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Prospects of Augmented Reality in Physical Stores's using Shopping Assistance App

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Abstract

This paper discusses about the enhancement of shopping behavior through mobile application as a personal assistant for the shopper's in a physical retail outlet by giving various information regarding the products, offers, discounts when they scan a product through mobile. The mobile app uses augmented reality added with in-store GPS technology to track the movements of the shoppers and analyze the buying behavior and shopping pattern. The target design of the conceptual framework is for large in store retail setup like for.eg, hyper market, shopping mall and supermarket.

Keywords: augmented reality.

1. Introduction

In recent years, the application of augmented reality in retail stores enhanced the experience of the users and became a topic of interest for several researchers in the marketing domain. Further, Augmented Reality has openings in areas like advertising, marketing, e-commerce and shopping malls to a greater extent [1]. Augmented Reality and Virtual Reality in Physical and Online Retailing: A Review, Synthesis and Research Agenda. Found that shoppers experience in a physical retail store can be enhanced through Augmented Reality (AR) and Virtual Reality (VR) by introducing AR and VR applications in a retail environment. The data gathered through such forms can be analyzed to streamline marketing decisions. With the help of in store navigation the customers can be navigated from their current location to the nearest place based on their product choice. Amirian, et al, 2016 uses AR for navigating users from their current location to the nearest landmark available [2]. The technological advancements both in hardware and software of the mobile phones have made it possible to use augmented reality in the detection of the user in store location and providing them various information needed based on their preferences [3].

Yim, et al, 2017 Wang, et al, 2015 have evaluated AR and conventional online web-based shopping experiences and found out that, AR tools in e-commerce has effectively initiated a positive attitude towards the purchase of products like sunglasses and watches online [4] [5]. Cosmetic companies like Sephora and L'Oréal use augmented reality mirror for customers to try virtual makeup, IKEA uses AR for its customers to choose among a wide range of furniture available saving inventory and display cost to a greater extent. Adidas too came up with AR mirror that enables customers to try on their garments virtually. Further games like Pokémon Go also uses AR digital graphics to a more significant extent. Rese, et al, 2017points out that application like Snap chat and the Instagram app using augmented imagery adds filters to the captured image of the users by implementing a wide range of filter effects to choose from [6]. Erra, et alcreated an augmented reality dressing room using skeleton mapping allowing users to move with the virtual clothing freely [7].

Welivita, et al developed an augmented reality application that uses face detection, face tracking and head pose estimation techniques. Their techniques are used to try fashion products like eyeglasses through mobile phones virtually. This improves the online shopping experience and helps in the decision making of users in purchasing the product as they can virtually try the product before the actual purchase [8].

The online industry has witnessed a significant technological change in recent years; companies like lenskart to facilitate their users provides augmented imagery to virtually try on glasses, Tim Hilken, et al, 2017 states AR has an enormous potential in enhancing the online service experience by improving the utilitarian and hedonic values [9], Çadirci, et al found that AR eliminates the risks of online shopping experience by providing real-time imagery [10] . The point of sales decision making is gradually increased using AR.

Cheng, et al presented mixed reality shopping using augmented retail products, the users could make use of both physical and virtual augmented recommendations providing additional information with the use of VR box [11].

2. Conceptual framework

AR is widely used in various aspects of retailing. The prior research works limits itself in enhancing the user experience, and the same is the case with In-store GPS tracking systems. The GPS tracking system defines itself in locating a particular person or a product inside a building. This research suggests combining in-store navigation using AR and dynamic capability of the app by catering to the needs of the customers and acts as a personalized shopping assistant.

The mobile application assists the shoppers by navigating them to the list of products that the user wants to locate for e.g., in a shopping mall, with the use of in-store GPS that uses wifi, RFID, INS and AR image capturing technologies [12] [13][14][15] ,In the form of augmented imagery, shoppers can also scan a particular product or an entire rack using their mobile camera and can get various information like the specifications of the products, multiple promotional offers available. The shopper's experience is enhanced because they can make use of both physical store experience combined with e-assistance on a real-time basis. Scholz, et al, 2018 defines that augmented reality is quite different from virtual reality. In virtual reality, there is no interaction with the real world [16]. Whereas in augmented reality, the real world view is enhanced with augmentations, which has a vital role in mobile marketing, motivating the shopper's purchase decision and reshaping the experience of the shoppers.

Takacs, et al research determines the exact user's location using augmented reality systems for mobile phones that compares the camera image and matches them with the database [12]. The augmented reality helps in providing additional information to the viewer apart from the real-time viewing experience. Display of the mobile application is a real-time image with an added digital virtual imagery obtained from the camera. The unwanted things that are captured by the camera are neglected focusing mainly on the product the shopper's scans using the mobile application. In addition to this context from the retailer point of view, the retailer could analyze the movement of the

shoppers through in- store GPS tracking when the shopper uses the mobile application in that particular store. The mobile application is dynamic in nature that can be modified to make it more interacting and useful for the shoppers.

Höllerer, et al States that Researches in the e-commerce field are thriving to find out ways to provide handy and secure assistance for the shoppers in a retail setup which can manage various tasks like giving information regarding the offers concerning a particular product, promotions, shopping lists and in-store navigation for the shoppers [17]. This mobile application acts as a personalized shopping assistant for the shoppers, Zhu, et al researchers like has created a promo pad device that provides in-store virtual experience with augmented reality visualization [18], Luley, et al used a similar technique of AR for the tourist by providing additional information with the image they captured in a particular tourist site [19] [20].

This application provides automated shopping aid that can make the shopping experience even more interacting and comfortable, yet another added advantage of this application is that the exact location of the user can be monitored and their shopping patterns can be analyzed. This helps in the formulation of in-store branding and promotional activities according to the taste and preferences of the shoppers since the information gained through the mobile application is unbiased.

2.1. The shopping assistance app

The shopping assistance app with the use of augmented reality provides a 3D virtual image of a product. In this design, the front display of the mobile phone is an output, and the mobile camera is the input as it captures the image and scans the products captured [21]. The application also provides shoppers to scan the entire shelf and through pop-ups of various products which has offers can be displayed using augmented reality as the captured image is sent to the retailer's database [19]. Available information regarding the product is collected, filtered according to their preferences, profile and displayed to shoppers mobile display. Studies mention that the interfaces that use AR were able to increase the consumer's engagement factor in a more efficient way than the traditional interface. Their brand attitude is influenced positively, which leads to sales increases in due course of time [22].

This design aims to provide assistance to shoppers according to their preferences and minimize seeking help from staff in a particular outlet. This application offers different information for shoppers in different situations. For the shoppers who have a list of things predetermined they want to buy, the shopping assistance app provides in-store navigation for the products that the shopper has in the list by saving time from wandering and finding their desired product quickly similar to the research done by [23].

The application helps shoppers who are seeking clearance sales, offers, and discounts to find various products that are available according to their preferences. Shoppers who tend to do window shopping seek additional information regarding a particular product apart from the details provided in the package is offered through augmented imagery. For example, if a shopper scans chocolate through the camera, the application recognizes the product and displays an ad for that product and provides exclusive offers available for that particular product.

Abed, et al research work concludes that the dynamic nature of the application dramatically enhances the shopping experiences according to the convenience of the shoppers as the majority of shopping purchases in a supermarket is impulse purchases [24]. Even a little assistance can improve marketing to a greater extent, which results in sales.

2.2. In-store tracking

Using in-store GPS tracking systems, the exact location of the shopper is identified, and it navigates him to the products/department he is searching and displays him the shortest route for the desired product or department. At the

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same time, the exact location of the consumer can be tracked and monitored. His shopping patterns can be obtained when the shopper is using the application for in-store navigation, scanning a particular product or an entire shelf to know offers available relating to that product in the store. Various researchers have explored the use of in-store GPS using ultrasonic, RFID [15] , infrared, augmented reality imagery [12] and vision-based technologies [14] to achieve location-awareness , for e.g., Amirian, et al (2016) uses augmented reality for landmark-based pedestrian navigation [2]. Through this, the shopper's pattern of movement can be analyzed. The product display patterns can be modified according to the gathered shopping patterns of every shopper. Observed results help in the product placing and display. Display strategies can be modified to meet shoppers taste and preferences.

2.3. Dynamic contextualization in the mobile app

Lazaris, et al states that virtually modifying the focal entity's context information for the users by the system administrators is called dynamic contextualization [25]. While the term dynamic contextualization is a strategy followed in the business environment in which the retailers virtually change in product settings, place or remove any complementary product or competing for product respectively and this attracts the numbers of people in the shopping zone.

The process of augmented reality technologies tends to re-develop the perception of shoppers that they experience in the real world in real time. The concept of augmented reality is a technology driven human-computer interaction, which ultimately improves human performance in actual time usage. Erra, et al test showed a statistical significance that improves the operational performance in instructing assemble tasks using Augmented reality [7]. Luley, et al for example developed a system which guides and offers personalized tours for archaeological sites Sweeney, et al and cultural heritage [19]. It works to improve information presentation, reproduce ancient environment, and recover destroyed sites. Tscheu, et al, Sweeney, et al quotes that , In the recent scenario, augmented reality occupies significant importance among application domains [26][27].

2.4. Applications

In a shopping environment, the consumer must understand the application of technology to track the needful items he/she need. In turn the details about the consumer [19] and product can be acquired by the people in-store tracking system [12].

The profile of user termed as user context includes data as brands preferred by the consumer in buying history. The detail also contains the interest of individual towards the products and aggregate the behavior based on his/her shopping experience, habits and demographic differences. While checking out after purchase, consumer details are recorded in the store membership database [28].At present, we can see storage of consumer database is an everyday activity in all kinds of retail stores which include a membership card, loyalty cards and the shreds of evidence that many consumers utilize these systems. The issue of loyalty cards and membership cards to the consumer will make them feel as they are part of the store, which may lead to visit the store as often they can. The consumers will be informed about the preferences they have towards the product. The technology-driven system tends to know the consumer's shopping pattern, and furthermore, the brand or product preferences.

Product information to consumer related to its complementary product information is associated with the focal product or the product under inspection [11]. A complementary product is a product that is closely related and enjoys an associative relationship with the focal product. While connecting with the additional product with the focal product, its image or symbol, the consumer preference towards the focal product can be influenced.

Functional complementary products are such that, consumed simultaneously to acquire some operational relationship. For instance, badminton club can be functionally complemented by balls, bag, shoes, etc [24]. Even in eatables when foods are served with ketchup, mustard and pepper powder adds value in the minds of consumers, and they tend to become loyal towards the retailer. Socio-cultural complementary products are a group of products that

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describe the consumption activity or product that takes place even when it has no inherent relationship with each other products which are grouped with some messages imbibed to communicate information to a group of people. For instance, t-shirts printed with some awareness content.

3. Conclusion

The shopping assistant app utilizes the augmented reality technologies to provide personalized advertising and in-store shopping assistance like in store navigation, customized product-specific information for the shoppers. This paper tends to study the implementation of augmented reality shopping behavior of consumers. The real-time modification of context, issue of loyalty cards tends to the usage of augmented reality in today's era. User privacy will be taken care, and the app will be able to predict the consumer's interest based on his/her previous shopping behavior. At the same time, it is more important to balance the tradeoff between automation and privacy to meet the needs of both retailers and consumers.

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