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E-DUKAAN for Local Merchants

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Abstract— The technological revolution has proven to be a threat to business of all local retailers. Moreover, the COVID regulations which pushed buyers to choose online services over local merchants, have only made it more challenging for small enterprises to sustain in the market. Even after the COVID restrictions were reduced, local stores continue to suffer losses with minimal footfall as they could not offer their services online. This paper focuses on developing an application to address this issue. The application is primarily concerned with giving small, local sellers access to the advantages offered by major e-commerce oligopolies. A recommendation system will be included to increase sales. The recommendation system will be trained using the orders data from the application itself. The application gives customer access to local stores and offer pick-up or delivery alternatives at their homes. To make the app user-friendly, the consumer can browse through it using a variety of filters. Provide them with spending statistics. Since the customers already know their local merchants, it's easier for them to trust the quality of goods they will receive.

Keywords – Local Merchants, E-Commerce Application, Recommendation System, KNN.

I. INTRODUCTION

The goal of this project is to create an all-purpose e-commerce platform that will enable any type of retailer to have an online presence and sell their products. As a recognised and utilised business paradigm, e-commerce is quickly gaining ground. Applications that offer capabilities for conducting business over the Web are being implemented by more and more companies. It is reasonable to assume that shopping online is becoming more commonplace. Many supermarkets are racing to shift to e-commerce. Tata House has been in this space since 2011 with BigBasket; Reliance recently acquired many warehouses and supermarkets to launch JioMart; other notable players include Amazon, Flipkart, and Swiggy Instamart. Day by day, due to the improvement in logistics, the delivery times have gone down from 1-2 days to 15–30 minutes. E-commerce is currently a fast-growing sector. With so many big players involved in this industry, the local brick-and-mortar stores are finding it difficult to survive. Market giants like Amazon and Alibaba are providing a wide variety of products with low margins and amazing offers that local stores are not able to match. This is leading to anti-competitive market practices, which will backfire later. Therefore, it is vital for us to support local stores now. The Government of India has been working hard to improve the situation, however, makes it difficult to get a general solution for this problem.

To tackle this problem, the paper discusses a solution to provide the local retailers with an online presence, which is different from the usual business models for e-commerce. The objective of this project is to develop a general-purpose e-commerce application where any kind of store can have an online presence to sell their goods. The application will have various features for the shopkeepers to help with selling online. Customers will be able to browse through their local stores from the comfort of their own homes and be assured of the product's quality. Since they will know the store in person, a virtual store is a place on the Internet where clients can go through the inventory and choose various kinds of items. The chosen items could be put in a shopping cart by the customer. The goods in the shopping cart will be shown as an order when it is time to check out. At that point, more details will be required to finalise the purchase. The customer will be required to provide or choose a billing address, a shipping address, a shipment method, and payment information, such as an online payment option or cash on delivery.

II. LITERATURE SURVEY

A Survey of Recommender System Techniques and the E-commerce Domain by Imran Hossain, Md Aminul Haque Palash, Anika Tabassum Sejuty, Noor A Tanjim, MD Abdullah AL Nasim, Sarwar Saif, Abu Bokor Suraj: In this proposed recommendation method, ontology is used to design and describe the domain knowledge of the learner and training resources, while the sequential pattern mining algorithm discovers the learners' sequential learning habits. Using the learner's sequential access approach and ontological domain knowledge, this hybrid approach will overcome the problems of data sparsity and cold starts [1].

ORDSIM: Ordinal Regression for E-Commerce Query Similarity Prediction by Md. Ahsanul Kabir, Mohammad Al Hasan, Aritra Mandal, Daniel Tunkelang, Zhe Wu: This paper focuses to increase the monetization of e-commerce platforms. For this, it is crucial to predict high-level similarity more accurately than low-level similarity. This is because highly similar queries retrieve items in line with user intentions, whereas moderately similar queries retrieve related items that might not result in a purchase. Regression models perform poorly at predicting query similarity because they do not adjust their loss function to concentrate around the high-similarity band. It resolves the previously mentioned issue by viewing the prediction of the query as an ordinal regression problem and thereby suggest a model, ORDSIM (OR Dinal Regression for Similarity Prediction) [2].

A Graph-based Method for Session-based Recommendations by Marina Delianidi, Michail Salampasis, Konstantinos Diamantaras, Theodosios Siomos, Alkiviadis Katsalis, Iphigenia Karaveli: For the efficient operation of a system for session-based next-item recommendations, this paper presents a graph-based approach. The suggested method prepares the necessary data infrastructure for the recommendation algorithm to function without an excessive training phase by collecting data incrementally and continuously from an e-commerce website. The research aims to create a recommender system that strikes a balance between the need for efficient data processing and management and the usefulness of the recommendations generated [3].

Deep Learning-based Online Alternative Product Recommendations at Scale by Mingming Guo, Nian Yan, Xiquan Cui, San He Wu, Unaiza Ahsan, Rebecca West and Khalifeh Al Jadda: In this paper, it transforms the recommendation problem into a supervised product embedding learning process. To be more specific, it creates a deep learning-based embedding approach using Siamese Network that leverages both product content (including title and description) and customer behavior to generate Top-N recommendations for an anchor product [4].

A Comparison of Supervised Learning to Match Methods for Product Search by Fatemeh Sarvi, Nikos Voskarides, Lois Mooiman, Sebastian Schelter, Maarten de Rijke: They discuss using current learning to match algorithms for product search in this study. In a product search environment, they compare these approaches' potency and efficiency. 50,000 queries each in two product search datasets are used to evaluate their performance. One is a free dataset that was made accessible as part of a community benchmarking initiative at CIKM 2016. The other is a private query log that was taken from an online store in Europe. To better appreciate the trade-offs involved in selecting a preferred model for this task, this comparison is being made [5].

Transformers with multi-modal features and post-fusion context for e-commerce session-based recommendation by Gabriel de Souza P. Moreira, Sara Rabhi, Ronay Ak, Md Yasin Kabir, Even Oldridge: For the efficient operation of a system for session-based next-item recommendations, the paper presents a graph-based approach. The suggested method prepares the necessary data infrastructure for the recommendation algorithm to function without an excessive training phase by collecting data incrementally and continuously from an e-commerce website. This research aims to create a recommender system that strikes a balance between the need for efficient data processing and management and the usefulness of the recommendations generated. A prototype of such a system is implemented using the Neo4j graph database. Furthermore, the paper reports on experiments using a graph-based approach and other innovative machine learning and deep learning techniques while using an industry dataset that represents a typical session-based e-commerce scenario [6].

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Deep Learning-based Online Alternative Product Recommendations at Scale by Mingming Guo, Nian Yan, Xiquan Cui, San He Wu, Unaiza Ahsan, Rebecca West and Khalifeh Al Jadda: In this paper, we transform the recommendation problem into a supervised product embedding learning process. To be more specific, we create a deep learning-based embedding approach using Siamese Network that leverages both product content (including title and description) and customer behaviour to generate Top-N recommendations for an anchor product [8].

A Retail Product Categorisation Dataset by Febin Sebastian Elayanithottathil and Janis Keuper: In this context, the identification of equivalent products is a common sub-task, which can be utilized in the implementation of recommendation systems, product search engines and internal supply logistics. Providing this data set, our goal is to boost the evaluation of machine learning methods for the prediction of the category of the retail products from tuples of images and descriptions [9].

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How to Grow a (Product) Tree Personalized Category Suggestions for e-Commerce Type-Ahead by Jacopo Tagliabue, Bingqing Yu, Marie Beaulieu : Leading digital retailers have been successfully encouraging their customers into certain category facets as early as in the type-ahead suggestions to balance precision and memory in the search page. In this study, they introduce SessionPath, a novel neural network model that enhances facet suggestions in two ways SessionPath can use session embeddings to provide scalable personalization and SessionPath predicts facets by explicitly producing a probability distribution at each node in the taxonomy path [10].

III. PROPOSED MODEL

To solve the problems faced by local stores, this paper focuses on developing some user-friendly applications through which the customers can interact with them. All the required data to run these applications will be stored in the cloud. Merchants can post information about their products to the application, and customers can access that information and place orders from various stores using a dedicated application. Customers will only see local stores, making it simpler for small businesses to deliver and less competitive for big businesses to dominate this market space.

The solution uses machine learning algorithms to improve sales by recommending suitable products from each store to the customers by analyzing the cloud database. These recommendations shall be updated frequently as the number of orders increases.

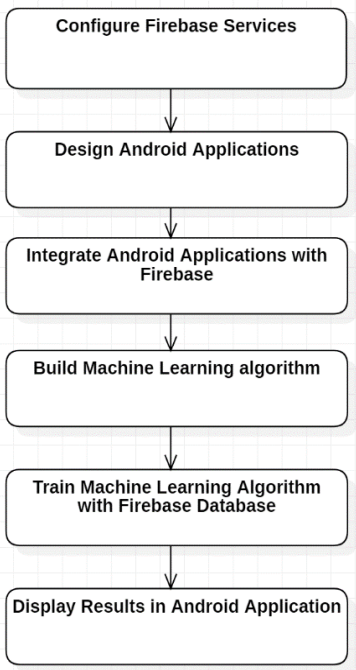

Figure 1

This paper implements the above system architecture.

IV. IMPLEMENTATION

This project's primary goal is to provide a platform for brick and motor stores a way to sell their products online. The implementation makes use of the following applications, modules, and services:

a) Firebase services: The data required by the applications and its security is handled by Firebase Authentication services and Firebase Realtime Database. It uses API calls from the application to communicate with the cloud services. Firebase Realtime Database uses NoSQL to store data in JSON format. All the required logic to authenticate users and store data is managed by the applications.

b) Merchant Application: It is an android application developed to help the merchant running his business online. The merchant can upload new items to his store along with images. He will be able to view orders on home screen and update their status for tracking.

c) Customer Application: It is an android application developed for the customer to browse through their local stores and place orders. The order history of the customer will be analyzed to provide recommendations in each shop he visits and update his spending analytics. The customer will be able to add items to his cart and confirm the order at the end. This application has been developed using Kotlin for backend and XML for frontend.

d) Recommendation System: A custom recommendation system is built, which recommends products to the user based on his profile data. If a new user logs in they'll be recommended products based on highest popularity index, and for the existing users the model recommends products based on user and item-based similarity index where in based on user's past history they're being matched to the other user's profiles with similar order history. The model implements collaborative filtering using KNN model as it was the most accurate model among few other algorithms when tested using cross-validation based on RSME and MAE metrics. The KNN model uses Euclidean metrics to calculate distance.

$$d(x, y) = \sqrt{\sum_{i=1}^{n}(x_i - y_i)^2}$$

e) Automation Module: It is a python Selenium program that helps in updating the database with recommendations for each customer.

f) Below figure 1 shows the interaction between all the applications, modules, and services.

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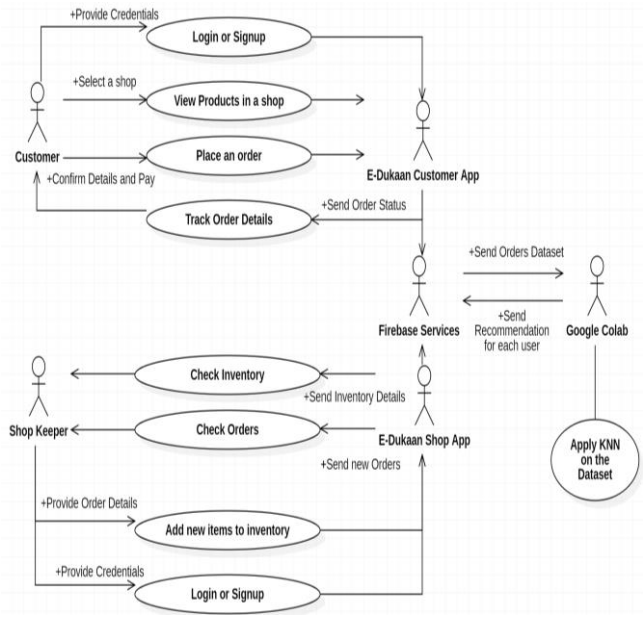
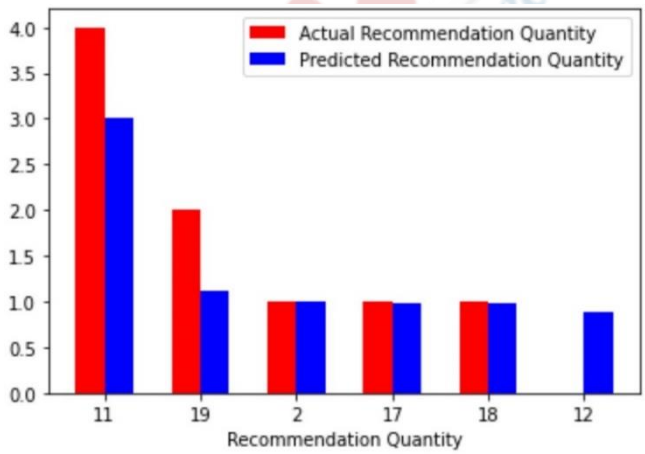


Figure 1

V. RESULT

For providing a competitive advantage to local merchants some applications have been built. With the help of these applications any store can have a digital footprint in very less time. Using the android applications, the merchants can upload their items to firebase database and the customers can view these from their application. Once the customer places an order, the merchant can view the order details and the required customer details. The customer can get recommendations by using his order history. The customer can view how much amount he is spending in each category in the analysis page. Users can also set up cloud stores so that the cost of maintenance is reduced drastically which can help them maintain competitive prices.

The below graph visualizes he comparison between the actual quantity to be recommended and the quantity that is recommended to the user by the recommendation system.



Graph 1

VI. CONCLUSION AND FUTURE SCOPE

Given that e-commerce is currently a rapidly expanding industry, an e-commerce platform is crucial for allowing a retailer to establish an online presence and sell their items. However, the local brick-and-mortar establishments are struggling to survive because there are so many powerful participants in this market. In order to solve this issue, A successful general-purpose e-commerce platform was developed that will allow any kind of merchant to have an online presence and sell their goods.

By incorporating a more complex model to improve performance, improving cold start recommendation, and adding a feature to auto-order on customer-specified intervals so that the application can place an order on the customer's behalf, the scope of this e-commerce platform can be expanded in the future to enhance its existing functionalities.

VII. ACKNOWLEDGMENT

We are grateful to Dr. Y. Krishna Bhargavi, our project guide, for her unwavering patience and guidance throughout our project work.

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