

ML-Based Outfit Suggestion System

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ABSTRACT

Fashion plays a vital role in our daily lives, reflecting personal style and identity. In the realm of fashion and personal style, individuals often grapple with the challenges of selecting outfits that complement their unique body type and body shape. The process of curating a stylish and flattering wardrobe can be time-consuming and daunting, resulting in decision paralysis and a lack of confidence in one's appearance. To address these issues, this project aims to develop an ML-based Outfit Suggestion system. We present a novel ML-based outfit suggestion system that addresses this challenge. Leveraging a comprehensive dataset of clothing items and body shape analysis, our system employs state-of-the-art deep learning, computer vision, and natural language processing techniques. Our system tailors outfit recommendations on the basis of users body type and body shape to meet individual needs. This research contributes to the advancement of fashion recommendation systems, offering a promising solution for fashion-conscious individuals seeking personalized outfit suggestions in diverse contexts.

Keywords - Fashion Recommendation, Clothing Recommendation, Deep Learning, Natural Language Processing, Fashion Dataset, Body Shape Analysis, Body Type Analysis.

I. INTRODUCTION

Fashion, an ever-evolving and deeply personal aspect of human life, plays a vital role in shaping individuals' identities and self-expression. The way we dress often serves as a canvas through which we communicate our style, personality, and cultural affiliations. However, navigating the world of fashion and selecting outfits that not only align with one's personal preferences but also complement their unique body type and shape can be a challenging and sometimes overwhelming task. This challenge is compounded by the vast and ever-expanding array of clothing options available in the market, making it increasingly difficult for individuals to make confident and informed fashion choices.

The process of curating a wardrobe that reflects one's individuality and enhances their appearance requires a keen understanding of both personal style and the science of body shapes. Many people, in their pursuit of fashion excellence, grapple with decision paralysis, leading to frustration and a lack of confidence in their appearance. The importance of these concerns extends beyond personal aesthetics, as studies have shown that one's clothing choices can influence their self-esteem and social interactions, emphasizing the significance of addressing these challenges (Kwong, 2019; Adam & Galinsky, 2012).

To tackle these challenges and bridge the gap between personal style and body-specific fashion choices, this research project introduces a novel Machine Learning (ML)-based Outfit Suggestion System. This system leverages the power of state-of-the-art deep learning, computer vision, and natural language processing techniques. It also integrates a comprehensive dataset of clothing items and body shape analysis to provide tailored outfit recommendations based on individual user needs.

The central objective of this research is to enhance the user's confidence and satisfaction by offering personalized outfit suggestions that consider their unique body type and shape. By doing so, we aim to streamline the decision-making process and reduce the time and effort required to curate a stylish and flattering wardrobe.

In the following sections, we will delve into the methodology, datasets, and technologies utilized in this ML-based outfit suggestion system. Additionally, we will discuss the potential impact of our research in the context of fashion recommendation systems and how it may empower fashion-conscious individuals in diverse contexts, from daily attire choices to special occasions and beyond.

This research not only contributes to the advancement of fashion recommendation systems but also offers a promising solution for individuals seeking personalized outfit suggestions, ultimately empowering them to make informed and stylish fashion choices that align with their unique body characteristics and self-identity. Through this fusion of technology and fashion expertise, our system strives to enhance the fashion experience and inspire greater confidence in personal style and appearance.

II. LITERATURE SURVEY

The following literature survey provides an overview of key research and developments in the areas relevant to our project, including fashion recommendation systems, body shape analysis, and the intersection of machine learning and fashion.

1. Fashion Recommendation Systems

Fashion recommendation systems have gained prominence with the surge in e-commerce and personalized user experiences. They are designed to offer users tailored clothing suggestions based on various factors such as their preferences, historical interactions, and item characteristics.

Collaborative Filtering: Collaborative filtering methods, including user-based and item-based collaborative filtering, have been widely used in fashion recommendation systems. These methods analyze user behavior and recommend items that similar users have liked (Su & Khoshgoftaar, 2009).

Content-Based Recommendation: Content-based recommendation systems use item characteristics to suggest products similar to ones a user has interacted with. In the context of fashion, these characteristics may include color, style, and fabric (Lops et al., 2011).

Hybrid Recommendation Systems: Hybrid recommendation systems combine collaborative filtering and content-based methods to provide more accurate and diverse recommendations. This approach mitigates the limitations of individual methods (Burke, 2002).

2. Computer Vision in Fashion Recommendations

Recent advancements in computer vision and deep learning have facilitated the integration of image analysis into fashion recommendation systems. These technologies have enabled systems to consider the visual aspects of clothing items in their recommendations.

Image-Based Fashion Recommendations: Systems like 'Dressify' (Kim et al., 2019) employ computer vision to analyze the style and characteristics of clothing items. This technology can offer recommendations based on a user's fashion preferences and the visual compatibility of different pieces

Deep Learning for Fashion: Deep learning techniques, particularly convolutional neural networks (CNNs), have shown promise in extracting rich features from clothing images. This approach allows systems to understand clothing styles and textures more effectively.

3. Body Shape Analysis

Understanding an individual's body shape is crucial in providing fashion recommendations that flatter their physique. Research in body shape analysis has seen notable developments.

3D Body Scanning: Technologies like 3D body scanning have gained prominence in the fashion industry. These systems provide precise body measurements, which can be integrated into recommendation algorithms to suggest clothing that fits and complements an individual's body shape.

Virtual Try-On Solutions: Virtual try-on applications leverage augmented reality to enable users to visualize how clothing items will look on their unique body shapes. These solutions enhance the online shopping experience (Zanotto et al., 2015).

4. Challenges and Opportunities

Several challenges and opportunities emerge in the domain of fashion recommendation systems:

Data Quality: The effectiveness of recommendation systems relies on high-quality data. Ensuring accurate and diverse datasets is essential for the success of the proposed ML-based outfit suggestion system.

Privacy and Personalization: Striking the right balance between personalization and privacy is crucial. Users should have control over the data shared while receiving highly personalized recommendations.

Cross-Context Recommendations: Extending recommendation systems to offer fashion suggestions for various contexts, such as work attire, casual wear, or special occasions, remains a challenge.

Ethical Considerations: Ethical considerations, including potential biases in recommendation algorithms and the sustainability of the fashion industry, should be addressed.

5. Recent Innovations

Recent innovations in the field have expanded the possibilities of fashion recommendation systems. For example, 'StyleGAN' (Karras et al., 2019) introduced generative adversarial networks (GANs) to generate realistic fashion images, potentially expanding the dataset of available clothing items.

This literature survey highlights the significant progress made in fashion recommendation systems, body shape analysis, and the integration of computer vision in fashion technology. The review underscores the project's relevance and importance in empowering fashion-conscious individuals with personalized outfit suggestions that align with their unique body types and style preferences. By building on the latest techniques and

addressing the challenges in this domain, our project seeks to enhance the fashion experience and inspire greater confidence in personal style and appearance.

LITERATURE SURVEY

Sr.No.	Research Paper	Authors	Publication Date	Remarks
1	" Complexion based Outfit color recommender using Neural Networks "	Reeta Koshy, Anisha Gharat, Tejashri Wagh and Siddesh Sonawane	2021	"Pocket Fashionista" which is a personalized Fashion Advisor is introduced that provides the best outfit and color combination recommendations to the users based on their complexion which will make them look great and feel confident about their appearance
2	"ViBE: Dressing for Diverse Body Shapes."	Wei-Lin Hsiao, Kristen Grauman	2020	We introduce ViBE, a Visual Body-aware Embedding that captures clothing's affinity with different body shapes. Given an image of a person, the proposed embedding identifies garments that will flatter her specific body shape
3	" Body Shape Analysis via Image Processing"	Yang Jinyan ¹ Li Yu ¹ , Jiang Tao ¹ , Wei Yu ¹ , Xu Guanlei	2019	This paper proposed a new method to analyze the body shape without touching via image processing technique
4	"Online Trial Room based on Human Body Shape Detection."	D. M. Anisuzman ¹ , Md. Hosne Al Walid ²	2019	we have designed a set of equipment to capture images of t-shirts of any color and propose an automatic cloth measurement approach using image processing techniques. A method has been introduced to recognize feature points, which has been used to calculate the cloth sizes.

III. Summary of Literature Survey

The literature survey covers key areas of fashion recommendation systems, body shape analysis, and technological advancements in the fashion domain. It highlights the significance of personalized fashion recommendations and the role of technologies like computer vision and deep learning. Challenges include data quality, privacy, and ethical considerations. Recent innovations, such as GANs, have expanded possibilities in fashion recommendation systems.

IV. FUTURE SCOPE

Certainly, the future scope for the ML-based Outfit Suggestion System is extensive, as it lies at the intersection of fashion, technology, and personalization. Here are several avenues for future development and expansion:

Enhanced Personalization: Future iterations of the system can focus on even more granular personalization. This can include considering individual color preferences, fabric choices, and even cultural or regional fashion norms to provide outfit recommendations that align closely with a user's unique style.

Integration of Real-Time Feedback: Implementing a feedback loop where users can rate and provide feedback on suggested outfits can help the system learn and adapt to changing preferences and seasonal trends. This can lead to more accurate recommendations over time.

Wardrobe Management: Expanding the system to offer wardrobe management features can help users keep track of their clothing inventory. It can provide recommendations based on the items already in their possession, helping users maximize the use of their existing wardrobe.

Sustainability and Ethical Fashion: The system can be extended to promote sustainable and ethical fashion choices. It can provide information on the environmental impact and ethical practices of clothing brands, guiding users toward more responsible purchasing decisions.

Augmented Reality Try-On: Augmented reality (AR) can be integrated for virtual try-ons, allowing users to see how suggested outfits would look on them in real-time. This can greatly enhance the online shopping experience.

Cross-Platform Integration: Extending the system's compatibility to various platforms, including mobile apps and smart mirrors, can further enhance its accessibility and utility.

Collaboration with Fashion Brands: Partnering with fashion brands and retailers to offer exclusive discounts and deals for recommended outfits can make the system more appealing and potentially generate revenue.

Expanding to Different Cultural Contexts: Adapting the system to cater to different cultural preferences and clothing norms is essential, especially in a global context. Ensuring the recommendations are culturally sensitive can enhance user satisfaction.

Multi-Modal Recommendations: Integrating recommendations that consider not only clothing but also accessories, hairstyles, and makeup can provide a more holistic approach to personal style enhancement.

Accessibility Features: Adding features for users with disabilities, such as voice-activated controls, and ensuring the system is inclusive and usable for a wide range of individuals.

Research on User Behavior: Conducting research on how users interact with and respond to fashion recommendations can provide insights into improving the system's algorithms and user experience.

Machine Learning Advancements: Incorporating the latest advancements in machine learning, including reinforcement learning and generative models, to further refine the recommendation algorithms.

Data Security and Privacy: As the system collects and processes personal data, ensuring robust data security and privacy features will be crucial for its continued success.

AI Fashion Advisors: Developing AI-driven fashion advisors that can engage in real-time conversations with users to understand their style preferences and offer recommendations or style tips.

Educational Component: Including educational content about fashion and style that helps users make more informed choices and develop their fashion sense.

User Communities: Facilitating online communities or forums where users can share their fashion experiences, tips, and recommendations can enhance user engagement.

The future scope for the ML-based Outfit Suggestion System is promising, as it can continue to evolve to meet the changing needs and expectations of fashion-conscious individuals while leveraging the latest advancements in technology and data analysis.

V. CONCLUSION

In the ever-evolving realm of fashion, where personal style and self-expression are paramount, the development of the ML-based Outfit Suggestion System represents a significant step forward in addressing the challenges faced by individuals seeking to curate a wardrobe that aligns with their unique body type and style preferences. This project leverages the latest advancements in machine learning, computer vision, and natural language processing to provide personalized outfit recommendations, enhancing the fashion experience and boosting user confidence.

The journey of this project has taken us through an exploration of the diverse fields of fashion recommendation systems, body shape analysis, and the integration of technology into fashion. Our extensive literature survey revealed the progress and innovations in these areas, setting the stage for the development of our system.

The ML-based Outfit Suggestion System offers a practical solution to the dilemmas that individuals often encounter when selecting the right clothing. Its ability to consider a user's body type and style preferences in recommending outfits not only streamlines the decision-making process but also empowers users to make informed and stylish choices.

As we conclude this project report, it is clear that the ML-based Outfit Suggestion System represents a promising solution in the ever-evolving landscape of fashion and technology. With the ever-growing demand for personalized and tech-driven fashion choices, this system is well-positioned to address the unique needs of users and contribute to the advancement of fashion recommendation systems. It is not merely a project but a pathway to greater self-expression, informed fashion choices, and enhanced confidence in personal style.

In closing, we envision a future where technology and fashion continue to intersect, where fashion-conscious individuals are empowered to define and refine their personal style, and where our ML-based Outfit Suggestion System remains at the forefront of this exciting journey.

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