rainwear, umbrellas, or waterproof footwear when necessary. In addition, event-specific rules determine whether the user requires formal, casual, or sports-appropriate attire, while time-based rules adjust recommendations according to whether the activity takes place in the morning, afternoon, or at night. Together, these rule sets enable the system to deliver highly tailored and practical clothing guidance.

Database Module

The database module plays a crucial role in supporting the system’s functionality by maintaining structured and persistent data. It stores various clothing categories that serve as the foundation for generating appropriate recommendations. Additionally, it logs previous recommendations to enable tracking and potential refinement of the system's logic over time. The module also links user queries with corresponding weather and recommendation data, facilitating analytics and future improvements such as personalization and trend analysis.

Implementation

Backend Implementation (FastAPI)

FastAPI serves as the core backend framework due to its high performance and minimal internal overhead, often operating with latencies of less than one millisecond, making it ideal for real-time applications like WearWise. The backend defines dedicated routes that handle weather-fetching requests and event-based queries, ensuring seamless communication between the user interface and the server. To maintain data consistency and reliability, Pydantic schemas are used to validate all incoming and outgoing data structures. Furthermore, SQLAlchemy ORM facilitates efficient and organized interactions with the PostgreSQL database, enabling secure storage and retrieval of structured information.

Frontend Implementation

The frontend of WearWise features a clean, dark-themed user interface designed for modern visual appeal and enhanced readability. It includes interactive forms that allow users to input city names, weather details, and event-specific parameters with ease. The interface leverages the JavaScript Fetch API to enable real-time data retrieval and dynamic rendering of results, ensuring a smooth and responsive user experience throughout the interaction.

Database Implementation (PostgreSQL)

The database design incorporates multiple tables that collectively support the operational flow of the WearWise system. These include a user logs table that records user interactions, a weather logs table that stores corresponding meteorological data, and a clothing metadata table that maintains categorized clothing information used by the AI engine. Additionally, an event-category mapping table links various user events to their relevant clothing categories, enabling the system to generate accurate and context-driven outfit recommendations.

Results & Discussion

Performance

The system demonstrates strong performance, with an average API response time ranging between 200 and 300 milliseconds, ensuring rapid delivery of recommendations. It operates smoothly even on low-speed networks, making it accessible to a wide range of users regardless of connectivity conditions. Additionally, the rule-based analysis enables accurate interpretation of weather parameters, resulting in reliable and contextually appropriate clothing suggestions.

User Feedback

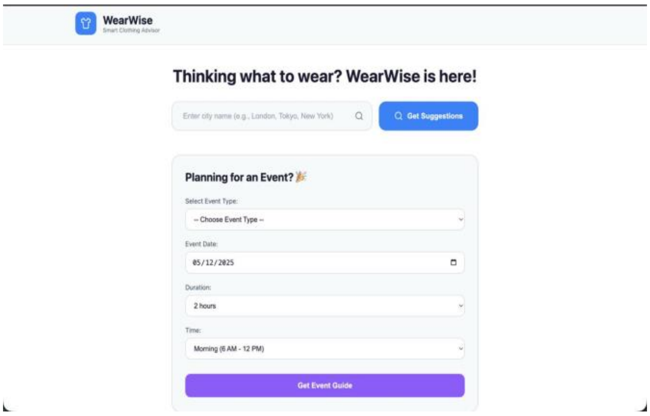
Feedback from test users indicated that the recommendations provided by WearWise were practical and genuinely helpful for selecting appropriate outfits. Users also appreciated the modern and visually appealing interface, noting that it was intuitive and easy to navigate. Furthermore, the event-based guidance feature was highlighted as a unique and valuable addition, offering personalized suggestions that enhanced the overall usefulness of the system.

System Strengths

WearWise benefits from the lightning-fast performance of FastAPI, enabling quick responses and smooth interactions throughout the system. Its lightweight architecture ensures minimal computational cost, making the application efficient even on limited hardware resources. The rule-based engine delivers high accuracy for everyday weather-related outfit recommendations, ensuring reliability across a wide range of conditions.

Conclusion

WearWise successfully integrates artificial intelligence with real-time meteorological data to deliver accurate, meaningful, and personalized clothing recommendations to users. By combining a FastAPI-powered backend, a structured PostgreSQL database, and a clean, responsive frontend interface, the system ensures robust performance, scalability, and ease of use. The AI rule-engine effectively interprets weather parameters—such as temperature, humidity, and weather conditions—and translates them into practical outfit suggestions that enhance user comfort and preparedness throughout the day. The project demonstrates strong real-world applicability, addressing a common daily challenge and offering a smart, automated solution that reduces decision fatigue. Furthermore, WearWise provides a solid foundation for future advancements, such as machine learning-based personalization, mobile app development, and integration with smart devices, making it a promising platform for continued innovation in intelligent lifestyle assistance systems.



WearWise
Smart Clothing Advisor

Thinking what to wear? WearWise is here!

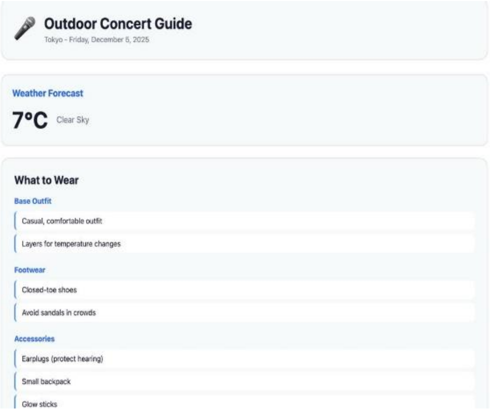
Planning for an Event? 🎉

Select Event Type: -- Choose Event Type --

Event Date: 05/12/2025

Duration: 2 hours

Time: Morning (6 AM - 12 PM)



🎤 Outdoor Concert Guide

Tokyo - Friday, December 5, 2025

Weather Forecast

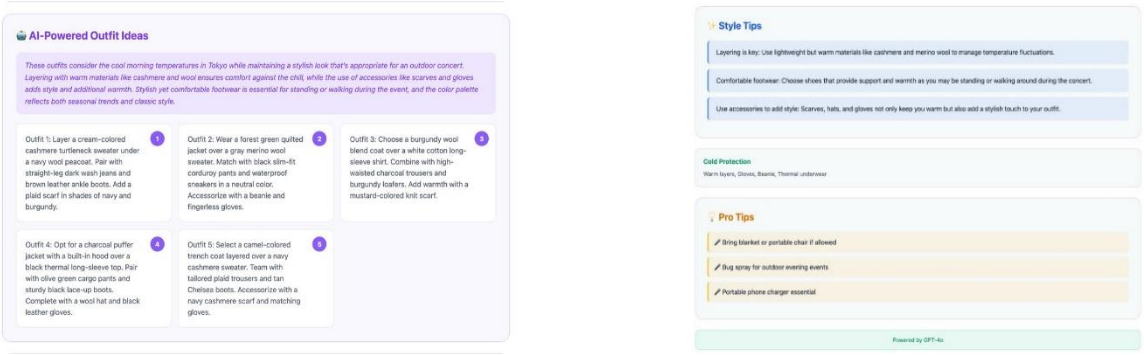
7°C Clear Sky

What to Wear

Base Outfit
- Casual, comfortable outfit
- Layers for temperature changes

Footwear
- Closed-toe shoes
- Avoid sandals in crowds

Accessories
- Earplugs (protect hearing)
- Small backpack
- Glow sticks



AI-Powered Outfit Ideas

These outfits consider the cool morning temperatures in Tokyo while maintaining a stylish look that's appropriate for an outdoor concert. Layering with warm materials like cashmere and wool ensures comfort against the chill, while the use of accessories like scarves and gloves adds style and additional warmth. Stylish yet comfortable footwear is essential for standing or walking during the event, and the color palette reflects both seasonal trends and classic style.

1 Outfit 1: Layer a cream-colored cashmere turtleneck sweater under a navy wool peacoat. Pair with straight-leg dark wash jeans and brown leather ankle boots. Add a plaid scarf in shades of navy and burgundy.

2 Outfit 2: Wear a forest green quilted jacket over a gray merino wool sweater. Match with black slim-fit corduroy pants and waterproof sneakers in a neutral color. Accessorize with a beanie and fingerless gloves.

3 Outfit 3: Choose a burgundy wool blend coat over a white cotton long-sleeve shirt. Combine with high-waisted charcoal trousers and burgundy loafers. Add warmth with a mustard-colored knit scarf.

4 Outfit 4: Opt for a charcoal puffer jacket with a built-in hood over a black thermal long-sleeve top. Pair with olive green cargo pants and sturdy black lace-up boots. Complete with a wool hat and black leather gloves.

5 Outfit 5: Select a camel-colored trench coat layered over a navy cashmere sweater. Team with tailored plaid trousers and tan Chelsea boots. Accessorize with a navy cashmere scarf and matching gloves.

Style Tips

Layering is key: Use lightweight but warm materials like cashmere and merino wool to manage temperature fluctuations.

Comfortable footwear: Choose shoes that provide support and warmth as you may be standing or walking around during the concert.

Use accessories to add style: Scarves, hats, and gloves not only keep you warm but also add a stylish touch to your outfit.

Cold Protection

Warm layers, Gloves, Beanie, Thermal underwear

Pro Tips

- Bring blanket or portable chair if allowed
- Bug spray for outdoor evening events
- Portable phone charger essential

Powered by GPT-4o

Fig. 1. User Interface of the WearWise System: (a) Event-based input panel; (b) Weather-based clothing suggestions; (c) AI-generated outfit ideas module; (d) Style and pro tips section

Future Scope

The future scope of WearWise includes expanding its capabilities through the integration of machine learning models that can learn user preferences over time and generate more personalized outfit recommendations. The system can be extended into a full-featured mobile application with real-time notifications and adaptive alerts for sudden weather changes. Additional enhancements may include voice-assistant compatibility, wardrobe digitization through image recognition, and integration with smart devices such as smartwatches or IoT weather sensors. Furthermore, incorporating advanced fashion datasets and trend analysis can enable WearWise to provide style-based suggestions in addition to weather-based guidance. These improvements would make the system more intelligent, user-centric, and capable of supporting a wider range of real-world scenarios.

References

FastAPI Documentation. (2023). Retrieved from https://fastapi.tiangolo.com/.

PostgreSQL Global Development Group. (2023). *PostgreSQL Documentation*. Retrieved from https://www.postgresql.org/.

OpenWeather. (2023). *Weather API Documentation*. Retrieved from https://openweathermap.org/api