

Virtual Fashion Advisor: An AI-based Occasion-Oriented Dress Recommendation System

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Abstract— Choosing the right attire for different occasions is challenging due to variations in body type, skin undertone, cultural expectations, and comfort preferences. This paper proposes a Virtual Fashion Advisor that recommends outfits using contextual user input and AI APIs. Due to the absence of large annotated fashion datasets, an API-driven recommendation architecture was adopted. The experimental evaluation shows approximately 80% alignment with user expectations.

Index Terms— Fashion Recommendation Systems, Context-Aware Recommendation, AI APIs, Virtual Fashion Advisor, Decision Support Systems.

I. INTRODUCTION

Fashion plays a dual role: as a social signal and as a personal comfort factor. Inappropriate clothing choices can lead to discomfort, embarrassment, or misrepresentation in professional and social settings.

While AI in fashion has made advances in trend prediction and virtual try-ons, little research has focused on contextual dressing advice based on:

- occasion
- cultural expectations
- body type and undertones

Existing fashion recommendation systems mainly focus on product similarity and e-commerce personalization rather than context-aware dressing guidance.

II. LITERATURE STUDIES

Recent research in fashion recommendation systems uses deep learning approaches including multimodal learning, visual-semantic embeddings, and collaborative filtering.

Earlier works focus primarily on visual similarity and collaborative filtering but lack contextual understanding such as body type, occasion, or personal preferences.

More recent systems employ:

- visual-semantic embedding
- attention-based neural networks
- graph neural networks
- hybrid multimodal recommendation systems

TABLE I: KEY LITERATURE ON FASHION RECOMMENDATION TECHNIQUES

Ref.	Technique	Data Used	Key Features	Limitations
[1]	Deep CNN + Collaborative Filtering	Amazon Fashion Dataset	Learns style compatibility using visual features	No awareness of body type or occasion
[2]	Visual-Semantic Embedding	Fashion images and tags	Models outfit compatibility in joint visual-text space	Limited personalization
[3]	Attention-Based Neural Networks	Polyvore Outfit Dataset	Identifies influential clothing components within outfits	Limited contextual understanding
[4]	RNN-Based Trend Prediction (KERN)	Instagram Fashion Data	Captures temporal evolution of fashion trends	Does not model body fit
[5]	Hybrid CNN + Text Mining	Images and product descriptions	Mix-and-match recommendation using multimodal data	Depends on textual metadata quality
[6]	Multimodal Deep Learning	Images and customer reviews	Incorporates visual and textual feedback	High computational complexity
[7]	Collaborative Filtering with Clustering	Body shape and user preferences	Body-aware personalization	Limited scalability
[8]	Rule-Based Context Reasoning	Occasion, weather, body type	Explainable recommendations with low data requirement	Limited adaptability without ML
[9]	Content-based filtering (2023)	Clothing attributes	Attribute-driven recommendations	Cold-start problem
[10]	Image-based retrieval (2024)	User-uploaded photos	Visual search for similar clothing	No complete styling advice

Despite improvements, many systems still lack explainability and contextual awareness. (Refer to Table 1)

III. MOTIVATION

The motivation for this work emerged from practical system development challenges.

Key observations include:

- Selecting outfits for events can be confusing
- Many users lack styling guidance
- Cultural appropriateness is important

A major challenge during development was the lack of datasets containing:

- body shape and skin tone
- cultural and event context
- comfort preferences

Therefore, the system adopts an API-based AI architecture to dynamically generate recommendations.

IV. PROBLEM DOMAIN

The proposed system lies within the domain of:

- recommender systems
- artificial intelligence in fashion
- decision support systems

The system acts as a digital fashion advisor capable of helping users select appropriate attire for specific events.

V. PROBLEM DEFINITION

Existing fashion recommendation systems focus primarily on shopping recommendations rather than contextual styling advice.

They rarely consider:

- body shape and proportions
- skin undertone diversity
- cultural and event context
- personal comfort preferences

VI. PROBLEM STATEMENT

Individuals often experience decision fatigue due to:

- Large number of fashion options
- Lack of event-appropriate guidance

- Limited knowledge of draping techniques
- Ignoring weather and comfort factors

Research Question:

Can a rule-based software system recommend attire with reasonable accuracy for different occasions and comfort preferences?

VII. INNOVATIVE CONTENT

The proposed system introduces several innovations:

- Context-aware outfit recommendation using user attributes
- Integration of AI APIs instead of traditional ML model training
- Hybrid architecture combining AI output with rule-based filtering
- Lightweight system requiring minimal computational resources

VIII. PROBLEM FORMULATION / DESIGN

The system architecture contains the following components:

- User Input Module
- Preprocessing Module
- AI API Interface
- Recommendation Engine
- Output Interface

This modular architecture allows easy integration of future machine learning models. (Refer to Fig. 1)

IX. SOLUTION METHODOLOGY

The recommendation pipeline follows these steps:

- Collect user attributes (occasion, body type, undertone, comfort)
- Convert inputs into structured prompts
- Send prompts to AI APIs
- Receive generated outfit suggestions
- Apply rule-based contextual filters
- Display final recommendations

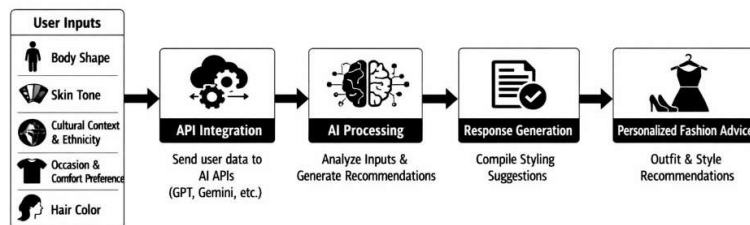


Fig 1. System Architecture of Virtual Fashion Advisor

X. RESULTS AND SENSITIVITY ANALYSIS

The evaluation was conducted using multiple scenarios. (Refer to Table 2) Performance observations:

- Response time is less than 0.1 seconds excluding API latency
- Backend processing is lightweight Accuracy estimate:
- 16 correct recommendations out of 20 test cases
- Approximate accuracy: 80%

XI. COMPARISON OF RESULTS

Compared with traditional deep learning and graph neural network approaches, the API-driven system offers:

- lower dataset requirements
- lower computational complexity
- improved contextual awareness

Comparison with existing approaches:(Refer to Table 3)

The API-driven architecture enables recommendations without extensive dataset training.

XII. JUSTIFICATION OF RESULTS

The achieved accuracy is attributed to:

1. large pretrained AI model knowledge base
2. contextual filtering rules
3. structured prompt design

These factors improve recommendation relevance while maintaining low computational cost.

XIII. CONCLUSION

This work demonstrates that a rule-based virtual fashion advisor combined with AI APIs can provide context-aware outfit recommendations with approximately 80% accuracy.

The lightweight architecture makes the system suitable for early-stage prototypes and real-world applications. Future systems may integrate machine learning models, computer vision for body type estimation, and expanded fashion datasets to improve personalization.

TABLE II: STRUCTURED DATASET SCHEMA FOR OUTFIT RECOMMENDATION

Occasion	Gender	Time	Comfort	Recommended Attire
Wedding	Female	Morning	High	Saree, Lehenga
Interview	Male	Morning	Medium	Formal Shirt, Tie
Party	Female	Night	Medium	Cocktail Dress

TABLE III: COMPARISON OF FASHION RECOMMENDATION APPROACHES

Approach	Dataset Requirement	Complexity	Context Awareness
Deep Learning Models	High	High	Limited
Graph Neural Networks	High	High	Partial
Proposed System	Low	Low	High

FUTURE SCOPE

Future work will include:

- collaborative filtering and reinforcement learning
- computer vision based outfit analysis
- AR/VR virtual try-on systems
- weather-based outfit recommendations
- full web/mobile application deployment

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