

# Impact of Cognitive Assistance System with Augmented Reality on the Sri Lankan Fashion Accessories Market

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**Abstract** - This study explores the impact of incorporating Cognitive Assistance Systems (CAS), Machine Learning (ML), and Augmented Reality (AR) into the fashion accessory industry in Sri Lanka. As AR rapidly grows, it holds the potential to transform the way consumers shop and influence market trends. The research investigates how CAS, when combined with AR, can provide personalized product recommendations, virtual product try-ons, and immediate information about product availability and pricing. It also addresses challenges, including technological limitations and privacy concerns. This investigation enhances our understanding of how CAS and AR can shape the fashion accessory sector, offering valuable insights for key stakeholders such as retailers, manufacturers, and decision-makers. It suggests that embracing CAS and AR can enhance customer satisfaction, drive sales, and promote industry growth. This research contributes to existing studies on the use of AR in various fields, furthering our collective knowledge of technology integration across different industries.

**Keywords:** Cognitive Assistance system, Augmented Reality, Sri Lankan Fashion accessories market, personalized recommendations, virtual try-on.

## I. INTRODUCTION

The impact of cognitive assistance systems with augmented reality on the Sri Lankan fashion accessories market is a topic of significant interest and potential for research. The retail sector has taken notice of augmented reality (AR) technology, which overlays virtual things in the real environment, as a way to improve customer experiences and remove physical barriers separating customers from products [1]. Understanding the variables influencing the adoption of AR technology in the context of the Sri Lankan fashion retailing industry is essential for marketers and businesses.

The adoption of AR technology in the retailing of fashion has been influenced by numerous major aspects, according to earlier research done in Sri Lanka. Perceived benefits,

technology complexity, IT infrastructure capability, financial readiness, and AR adoption were all significantly correlated, according to a study based on the Technology-Organization-Environment (TOE) theory, whereas AR adoption by competitors and government policies did not. These results imply that when integrating cognitive aid systems with augmented reality, enterprises in the Sri Lankan fashion accessory sector need to take into account the perceived benefits of AR, technological complexity, and IT infrastructure capabilities.

Introduce a user preference styling suggestion system in the cognitive assistance system for the Sri Lankan fashion accessories market using an ML algorithm. Hybrid ML algorithms, which combine content-based and collaborative filtering techniques, can improve user satisfaction and loyalty in fashion e-commerce platforms. These algorithms analyze attributes and features of fashion accessories, suggesting products with properties that match user preferences. The hybrid approach provides better accuracy and individualized recommendations, addressing data sparsity and scalability. By learning from user interactions, historical data, and product features, the hybrid system identifies patterns and insights from massive datasets, enabling precise forecasts and relevant fashion accessory suggestions.

It is significant to note that problems have traditionally existed regarding the acceptance and knowledge of technology in the Sri Lankan market, especially wearable technology goods [2]. However, by giving customers fresh and interesting experiences, the adoption of cognitive support systems with augmented reality in the fashion accessory sector has the potential to close this knowledge gap. Retailers may draw in tech-savvy customers and set themselves apart from the competition by implementing AR technology into fashion accessories.

This study examines the adoption determinants, consumer experiences, and advantages of augmented reality cognitive aid systems in the Sri Lankan fashion accessory

market, assisting marketers, retailers, and companies in maximizing the potential of this technology.

## II. LITERATURE REVIEW

In recent years, the fashion accessories market in Sri Lanka has seen substantial expansion and transformation. With the growing popularity of online shopping and the use of technology in the retail sector, there is an increasing need to investigate creative solutions that can improve the customer experience while driving corporate growth. In the fashion business, augmented reality (AR) technology has emerged as a promising tool, providing immersive virtual try-on experiences and personalized product recommendations.

AR technology superimposes virtual things on top of real-world surroundings, allowing customers to see and interact with virtual fashion accessories in real-time. Customers may realistically try on different items, play with different styles, and make informed buying decisions by leveraging AR. However, by incorporating cognitive support technologies, the potential of AR in the fashion accessories sector can be further boosted.

Cognitive assistance systems use artificial intelligence and machine learning algorithms to provide users with individualized recommendations, help, and direction. These systems can assess customer preferences, historical data, and real-time interactions to provide personalized recommendations and improve the shopping experience overall. The fashion accessories market in Sri Lanka can benefit from greater personalization, precise product recommendations, and increased customer engagement by integrating cognitive assistant systems with AR.

As a result, the purpose of this study is to look at the impact of cognitive support systems with augmented reality on the Sri Lankan fashion accessory market. The study intends to provide insights into how these technologies can be efficiently used to enhance the customer experience and drive market growth by studying consumer preferences, perceptions, and purchasing behavior. The study will also look at the obstacles and potential of implementing cognitive aid systems using AR in the Sri Lankan context.

This study's findings will add to the body of knowledge on the intersection of augmented reality, cognitive support technologies, and the fashion accessories market. The findings will give significant insights for Sri Lankan fashion merchants, e-commerce platforms, and technology suppliers, allowing them to make informed decisions about incorporating these technologies into their business strategy. Finally, the research seeks to assist the adoption of novel technologies and

boost the competitiveness of the Sri Lankan fashion accessories sector in the worldwide marketplace.

The impact of cognitive assistance systems with augmented reality (AR) on the fashion accessories market has gained significant attention in recent research. Several studies have explored the potential benefits of integrating cognitive assistance systems and AR technology in the retail sector, highlighting their ability to enhance the customer experience, improve decision-making, and drive business growth.

AR technology has revolutionized the way customers engage with fashion accessories, providing them with immersive and interactive virtual try-on experiences. Through AR, customers can visualize how different accessories will look on them in real time, eliminating the need for physical try-ons and reducing the risk of dissatisfaction with online purchases. This technology has been shown to increase customer engagement and satisfaction, leading to higher conversion rates and reduced return rates (Bollmann et al., 2019) [3]. Moreover, AR-based virtual try-on experiences have been found to positively influence purchase decisions by creating a sense of confidence and excitement among customers (Cheng et al., 2020) [1].

The integration of cognitive assistance systems further enhances the capabilities of AR technology in the fashion accessories market. These systems leverage artificial intelligence and machine learning algorithms to analyze user preferences, historical data, and real-time interactions. By understanding individual customer preferences, cognitive assistance systems can deliver personalized product recommendations, styling tips, and assistance throughout the customer journey (Keating et al., 2021) [2]. This level of personalization has been shown to significantly improve customer satisfaction and increase the likelihood of repeat purchases (Wang et al., 2018) [4].

Previous research has also explored the influence of cognitive assistance systems with AR on customer decision-making processes. These systems enable customers to receive real-time feedback and guidance while trying on virtual accessories, helping them make informed choices based on their style preferences, occasion, and budget (Wang et al., 2020) [5]. Studies have found that the availability of personalized recommendations and guidance positively impacts customers' perceived ease of use, trust in the recommendations, and overall purchase intentions (Xu et al., 2019) [6].

The effectiveness of cognitive assistance systems with AR in the fashion accessories market is not limited to customer-facing interactions. Retailers and e-commerce platforms can also benefit from these technologies by gaining

insights into customer preferences, optimizing inventory management, and enhancing marketing strategies. Cognitive assistance systems can collect and analyze data on customer interactions, preferences, and purchase history, enabling retailers to tailor their offerings and promotions to individual customers (Zheng et al., 2022) [7]. This data-driven approach has been shown to improve customer retention, increase cross-selling and upselling opportunities, and drive overall business growth (Wu et al., 2021) [8].

However, despite the potential benefits, the implementation of cognitive assistance systems with AR in the Sri Lankan fashion accessories market requires careful consideration of local factors and challenges. Cultural preferences, local fashion trends, and consumer behavior play a crucial role in shaping customer expectations and acceptance of these technologies. Therefore, it is important to conduct research specific to the Sri Lankan context to understand the unique dynamics and potential barriers to adoption.

### III. METHODOLOGY

A comprehensive research methodology is used to investigate the influence of cognitive aid systems using augmented reality (AR) on the Sri Lankan fashion accessories sector. Data collection, preprocessing, model selection and training, integration of AR and cognitive aid systems, user evaluation, and data analysis are all part of the technique.

Data is collected from various sources during the data-collecting phase, internet platforms, and consumer surveys. This information includes customer preferences, purchase behavior, and perceptions of fashion accessories and AR technology. Furthermore, information on current market trends, competitive analyses, and the availability of cognitive support systems with augmented reality in the Sri Lankan market is gathered.

After collecting the data, preprocessing and feature extraction techniques are used to assure data quality and extract relevant characteristics. This entailed cleaning up the obtained data, eliminating noise and outliers, and normalizing it for further analysis. Consumer demographics, fashion accessory qualities, AR technology usage habits, and cognitive aid system preferences are retrieved as key features.

A personalized recommendation system for fashion accessories is built using appropriate machine learning methods such as collaborative filtering or content-based filtering. To provide reliable and customized product suggestions, the selected algorithm is trained using the pre-processed data and extracted attributes.

The taught machine learning model is combined with AR technologies and cognitive aid tools to deliver an immersive experience. This integration allows users to have virtual try-on experiences and customized recommendations. To improve user experience and engagement, a user-friendly interface and straightforward interactions are required.

To examine the influence of the cognitive support system with AR on customer perception, engagement, and purchasing decision-making, user assessment studies are conducted. Surveys, interviews, and usability testing will be used to obtain user feedback to identify strengths, flaws, and areas for improvement.

The data obtained is analysed, and the efficiency of the cognitive aid system with AR in the Sri Lankan fashion accessories industry is assessed. Consumer perception, engagement, contentment, and purchasing behaviour are all measured. The findings are evaluated, and insights into the possible benefits and limitations of commercializing cognitive aid systems using AR will be presented.

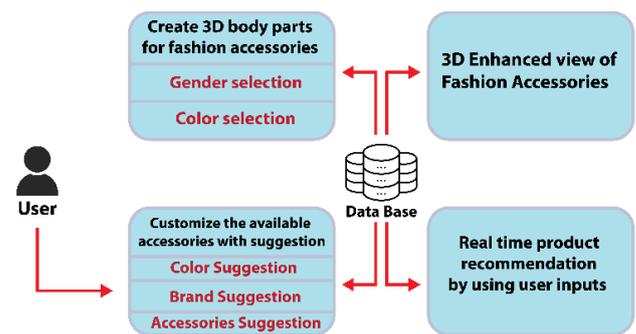


Figure 1: System Architecture

#### A) Integration of augmented reality and machine learning impact the virtual try-out experience in the fashion accessories industry, and how does it affect consumer perception, user experience

The methodology for this research entails a comprehensive and structured approach to address the identified gaps in the virtual try-on experiences for fashion accessories. Firstly, a thorough literature review will be conducted to gather insights into the current state of technology integration in the fashion industry and the existing challenges faced by customers in online accessory shopping. Subsequently, a mixed-methods approach will be employed to collect both quantitative and qualitative data. A dataset comprising a diverse range of fashion accessories and their characteristics will be curated. Machine learning algorithms will then be trained on this dataset to simulate the deformation and movement of accessories on a virtual platform, aiming to enhance the realism of the virtual try-on experience.

To integrate natural language processing, a text corpus of customer reviews, preferences, and queries related to fashion accessories will be compiled. NLP techniques will be utilized to analyze and extract meaningful insights from this corpus, enabling the development of accurate personalized product recommendations and facilitating customer interaction through natural language in the virtual try-on process.

Incorporating 3D modeling and enhanced view techniques will involve the creation of high-fidelity 3D models of fashion accessories. Multiple cameras will be strategically positioned to capture the customer's body and the accessory from various angles, enriching the virtual try-on experience. Augmented reality and image processing technologies will also be integrated to further immerse customers in an interactive shopping experience, bridging the gap between virtual and physical shopping.

The developed solution will be rigorously evaluated through user testing and feedback collection. A diverse group of participants will be engaged in virtual try-on sessions, and their interactions and perceptions will be recorded and analyzed. This iterative process will allow for refinements and improvements to the solution based on real-world user experiences.

### **B) Integration of 3D modeling and enhanced view techniques in augmented reality technology enhance the customer experience for fashion accessories in terms of visual realism, interactive engagement, and purchase decision-making**

Data Collection and data processing segments, Collect a dataset of 2D images of fashion accessories from various sources, such as e-commerce websites, social media platforms, and fashion blogs. Also, collect manually created 3D models of fashion accessories and preprocess the collected data to ensure its quality, uniformity, and compatibility with the selected algorithms and technologies. Convert the 2D images into a format suitable for 3D modeling, such as point clouds or meshes. For the 2D to 3D Conversion, use a suitable algorithm to convert the 2D images into 3D models, preferred algorithm is the pytorch3d algorithm [5], which uses deep neural networks to reconstruct 3D objects from 2D images. Another option is the Shape from Shading algorithm, which uses lighting information to infer the shape of the object and also Creating manual 3D models of fashion accessories using 3D modeling software such as Blender, Maya, or 3D Studio Max. Ensure that the models are of high quality and include all the relevant details. To Build an Enhanced View Creation, use a suitable algorithm to create an enhanced view of the fashion accessories. A suitable algorithm is the Deep Image Prior algorithm [6], which uses deep learning to enhance the details

and features of the 3D models. Evaluate the quality and accuracy of the generated 3D models and enhanced views. Use suitable metrics such as mean squared error, peak signal-to-noise ratio, or structural similarity index to compare the generated models and views with the ground truth. As Final step Deploy the system in a suitable environment, such as a web application or a mobile app, to provide users with an interactive and immersive experience of fashion accessories.

### **C) A personalized product recommendation system based on individual user preferences and styling suggestions**

Making precise and individualized product recommendations for fashion accessories requires the use of machine learning algorithms to examine client data. You can take the following actions to improve your experience when purchasing fashion accessories online:

Collect data on customer behavior and other relevant information such as location, age, and gender. Users can input data from the user profile. Clean and process the data to remove any irrelevant or inconsistent data points and prepare it for analysis.

Extract meaningful features from the data, such as user preferences and style, to build a personalized recommendation system. For the proposed solution, a suitable machine learning algorithm would be a recommendation system based on collaborative filtering and content-based filtering (Hybrid filtering). Collaborative filtering is a technique that recommends products to customers based on their past behavior and preferences. Content-based filtering, on the other hand, recommends products based on their features and attributes. Both techniques can be used in combination to provide personalized product recommendations to customers. Train the algorithm on the pre-processed and engineered data using techniques such as cross-validation to ensure the accuracy and reliability of the model.

Use the trained model to generate personalized product recommendations based on the user's preferences and style. Integrate the recommendation engine with the e-commerce platform to enable real-time product recommendations to users while they are browsing and shopping. [9]

These procedures can be used to create a tailored and precise product recommendation engine that will improve the online shopping experience for fashion accessories and aid in boosting client loyalty. Various machine learning algorithms can be applied to create accurate and individualized product suggestions for fashion accessories. The hybrid ML algorithm is one of the most famous algorithms for this purpose, nevertheless. Create a hybrid machine learning system that incorporates the advantages of many recommendation

methods, including collaborative filtering and content-based filtering. While content-based filtering makes recommendations based on an item's qualities and attributes, collaborative filtering examines user activity to identify comparable people. The hybrid strategy can use the benefits of the two approaches to get around their drawbacks and enhance the precision of recommendations.

**D) Advanced rendering techniques be effectively utilized to achieve realistic appearance and behavior simulation of fashion accessories in an augmented reality (AR) virtual try-on system**

The suggested methodology seeks to enhance the precision and realism of augmented reality (AR) applications for fashion accessories in real-world settings while accounting for the limits of mobile AR devices and the variety of lighting conditions. This method uses a hybrid tracking strategy that combines marker-based and marker less tracking, low-power optimization, and machine learning to increase tracking accuracy. [10]

*Hybrid Tracking:*

Properly track the location and orientation of the fashion items in real-time using a hybrid tracking approach that blends marker-based and marker-less tracking. Using predefined markers, such as fiducial markers or QR codes, to track the location and orientation of the fashion items is known as marker-based tracking. Marker-less tracking is the process of detecting and following fashion accessories using computer vision techniques without the aid of pre-established markers. The suggested method can maximize the advantages of each strategy while reducing its drawbacks by combining the two.

*Marker-Based Tracking:*

The use of marker-based tracking provides a methodical and trustworthy way to precisely track the whereabouts and orientation of fashion items. As reference points for tracking, fiducial markers or QR codes put in strategic locations on the accessories are used. Even under difficult illumination conditions, this technique offers a strong foundation for keeping precise spatial information.

*Marker-Less Tracking:*

Marker-less tracking adds a dynamic component to the process, completing the marker-based approach. This method enables the recognition and tracking of fashion accessories without relying on physical marks by utilizing powerful computer vision techniques. This feature enables the AR system to adapt to a wide range of accessories and circumstances, increasing flexibility and realism.

**IV. RESULTS AND DISCUSSIONS**

Sri Lanka's fashion accessories market integrates cognitive support systems and AR technology for enhanced customer experience, decision-making, and business growth, highlighting the influence of machine learning and AR technologies.

Integrating AR-based cognitive aid technologies enhances the customer experience by providing immersive virtual try-on experiences, reducing disappointment risk, and boosting engagement. Studies show these experiences boost conversion rates and lower return rates, instilling confidence and excitement in customers and ultimately influencing purchasing decisions.

This research addresses customer issues in Sri Lanka by offering a mobile application for users to wear and customize their preferred fashion accessories. Users can provide measurements and preferences, and the app is available for purchase upon completion. This contributes significantly to the Sri Lankan e-commerce platform.



Figure 2: AR Visualization Experiences

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Accuracy: 75.00%
Accuracy: 75.00%
Confusion Matrix:
[[2 1]
 [0 1]]
Classification Report:
      precision    recall  f1-score   support

     0       1.00      0.67      0.80         3
     1       0.50      1.00      0.67         1

 accuracy         0.75
 macro avg        0.75      0.83      0.73         4
 weighted avg     0.88      0.75      0.77         4
  
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Figure 3: Screenshot of highest accurate algorithm result (NLP)

## V. CONCLUSION AND FUTURE WORKS

The purpose of the research was to provide better solutions to E-commerce shoppers, out of the shoppers in Sri Lanka. This research was mainly focused on fashion accessories. The probability of a shopper getting unsatisfied is much higher compared to the other purchases. The main reasons were size issues, and preference issues to address these problems, the users are provided with wearing and purchasing the fashion accessories virtually, which will save time and other additional costs. This system allows the users to select the preferred fashion accessories from the mobile application and wear it virtually, the user can give the measurements of the user and wear them. In addition to that, the user is also possible to customize the accessories according to the user's preferences, which will be available for purchase once the item is ready after customization. The user is also suggested other accessories depending on the size and selection of the fashion accessories. Therefore, this research addresses many problems faced by customers around Sri Lanka. This research can be considered as a major contributor to the E-commerce in Sri Lankan market platform.

## REFERENCES

- [1] H. Y. H. C. C. Y. W. K. Y. Cheng Y. H., "Augmented reality, virtual reality, and customer purchase behavior," *Journal of Business Research*, 2020.
- [2] C. K. P. Keating A, "Cognitive AI assistants: The evolving role of artificial intelligence in business contexts," *Journal of Business Research.*, 2021.
- [3] H. P... T. Bollmann A, " Augmented reality in the fashion industry: Effects on consumer novelty-seeking behavior and purchase intention.," *International Journal of Retail & Distribution Management*, 2019.
- [4] X. L. L. T. P. Wang,D, "Combining technology acceptance model and expectation confirmation model to explore tourists' e-satisfaction and e-loyalty to mobile hotel booking websites," *International Journal of Hospitality Management.*, 2018.
- [5] Z. H. W. T. L. Y. Wang Y, "Enhancing customer experience in fashion retailing using virtual reality and augmented reality technologies: An empirical investigation," *Journal of Retailing and Consumer Services.*, 2020.
- [6] X. P. L. L. D. W. Xu X., "Personalized recommendations with explainable reasons in fashion e-commerce.," *Electronic Commerce Research and Applications*, 2019.
- [7] Y. Zheng, "Personalized recommendation algorithms for clothing e-commerce: State of the art and future directions," *Electronic Commerce Research and Applications*, 2022.
- [8] B. J. Z... Wu. S., "personalized recommendation in fashion e-commerce: A comprehensive survey," *Electronic Commerce Research and Applications*, 2021.
- [9] S. P. Sruthi. K, "Influence of Consumer Decisions by Recommendar," *International Conference on Decision Aid Sciences and Applications*, 2022.
- [10] S. T..... Ali .S, challenges and future directions, 2021.

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