AI POWERED VIRTUAL OUTFIT CHECKER

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***Abstract*—Internet clothing shopping still faces problems such as inappropriate size selection, outfit mismatch, and limited visualization of clothing display on particular users. Virtual try-on systems have been developed to address the above problems, however many of the existing solutions are limited to original e-commerce platforms and do not consider handling reliable validation to prevent mismatched outfit combinations. The present disclosure relates to a cross-platform AI-based virtual fitting system for displaying apparel purchased from multiple online shopping platforms in a single try-on session. The suggested system allows a user to upload a full-body photograph and to submit links to top wear, bottom wear, footwear or complete attire products that come from different platforms, if any. In order to produce meaningful and realistic results, a multi-level mismatch validation system is built for assuring category correctness, gender fusion, and logical clothing-type consistency before initiating the virtual fitting process. User characteristics such as gender and other body measurements are taken into consideration to improve garment fitting and sizing. The acceptable clothing items are overlaid on the user's body-photograph by using image processing techniques to produce a realistic outfit display. The obtained results are stored temporarily on the local device, to protect user privacy.**

***Index Terms*—Virtual Try-On, Computer Vision, Online Fashion, Image Processing, E-Commerce, Mismatch Verification, Cross-Platform Integration**

I. Introduction

The Online shopping of e-commerce platforms has brought dramatic changes to consumers' fashion product shopping behavior.However, buying apparel online is still not free of many issues, such as wrong size and outfit selection, and customers' uncertainty of how the apparel looks in them.The virtual try-on technology is proposed as an effective solution to this problem by helping users to view the apparel items digitally.Being usually designed for its corresponding platform, most existing virtual try-on solutions are limited to specific platform ecosystems, thus users would not be able to mix and match garment from multi-platforms to form a complete outfit, which limits flexibility and usability.Experiments and surveys have been run in this paper to propose a multi-platform-based virtual try-on solution to support clothing aggregation from multiplatform e-commerce sites in a single workflow. Moreover, a multi-level mismatch verification engine has been proposed to verify the user inputs before the execution of the try-on.Ideal try-on systems should be accurate, realistic, and induce confidence of the users.

Therefore, we proposed a multi-platform and privacy-preserving virtual try-on system by temporarily saving the results on local user machines.

II. LITERATURE REVIEW

Recent advancements in artificial intelligence and computer vision have significantly influenced the fashion technology domain, particularly in areas such as outfit generation, recommendation systems, and virtual try-on solutions. This section reviews key research works relevant to the proposed system and highlights their contributions and limitations.

In this work, a new way of generating outfits is shown by using large language models (LLMs) and visionbased style extraction. This system looks at visual details like color choices, fabric types, and clothing shapes in photos to create outfits for a fictional or themed character. In this process, the results from the vision-augmented part are combined with the prompts in text format so that the generated outfits are more stylistic overall. The main contribution is that it bridges the gap between visual understanding and language-mediated reasoning for more expressive and context-aware outfit generation.

This study explores the use of deep neural networks (DNNs) to improve personalized fashion recommendations. By analyzing user preferences, browsing history, and purchase behavior, the proposed model suggests outfits tailored to individual tastes. The system employs feature embeddings to capture relationships between different clothing items and user profiles. The primary strength of this approach is its focus on personalization and data-driven recommendations.

This paper presents a deep learning–based approach for improving personalized fashion outfit recommendations by analyzing user preferences and clothing attributes. The proposed system employs deep neural networks to learn complex relationships between users and fashion items, enabling more accurate and contextaware outfit suggestions. By processing historical user interaction data, such as previous selections and preferences, the model captures latent style patterns that traditional rulebased or collaborative filtering methods fail to identify. The study focuses on modeling fashion compatibility between clothing items and aligning recommendations with individual user tastes. Feature extraction techniques are applied to clothing images and metadata to represent garments in a high-dimensional space.

This paper presents a fuzzy inference–based recommendation system aimed at promoting sustainability within the fashion industry by intelligently suggesting outfits that balance user preferences, fashion trends, and environmental impact.

The proposed system addresses the inherent uncertainty and subjectivity involved in fashion decisionmaking, such as varying personal tastes, comfort levels, and sustainability awareness, by leveraging fuzzy logic rather than rigid rule-based methods.

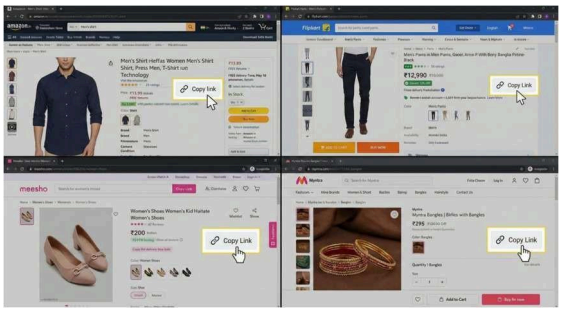
The rapid growth of e-commerce and digital retail has accelerated the adoption of artificial intelligence (AI) in the fashion industry to enhance user experience and decision-making. This survey presents a comprehensive review of AI-driven fashion technologies, focusing on three major domains: clothing detection, fashion recommendation systems, and virtual try-on solutions. The paper examines how computer vision techniques such as image classification, object detection, and human pose estimation are employed to identify clothing items and extract fashion attributes from images.

III. METHODOLOGY

The proposed system follows a modular and sequential methodology designed to ensure accurate outfit visualization while preventing incorrect or illogical try-on results. The overall workflow integrates user input processing, product link analysis, multi-level mismatch verification, and AI-based virtual try-on generation. Each stage contributes to improving realism, reliability, and usability of the system.

1. Data Collection

The user provides base user information such as name, chosen gender and optional body measurements including height, chest, waist and hip. These measurements are used to assist decisions about garment scaling, alignment and validation during later stages of the workflow. The user uploads a full body image, preferably front facing, which is used as the base image for the virtual try on workflow which it is temporarily stored and preprocessed to have a common resolution and to be compatible with further image processing operations.



2. Product Link Collection and Categorization

The system has pre-defined fields corresponding to the clothing category full dress, top wear, bottom wear and footwear. Product links retrieved from different e-commerce sites are pasted into the designated category.The proposed solution differs from conventional systems in that each product link can be retrieved from a different platform.

The cross-platform nature facilitates a mix-andmatch approach of combining garments from different ecommerce sites to create a complete outfit.

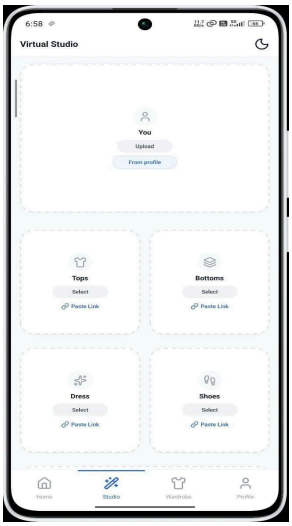


Fig:3.2 product collection and Categorization

3. Product Information Extraction

Once the links are submitted, the system extracts essential product metadata such as product title, category keywords, and associated images. This extraction process is designed to be platform-independent, allowing the system to handle links from multiple e-commerce websites without relying on platform-specific integrations.

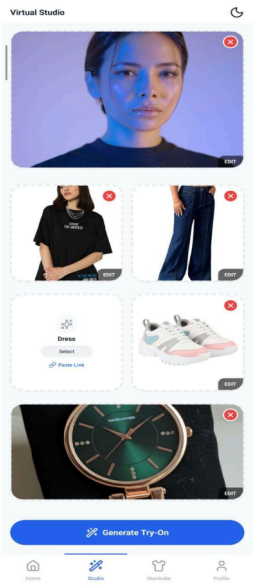


Fig 3.3 Product Information Extraction

The extracted information serves as the input for the validation and verification stages.

4. Multi-Level Mismatch Verification

A key contribution of this work is the multi-level mismatch verification engine, which validates all inputs before initiating the virtual try-on process. This verification is carried out in four stages:

A. Category-Level Verification:

Ensures that each product link corresponds to the clothing category in which it is placed. Incorrect placements, such as footwear submitted as top wear, are identified and blocked. B. Gender Compatibility Verification:

Verifies whether the selected product is suitable for the user's chosen gender. Gender-incompatible products are flagged, and the user is notified before proceeding. C. Logical Dress-Type Verification: Detects illogical outfit combinations even within valid categories, such as selecting a full dress as bottom wear or incompatible apparel types for a specific gender. D. Confidence-Based Validation: Each product is assigned a confidence score based on metadata consistency and image-based garment classification. Products with low confidence trigger warning messages and require user confirmation.

5. Virtual Try-On Generation

The uploaded user image undergoes preprocessing steps such as resizing and basic background handling to prepare it for garment overlay. Body alignment logic is applied using the user's gender and optional measurement data to determine approximate garment positioning and scaling.After successful validation and preprocessing, the selected clothing items are digitally overlaid onto the user's body image. Each garment is resized and positioned according to its category and alignment parameters.

fig 3.5 virtual try on generation

The proposed methodology emphasizes input validation before visualization, which significantly reduces incorrect try-on results. By combining cross-platform product aggregation with structured mismatch verification and image-based garment overlay, the system delivers a reliable and user-centric virtual try-on experience.

IV. RESULT

The proposed cross-platform virtual try-on system was evaluated on various test cases across clothing categories, genders, and e-commerce platforms to analyze validation accuracy and output reliability. The experimental results demonstrate that the multi-level mismatch verification engine detected and prevented invalid category placement, gender-mismatched products, and illogical dress combinations before the try-on process and reduced the invalid try-on outputs. Compared to a baseline try-on workflow without validation, the proposed system produced more consistent and visually meaningful outfit previews. The use of user attributes such as gender and body measurements contributed to the proper alignment and proportionally scaled garment rendering in the final outputs.

By enabling multiple clothing items across platforms in the same try-on session, the proposed system allowed users a higher degree of flexibility, control, and confidence when selecting outfits. The temporary local storage of the generated outfits ensured privacy for the user while allowing the comparison of multiple outfit combinations in a session. Overall, from our experimental observations, we found that the proposed system increased the reliability of the try-on outputs, decreased user input errors, and increased the confidence in the apparel selection.

V. CONCLUSION

In this paper, we made a cross-platform AI-based virtual try-on system that fixes two key restrictions in existing solutions to online fashion shopping: 1) lack of flexibility in supporting multiple e-commerce platforms, and 2) lack of a strong input validation mechanism that can prevent the system from producing incorrect or unrealistic results. By allowing users to blend clothing items from multiple platforms within the same try-on session, the proposed system opens up a more practical, user-centered way to visualize outfits. The most significant novelty of this paper is the addition of a multi-level mismatch verification engine that validates, on each clothing input, the correctness of the product category placement, the gender compatibility, and also the logical correctness of the dress-type combination, before a try-on. Incorporation of user attributes including gender and optional body measurements can help make garment alignment and fitting more accurate. Generated results are only stored locally on a temporary basis, ensuring user privacy and security. Our experimental observations suggest the proposed system can help boost the reliability of virtual try-on results, make users more confident and improve the quality of fashion apparel selection, and eventually assist online fashion retail in reducing product return rates. In conclusion, the proposed approach has demonstrated that combining cross-platform integration with intelligent validation can greatly boost the effectiveness of virtual try-on systems. It has developed a scalable platform with great future research and application potential for deployment in real e-commerce situations.

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