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Bridging the Gap: Exploring new ways to deliver online Grocery shopping using Smart Software

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Abstract—Its great convenience and the availability of delivery and pickup options, online grocery shopping has transformed the procurement of food and household goods. These platforms frequently outperform brick-and-mortar businesses in terms of product selection. Technology, such as mobile apps and websites, has played a critical role in this process by delivering user-friendly interfaces, personalized recommendations, and smooth transactions. Artificial intelligence and data analytics improve the shopping experience even further by personalizing options and streamlining inventory management for shops.However, there are significant hurdles to online grocery buying, including delivery problems, the need for strong cybersecurity, and worries about the environmental impact of packing and transportation. Despite these obstacles, the online grocery business continues to be a dynamic and exciting component of modern retail as technology evolves and customer behaviors change.

Keywords- Online grocery shopping; Artificial intelligence; Environmental; Customer behaviors.

I. INTRODUCTION

Online grocery shopping has become increasingly popular in recent years, and artificial intelligence (AI) is playing an increasingly important role in this industry.

AI can be used to improve the customer experience in a number of ways, such as by providing personalized recommendations, optimizing delivery routes, and reducing food waste. Online grocery stores have transformed the way we buy for daily necessities by providing a seamless platform for users to browse, select, and purchase, making shopping more personalized and efficient. Furthermore, efficient inventory management algorithms can optimize stock levels, assuring consistent product availability and minimizing waste. Furthermore, using real-time data analytics can help merchants anticipate demand trends and respond quickly to variations, guaranteeing a smooth and uninterrupted shopping experience for customers. Customers may explore a wide range of products, compare prices, read reviews, and place purchases from the comfort of their own homes with just a few clicks. This extraordinary level of convenience has saved many hours spent waiting in long lines. Physical supermarkets have become a lifeline for busy people, the aged, and those with limited mobility.

Numerous advances have already been adopted in online grocery stores, improving the client shopping experience. User-friendly interfaces and straightforward navigation make browsing through huge product catalogs simple, which are further enhanced by full product descriptions and photographs.

Secure payment gateways establish trust in shoppers by protecting their financial transactions. Efficient and dependable delivery methods ensure that orders are filled on time, with the added convenience of selecting preferred delivery time slots. These existing advancements have fostered a devoted client base, driving repeat purchases and cultivating brand loyalty. Smart software and technical advancementsare primed to propel online grocery shopping to new heights. A recommendation system powered by AI have the ability to transform personalized purchasing experiences. These algorithms can offer specialized product suggestions by studying user behavior, purchase history, and preferences, expediting the decision-making process for customers and boosting the likelihood of finding products they actually need or want. Furthermore, using intelligent inventory management systems helps improve stock levels,resulting in less waste and better supply chain management. Real-time data analytics will be critical in predicting demand trends, allowing retailers to anticipate spikes in purchases and manage inventories proactively. This predictivecapability enables more effective logistics planning, ensuring products are readily available during peak demand periods and reducing out-of-stock items. The collaboration of smart software and online grocery stores will continue torevolutionize the shopping experience, making it more convenient more tailored, efficient and smooth. Adopting these technical breakthroughs will surely impact the industry's future, giving exciting chances for growth and prosperity. Online grocery shopping will surely become a

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fundamental aspect of modern living as smart software continues to grow, catering.

II. LITERATURE SURVEY

A. *Convenience of online grocery system:*

Order accessibility since online grocery stores have potential to grow, retailers basically can use different strategies to penetrate different markets and market segments. One of the strategies is providing a wide range of product assortments. Online stores create value to their customers by offering customers to search and browse a specialized assortment or customized products. Online store easily becomes a specialty store to offer specific products and their target audience classified based on market segmentation and individual demands. Perceived order accessibility involves consumer's perception on the easiness to order the products via online grocer's sites [1]. In this case, online grocers have to find ways to solve the navigation problem. As mentioned the reducing number of online shoppers to purchase via online is due to the layout, design and navigation of the online grocery' websites. Online groceries have to equip with fast, flexible, convenient and easy-to-use-item search systems where customers can easily search what they want to buy Order fulfilment is one of the important key success factors when running online business to end users. Based on the study of understanding shopper's expectation on internet retailing, the most important and significant factor of shopper's expectation on online groceries is "time to place an order". In other words, online grocers have to ensure the speed of the webpage when placing an order via online. Besides that, "delivery time" is also another important attribute because the increase and decrease of the sales depends on the duration of delivery. The unique selling point of online business is the superior delivery system. So, the delivery should be flexible and fast to fulfil different kinds of customers and increase the operational efficiency.

B. *Perceived risk*

Perceived risk is determined by the consumer's perception of uncertainty and negative consequences when purchasing goods and services. Risk perception can be classified into several categories. However, perceived risk associated with online shopping can only be divided into four categories: privacy risk, security risk, product performance risk, and vendor risk.

Table 1.1 Categories of perceived risk

Categories of PerceivedRisk	Definition
Privacy risk	The degree of the online shoppers' feeling on whetherthey are secure and protected when they provide their personal information to the website
Securityrisk	The potential losses causedby the internet and related technologies.
Product performance risk	The possibility that the consumers received a particular product and servicewhich does not meet the consumer's expectation
Perceivedvendor risk	It involves the issue of consumers facing losses caused by virtual grocerystore

Consumer privacy is no longer a new concern in the world of electronic commerce. The degree to which online shoppers feel secure and protected when providing personal information to a website can be defined as privacy risk. When Internet users provide personal information to a website, they are always concerned that the information will be misused by unethical companies. If customers have a negative experience, Consumers will feel anxious and 29% will be hesitant to purchase online based on their previous experience. As Internet users, they normally expect companies to protect their personal information and privacy.

In recent years, technological advancements have increased the number of people who have access to the Internet, which has indirectly increased consumer privacy concerns in electronic commerce.

Online shopping, posting messages in forums, blogs, and bulletin boards, chat room discussions, email use, and participation in network community sites are typical cyberspace activities. Through these activities, a malicious person may be able to collect information from cyberspace directly or indirectly without the owner's knowledge. Because of the rapid changes in technology, consumers have resolved to become Internet users and adapt to the environment of electronic commerce. However, when it comes to online shopping, most consumers are still concerned about technology risks such as security [1][2]. Security is one of the technological risks that consumers face when purchasing groceries from virtual stores. Security is always a major concern among Internet users, whether they are purchasing or not. Most Internet users are concerned about online payment security, personal privacy, and the credibility of websites before purchasing products and services via the Internet [1][2][3]. In the consumers' minds, the security concerns consist of personal authentication and the exchange of the consumer's data and information between the consumers and web owners.

C. *Social factors*

Social factors are changes in consumer attitudes that occur both intentionally and unintentionally as a result of being influenced by others. Superiors, coworkers, relatives, and friends are the most common social groups. Consumers' purchasing behavior shifts from traditional to virtual stores are influenced by colleagues, family, and friends, as well as advertisement exposure and accidental browsing across interesting commercial websites.

Consumers are influenced to try new shopping channels by the opinions, recommendations, and shopping experiences provided by reference groups such as family, friends, or colleagues. Reference groups not only communicate and recommend to their colleagues, family, and friends, but they also persuade them to use online virtual stores [4]. To create

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awareness, persuasion, repurchase, and loyalty on specific virtual stores or products and services, online vendors must use appropriate communication tools. [3]. Proper communication tools are essential for facilitating communication between online vendors and targeted customers. The ability of a product to be noticed and promoted to consumers via formal and informal networks is referred to as communicability. In contrast, communicability can be defined as the degree of "social acceptance" with which information can be spread from one consumer to another.

Attitude towards online grocery shopping

We investigate the relationship between attitude toward online grocery shopping and future online grocery purchasing intention in this study. Buying intention measures have been widely used to investigate purchasing preferences for specific products over specific time periods [1]. Consumers who report an intention or lack of intention to purchase specific products generally have an impact on the level of buying rates. The theory of reasoned action is applicable to consumer behavior in which the behavioral intention is significantly influenced by the attitude toward that behavior (i.e., the general feeling of favorability or disfavor ability for that behavior) and "subjective norm" (i.e., the perceived opinion of other people in relation to the behavior in question). According to the theory of reasoned action, people adopt attitudes based on the basis of their beliefs (perceptions and knowledge) about certain objects. That is, a person's overall attitudes toward a particular object may be derived from his or her beliefs. Individual lifestyle influences consumer purchasing behavior by combining external and internal factors. External factors include demographic, economic, social, and situational factors, as well as technological factors [2]. Beliefs and attitudes, learning, motives and needs, personality, perception, and values are examples of internal factors. Consumer purchasing preferences are classified as internal factors because they involve the purchaser's purchase motivation and preference. The researcher also believes that if consumers perceive benefits and their needs and desires are met, they will have a positive attitude toward online shopping. As a result, consumers' attitudes toward online grocery shopping may influence their future online grocery purchasing intentions, and we hypothesize that attitudes toward online grocery shopping will positively influence future online grocery purchasing intentions.

III. METHODOLOGY

Before designing the actual Database,implementation of LLM model can beimplemented by,

1. Select an LLM model.
There are several LLM models available, including Bard, GPT-3, and LaMDA. You must select a model that is well-suited to the task ofrecommending ingredients based on a user's cart.

2. Develop the LLM model.
After selecting an LLM model, you must train it on a dataset of recipes andgrocery lists. This will assist the modelin learning how to associate ingredientswith various dishes.

3. Developing the Backend:

a. Create two MySQL databases: one for user registration data (for example, "user data") and one for login credentials (for example, "login data").

4. Database Safety:
To prevent SQL injection attacks, use prepared statements and parameterizedqueries.
Use a strong hashing algorithm (e.g., bcrypt) and salting to securely store passwords.
Update and patch the database management system on a regular basis for security updates.

5. Session Administration:
Use PHP sessions to track user sessionsand securely store data.
For convenience, set a session timeout and remember user settings.

6. Handling Errors and Providing Feedback:
Make available Users should receiveclear and informative error messagesduring registration and login.
Record errors and attempted access for monitoring and security.

7. User Interface:
For both the registration and login forms, create a user-friendly interface with a responsive design.
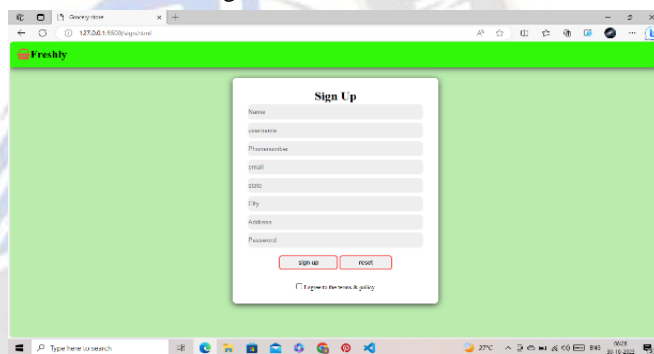During registration, include password strength requirements and validation messages.
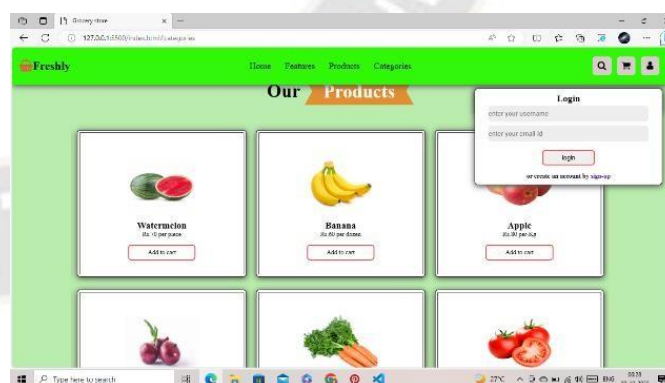

Fig1.0 Login Page

Fig1.1 User Interface

1. Testing:

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Test the registration and login processes thoroughly with various input scenarios.

Check for security flaws and ensure data integrity.

Documentation:

For future reference and maintenance, document the database schema, PHP code, and security measures.

2. Deployment:

Set up the online grocery store on a web server with the necessary security settings.

Constantly monitor the system and database for issues related to performance, security, and user interface

3. Choose an LLM model

When choosing an LLM model, you will need to consider the following factors:

a) **The size of the model:** Larger models are generally more capable, but they can also be more expensive to train and deploy.

b) **The type of model:** There are two main types of LLM models: generative models and discriminative models. Generative models are better at generating new text, while discriminative models are better at classifying text.

c) **The availability of training data**: You will need to find a dataset of recipes and grocery lists to train the LLM model. If you do not have access to a private dataset, you can use a public dataset such as the Recipe1M dataset.

d) Train the LLM model

Once you have chosen an LLM model, you will need to train it on a dataset of recipes and grocery lists. You can do this using a cloud-based service such as Google Cloud AI Platform or Amazon Sage Maker.

To train the LLM model, you will need to provide it with a set of inputs and outputs. The inputs will be the recipes and grocery lists from your dataset. The outputs will be the suggested ingredients for each recipe or grocery list.

Once the LLM model is trained, you can deploy it to your website backend.

With the help of LLM models we can implement a grocery website which can achieve these goals,

4. Personalized recommendations: AI can be used to analyze customer purchase history and browsing behavior to generate personalized product recommendations. This can help customers discover new products that they might be interested in and make shopping more efficient.

5. Optimized delivery routes: AI can be used to optimize delivery routes, taking into account factors such as traffic conditions, customer locations, and order volumes. This can help to reduce delivery costs and improve delivery times.

6. Reduced food waste: AI can be used to predict demand for individual products and optimize inventory levels. This can help to reduce food waste and save money.

7. Chatbots and virtual assistants: AI-powered chatbots and virtual assistants can be used to provide customer support, answer questions, and help customers with their orders. This can free up human customer service agents to focus on more complex issues.

IV. FUTURE SCOPE

As AI technology continues to develop, we can expect to see even more innovative and transformative applications in the online grocery industry. For example, AI could be used to: Develop autonomous grocery delivery vehicles.

Create virtual grocery stores that allow customers to shop using immersive technologies such as augmented reality and virtual reality.

Use AI to develop new food products and recipes that meet the specific needs of individual customers.

Overall, AI has the potential to make online grocery shopping more convenient, affordable, and sustainable for everyone involved. Many of us were unfamiliar with e-commerce until recently. The majority of us were wary of the idea. We couldn't put our faith in online shopping websites to provide high-quality goods and services. E-Commerce began to flourish over time as it gained popularity among the younger generation. However, because the coronavirus pandemic confined us all to our homes, it became impossible for us to physically go out and buy the things we desired [2][3][9]. I believe this is when the rest of the world began to experiment with e-commerce services. They realized that reputable online shopping websites offered a wide range of options as well as exceptional services. During the pandemic, the scope of e-commerce in India expanded [4][7]. This success could also be attributed to our generation's increased use of the internet. The increasing popularity of e-commerce websites can rightly be referred to as a "positive impact of covid-19 on e-commerce". One of the most significant advantages of e-commerce for businesses is the ability to sell products to a larger audience, regardless of their physical location. India's e-Commerce sector has grown rapidly. It is now bursting at the seams with job opportunities and service providers.

The internet allows commerce to take place between any two parties on the planet, regardless of their physical location. More connections indicate that there will be more markets to cover, which will result in more investors participating, which will result in more business. The ease of doing business online reduces the costs associated with running traditional businesses. Furthermore, it is the most practical method of conducting business. It is simple and quick to use. It also has the potential to eliminate the additional fees associated with a middleman by directly connecting the buyer and the supplier.

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People are increasingly using their mobile phones to make purchases rather than desktop computers because mobile phones are more convenient [4]. As a result, most e- commerce companies should concentrate on optimizing their websites for mobile use. Those who have not optimized their online businesses for mobile use are losing a large number of potential customers and sales.

Making your online store's website responsive is an important part of making it mobile-friendly. To be more specific, users should be able to observe and interact with the view's components without having to manually change the view itself. They do not need to resize their screen, scroll, zoom, or pan. Your website's components will format and reorganize themselves based on the screen size of the device being used to view the website. As a result, their user experience when shopping on your e- commerce website will be positive. Another aspect of mobile friendliness is the ability to synchronize content between your mobile and desktop sites. That is, a consumer's actions on your desktop site should be reflected on the mobile site, and vice versa. The mobile site, in particular, should be able to sync with the desktop site. If she adds some items to her cart on the desktop, the information should be updated.

When she accesses it on her mobile device. On this basis, it should be possible to have a consistent purchasing experience across all devices.

Since its inception three decades ago, e-Commerce has been rapidly evolving and expanding. More than 2 billion global digital buyers are expected to emerge and continue to multiply by 2022. That equates to nearly 27% of the world's population. With the impact of the pandemic and businesses shifting to the online forum, nearly 22% of global retail sales are expected to converge into e-Commerce platforms by 2023 due to their lower expenditure range [11]. Free delivery, reviews, discounts, accessibility, easy returns, loyalty points, feasible payment options with lower interest, and much more are all advantages of e-Commerce.

V. CONCLUSION

The internet has created numerous opportunities for conducting business online, with e-commerce being one of the most popular. Not only does it require little investment, but it is also a type of business that does not require a full-time commitment, especially if you only sell a few products. You simply create an online presence and promote the business using both free and paid methods. However, as with any business, it has both positive and negative aspects. If you want to be successful, you must develop an organized strategy based on realistic goals and a thorough market analysis.

Running a successful e-commerce business necessitates a great deal of consistency and dedication on your part. Always maintain a professional demeanor and use an approach that is consistent with your business objectives. The first part is where you focus on planning and establishing your online business. Aside from planning, which is one of the most important tasks,

you will also need to focus on website development, product page creation, and optimization, among other things. Before you make products and services available to customers, you must thoroughly test the website. You should pay special attention to testing integrations such as the checkout page and payment gateways. It is critical that everything on your website works properly because any loading error will most likely turn off potential customers. The second phase of work begins once the store is online, and it focuses on website maintenance, product promotion, and customer service. Consistency in approach is also required here because each social media post, newsletter, and ad represents your company and contributes to the public image you create for the business you run. You must be professional and dedicated to representing your company in the best possible way if you want to be taken seriously and build a respectable online business. After all, potential customers will scrutinize every online activity, and you don't want to give them any reason to doubt your credibility. E-Commerce is more than just transacting business over the Internet. Its impact will be far-reaching and far- reaching than we currently realize. This is due to the fact that the information technology revolution is occurring concurrently with other developments, particularly the globalization of business. The new era of global e-commerce is spawning an entirely new economy, which will profoundly alter our lives, reshape competition in various industries, and alter the global economy. As companies increase their profits, more and more other businesses develop their websites to increase their profits. Because more businesses are being conducted online, the economy is growing and a more innovative and advanced technology is emerging

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