International Journal of Advanced Technology in Engineering and Science
Vol. No. 13, Issue No. 03, March 2025
www.ijates.com
ijates
ISSN 2348 - 7550

INTELLIWEAR: A MACHINE LEARNING APPROACH TO PERSONALIZED FASHION CHOICES

Shruti Kumbar[1] Sapna B Patil[2] Pratiksha Kamate[3] Nidhi Trikani[4]

[1,2]Assistant Professor [3,4] Student

[1, 2,3,4] Department of Computer Science Engineering,

Hirasugar Institute of Technology, Nidasoshi, Karnataka, India

ABSTRACT

In recent years, personalized fashion has become an area of growing interest, driven by advancements in machine learning and data analytics. This paper introduces IntelliWear, a machine learning-based system designed to assist users in making personalized fashion choices. The system integrates user preferences, body type, seasonal trends, and fashion styles to generate tailored clothing recommendations. Using supervised learning algorithms, IntelliWear continuously learns from user feedback and incorporates data such as purchase history, fashion trends, and social media activity to refine its predictions. The paper discusses the design and architecture of IntelliWear, highlighting its ability to provide individualized suggestions and adapt to changing fashion landscapes. We also present a case study to demonstrate the practical application of the system, showcasing its effectiveness in increasing user satisfaction and engagement with fashion choices. Finally, we explore the potential of IntelliWear in transforming the fashion industry by bridging the gap between technology and personal style.

Keywords: *Deep learning model, Image Recognition, CNN, KNN, RESNET50, Image dataset*

1. INTRODUCTION

Fashion is an integral part of human culture and personal expression, with individuals constantly seeking ways to reflect their identity and adapt to ever-evolving trends. As the fashion industry becomes increasingly digital , there is a growing need for personalized solutions that help consumers make informed and individualized fashion choices. Traditional shopping experiences often fail to meet the diverse preferences of consumers, leading to a disconnect between the available options and the personal style of the buyer. The rise of machine learning (ML) and data analytics has presented new opportunities for revolutionizing the way people approach fashion. By leveraging these technologies, personalized recommendations can be made based on various factors, including user preferences, body type, current trends, and even climate conditions. However, existing solutions often struggle with providing truly customized and dynamic experiences that cater to the unique needs of each individual.This project introduces IntelliWear, a machine learning-based approach to personalized fashion recommendations. The system aims to provide users with a seamless experience by offering clothing suggestions tailored to their tastes, preferences, and lifestyle. Through advanced algorithms

and continuous learning from user interactions, IntelliWear adapts to each individual's style and offers an evolving set of fashion choices. By integrating real-time data, such as weather patterns, social media trends, and personal feedback, IntelliWear not only anticipates consumer needs but also provides relevant and timely suggestions.

2. LITERATURE SURVEY

The evolution of recommendation systems has led to hybrid models that integrate collaborative filtering, content-based filtering, and deep learning architectures. Early fashion recommendation systems relied on statistical models and rule-based systems. These systems were limited in handling dynamic user preferences and were unable to adapt to changing fashion trends. Collaborative filtering (CF) is a widely used technique in recommendation systems. It works by analyzing user interactions, such as purchase history and preferences, to suggest items based on similar user behaviors. Studies like Shivaranjani et al. (2023) [1] highlight the effectiveness of CF in fashion recommendations but note its limitations in handling new users (cold-start problem).

Content-based filtering focuses on the characteristics of fashion items, such as color, style, and fabric, to recommend similar products. Chakraborty et al. (2021) [2] explored various models in fashion recommendation and emphasized the need for more accurate feature extraction techniques.

Hybrid models combine collaborative and content-based filtering to improve recommendation accuracy. Pereira et al. (2023) [3] proposed a hybrid approach that integrates user preferences with fashion trends extracted from social media and online shopping platforms.

CNNs are effective in image-based fashion recommendations by extracting visual features from clothing images. Elleuch et al. (2021) [4] developed a CNN-based clothing classification system using transfer learning to enhance the accuracy of outfit suggestions.

Fashion outfit compatibility is a key aspect of personalized recommendations. Balim and Ozkn (2023) [5] applied deep learning techniques to diagnose outfit compatibility, demonstrating improvements over traditional machine learning approaches.

Recent advancements explore reinforcement learning to improve dynamic and real-time recommendations. This technique continuously learns from user interactions to refine suggestions over time. Fashion choices depend on various contextual factors, including weather conditions, social trends, and personal preferences. Gupta et al. (2015) [6] developed an apparel classifier that considers environmental and personal factors, highlighting the need for context-aware recommendation systems.

3. METHODOLOGY

The methodology for developing an Intelliware Fashion Recommendation System using Machine Learning involves several stages. First, data collection is essential, gathering user data (such as purchase history and browsing behavior), product attributes (like color, size, and style), and contextual information (such as seasonal trends and events). Next, data preprocessing includes cleaning the data, encoding categorical features, normalizing numerical data, and extracting relevant features from text or images using techniques like TF-IDF or CNNs. Various machine learning techniques can be applied based on the recommendation

type: collaborative filtering (e.g., matrix factorization or neural collaborative filtering) for user-item interaction, content-based filtering for using product attributes, hybrid models that combine these approaches, and deep learning models (such as auto encoders or transformers) for advanced recommendations. Context-aware methods, such as reinforcement learning, can also be employed for dynamic, personalized suggestions. The system is trained using historical data and evaluated with metrics like precision, recall, F1-score, and NDCG to ensure accuracy and relevance. Finally, the model is deployed using platforms like Flask or Tensor Flow Serving for integration with web or mobile applications, with real-time recommendations enabled through tools like Apache Kafka. Continuous improvement is ensured by incorporating user feedback, retraining models, and conducting A/B testing to enhance performance and user satisfaction.

3.1 Functional Requirements

3.1.1 User Profile Management

Allows users to create and manage their profiles, including personal style preferences, body measurements, and shopping history.

3.1.2 Style Analysis

Analyzes user data to identify their unique style preferences, including color palettes, silhouettes, and fashion trends.

3.1.3 Recommendation Generation

Generates personalized fashion recommendations based on user preferences, trends, and available inventory.

3.1.4 Feedback Integration

Collects user feedback on recommendations, allowing the system to learn and improve its accuracy over time

4. DESIGNANDIMPLEMENTATION

4.1 Data Collection

- User Input: Includes data about the user's profile (e.g., gender, body type, and preferences), wardrobe items, and feedback on past outfit suggestions.
- External Data: Gathers fashion trends from social media, weather data through APIs, and images of the user's wardrobe.

4.2 Data Pre-processing

- Clothing items are categorized by type, color, and fabric.
- Image Processing: Uses computer vision techniques like Convolutional Neural Networks (CNNs) to identify and categorize clothing items from images.
- Feedback Data: Tracks user interactions with outfit suggestions to improve future recommendations.

4.3 Recommendation System

- Collaborative Filtering: Suggests outfits based on what similar users prefer.
- Content-based Filtering: Uses features of clothing items (e.g., color, type, style) to recommend similar outfits.
- Hybrid Model: Combines both collaborative and content-based filtering for better accuracy.
- Deep Learning: Neural networks learn from historical data, refining outfit suggestions as user preferences evolve

4.4 System Architecture

- Frontend: A mobile app (React Native) or web interface allows users to input preferences and receive suggestions.
- Backend: Python frameworks (Flask/ Django) host machine learning models for real-time processing of recommendations.
- Database: Cloud storage (e.g., PostgreSQL, MongoDB) holds user profiles, wardrobe data, and past recommendations.
- APIs: Integrates with weather APIs and fashion trend databases to update suggestions.

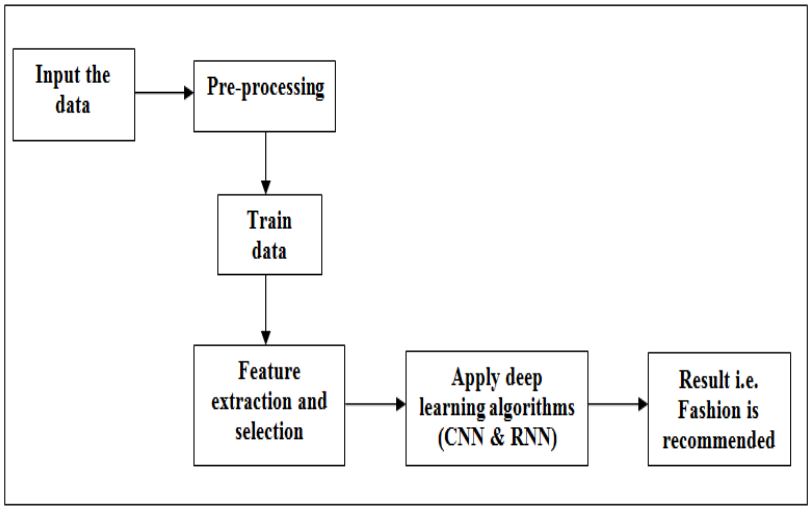

Fig 1: Data Flow diagram

5. RESULTS

In summary, IntelliWear enhances the daily fashion decision-making process by making it personalized, data-driven, and adaptable to both environmental factors and user feedback, offering users a smarter, more efficient way to dress

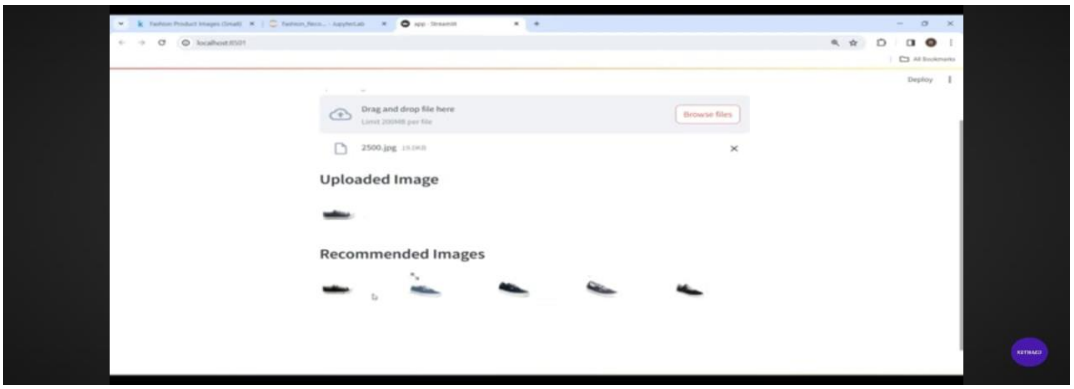

Fig 2: Output for the given input image

International Journal of Advanced Technology in Engineering and Science
Vol. No. 13, Issue No. 03, March 2025
www.ijates.com
ijates
ISSN 2348 - 7550

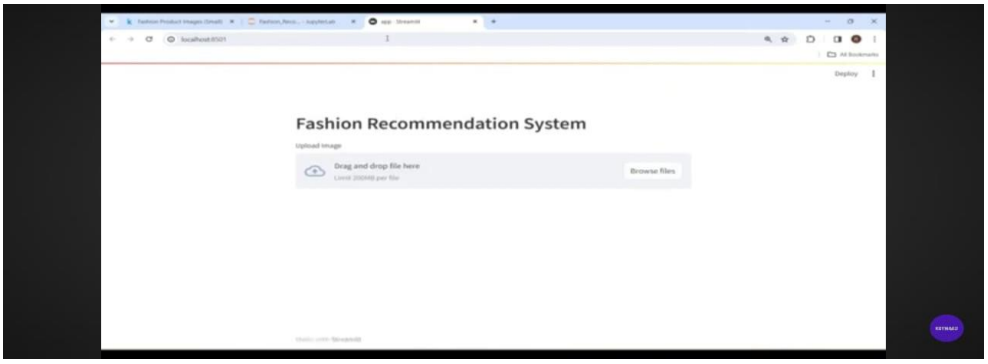

Fig 3: Display page of the output

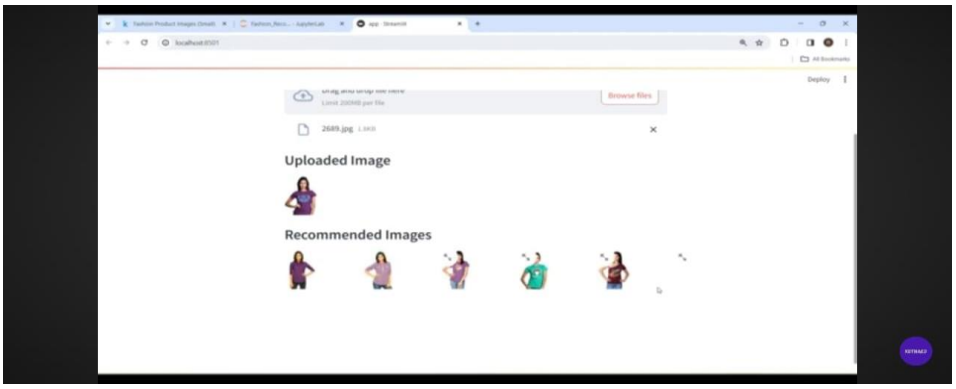

Fig 4: Output for the given input image

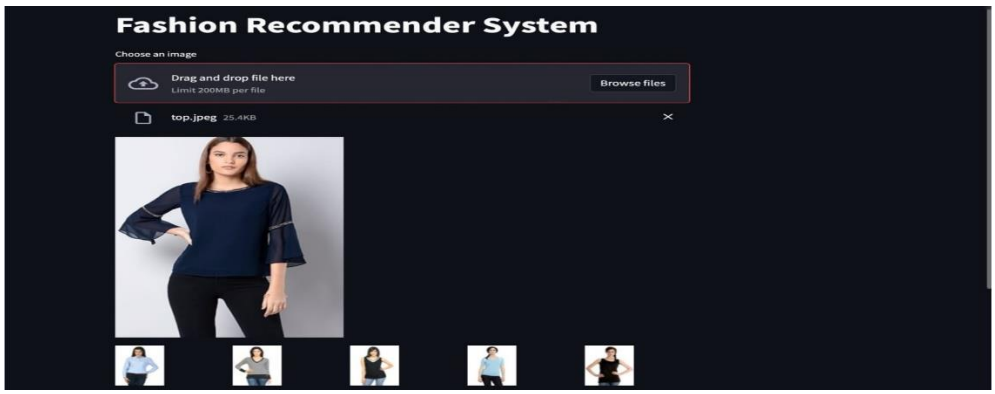

Fig 5: Different output for single image

Fig 6: Different output for single image

6. CONCLUSION

In conclusion, IntelliWear: A Machine Learning Approach to Personalized Fashion Choices presents a promising solution for revolutionizing the fashion industry by leveraging machine learning algorithms to curate tailored clothing recommendations. By analyzing personal preferences, body types, weather conditions, and social trends, IntelliWear enhances the shopping experience, enabling users to make more informed and confident fashion choices. This personalized approach not only optimizes customer satisfaction but also contributes to sustainable fashion practices by reducing unnecessary purchases and returns. As machine learning technology continues to evolve, IntelliWear holds the potential to reshape the future of fashion, making it more accessible, efficient, and aligned with individual styles and needs.

REFERENCES

[1] L. Shivaranjani, S.K. rachamadugu,B.V.S.Reddy, B.R. Sakthivel and S.Depuru(2023),"Fashion Recommendation System Using Machine Learning", 2023 4th International Conference on Smart Electronics and Communication (ICOSEC)

[2] Chakraborty, Samit & Hoque, Md. Saiful & Jeem, Naimur &Biswas, Manik Chandra & Bardhan, Deepayan & Lobaton,Edgar. (2021). Fashion Recommendation Systems, Modelsand Methods: A Review. Informatics. 8. 49.10.3390/informatics8030049.

[3] Pereira, A.M., de Barros Costa, E., Vieira, T., Landim, A. R. and Moura, J.A.B., 2023. Helping Online Fashion Customers Help Themselves: Personalized Recommender Systems. In Reinventing Fashion Retailing: Digitalizing, Gamifying, Entrepreneuring (pp. 17-33). Cham: Springer International Publishing.

[4] Mohamed Elleuch, Anis Mezghani, Mariem Khemakhem, Monji Kherallah "Clothing Classification using Deep CNN Architecture based on TransferLearning" ,2021 DOI:10.1007/978-3-030-49336-3_24

[5] Balim, Caner and Kamal Ozkn(2023). "Diagnosing Fashion Outfit Compatibilitywith deep learning Techniques", 2023 3rd International Conference on Mobile Networks and Wireless Communications (ICMNWC)

[6] Saurabh Gupta, Siddartha Agarwal, Apoorve Dave. "Apparel Classifier and Recommender using Deep Learning." (2015).

[7] Aneesh K, P. V. Rohith Kumar, Sai Uday Nagula, Archana Nagelli, "Fashion Recommendation System".

[8]] Bossard, Lukas, Matthias Dantone, Christian Leistner, Christian Wengert, Till Quack and Luc Van Gool. "Apparel Classification with Style." ACCV (2012).