



# Implementation of Online Grocery Recommendation System by using Python Flask & Machine Learning

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**Abstract** :-Online services are most popular now days. Like others e- commerce services, online grocery service get benefit from recommendation system, when it comes to predict users purchasing behaviour. These particular situations have specific characteristics, such as repetition loyalty, it makes different from the standard recommendations. In this paper we present an efficient solution to calculate the next purchase cart recommendation under more general standard recommendation framework. We suggest a set of collaborative filtering based techniques that can capture user purchase patterns.

**Keywords**- Machine Learning, Collaborative Filtering Algorithm, Item Based Filtering, User Based Filtering, Content Based Recommendation.

## I. INTRODUCTION

Now a day's online grocery shopping become a very convenient way to shop. Because of 2019-20 Pandemic, as we know in the pandemic we are strictly follow the lock down rules and have to stay most of the time at the home, after that the online Shopping became very useful. Thanks to e-commerce for providing such a great opportunity to seller as well as buyer. Moreover, people can use not only computers but also various types of devices i.e. (smart phones and tablets) to surf websites, so as to do their shopping become easily as information technology advances recently. As a result, shopping groceries online becomes more and more popular.

In view of this, most online stores provide a shopping recommendation system for the users to facilitate online shopping. The core of such systems is a personalized recommendation algorithm. This algorithm models analyse user shopping behaviour and recommend items to the users while doing on-line purchasing. The system has to estimate user's preferences from their purchased histories and their purchasing behaviour. One of the useful techniques used to develop a recommendation algorithm is collaborative filtering. A critical component of a modern day e-commerce platform is a user-personalized system for serving recommendations. While there has been extensive academic research for recommendations in the general e-commerce setting, user personalization in the online groceries domain is still nascent. An important characteristic of online grocery shopping is that it is highly personal. Customers show both regularity in purchase types and purchase frequency, as well as exhibit specific preferences for product characteristics, such as brand affinity for milk or price sensitivity for wine. One important type of grocery recommender system is a within basket recommender, which suggests grocery items that go well with the items in a customer's shopping basket, such as milk with cereals or pasta with pasta sauce. In practice, customers often purchase groceries with a particular intent, such as for preparing a recipe or stocking up for daily necessities.

Therefore, a within-basket recommendation engine should needs to consider both item-to-item compatibility within a shopping basket as well as user-to-item affinity, to generate efficient product recommendations which are truly user-personalized Purchase of online grocery has been a boom in present life of people. As this should saves their time and energy of visiting supermarket and grocery vendors. Thus this online grocery has relieved people by providing access to all groceries and purchasing them just by sitting at home. These grocery items may account to hundreds and making a perfect

choice of selecting them may become difficult for the user. This is where Recommendation system comes into picture and plays a major role in sorting those items according to user needs. As a result online grocery purchasing has become more efficient and popular. Most of the e-commerce websites use recommendation systems. These recommendation systems work on specific algorithms. Most of the e-commerce companies have their own algorithms of generating recommendations of the items to the user. The concepts which are mostly used to develop recommendation systems are collaborative filtering and content based filtering. Both of these concepts use its own technique to provide recommendation to user. Nevertheless, these techniques may have limitations and disadvantages of their own. Therefore use of Hybrid recommendation system are preferred over the individual techniques. The use of such technique eliminates the limitations of individual algorithms and combines the advantages of these techniques to make one effective algorithm. In this paper we have included two effective algorithms for building recommendation system. The first being called as slope one algorithm which works on item to item collaborative filtering and the second called as min hash algorithm which generates result based on the user profile. Also a new concept of special basket has been introduced. This special basket contains all those essential items desired by a particular user. Take a case of mother and a nutritionist. A special basket can be made for mother in which she can have all the items needed for her baby or a nutritionist can make a special basket for health-conscious people. The idea is providing everything at one place thus making easy for user to search among thousands of items.

## Background

In this study, in the critical situations such as Covid-19 it is necessary to move towards the online shopping. Grocery is most essential thing in the regular life, and every month we should have to buy grocery. For this, we are going to implement a system which contains online grocery store with the help of recommendation system. In this system, with the help of collaborative filtering algorithm we should suggest the user most buying product or most ordered product from our system. Another thing is that, at the time of user registration we collect data from user regarding with name, email, address, etc. With the help of past buying history of user, we should suggest same product to another user from same area or same address.

## Relevance

With the help of this system, main relevance and motivation of this system is to give relevant and recommended grocery product to the user. This system should be used in the different systems like Amazon, Flipkart.

## Papert Undertaken

We started working on this system to implement online grocery system which helps to recommend user different products from most sell products on system and from past history of another users from same area, we should recommend relevant and same products to the user.

## Summery

A grocery store is a retail store that primarily sells food products. The Online Grocery System is the practical implementation of E-commerce for grocery goods. E-commerce (Electronic Commerce) is nothing but the selling or buying of goods and services online. As this should save their time and energy of visiting supermarkets and grocery vendors. Thus, this online grocery system has relieved people by providing access to all groceries and purchasing them by just sitting at home. The main objective of this e-commerce websites is to find out which products the customers might like to purchase based on his/her previous purchase history. A recommendation system also allows preparing more relevant personalized offers. Recommendations are used for making the work of the customer easier and faster. This reduces their valuable time and also the efforts. For this the recommendations given to the customer by this system is exact and fast.

Recommendation systems have been widely and fruitfully studied in recent years. The 2009 Netflix Prize collaborative filtering competition is the most famous of many studies examining the best way to recommend products and services to consumers. Grocery recommendations are a tougher nut to crack. Unlike Netflix, this has a limited number of movies and TV shows to credibly recommend, grocery shopping presents a challenge in its high sparsity. A grocery store stocks thousands of items, yet most people only buy a handful of them at a time. Analysis of this question has included methods like basket-sensitive random walks and SVD approximations to recommend items to consumers. Others have delved more into the theory, hoping to lay out a process that incorporates both product and user features into a recommendation process. A problem specific to our methods, uneven class label size in binary classification, has been studied as well. Work has been done in gauging the benefit of weighing to offset the class label skew, a method we utilize via Sci-kit's class weight argument. The results are not always promising or consistent, with at least one paper showing that improving classification scores on the underrepresented class comes at the expense of overall classification. Other work has acknowledged the difficulty in measuring correctness with class skew, recommending data and domain-specific approaches for evaluation. The inconclusiveness of research related to class label skew is reflected in a recent survey and even in our own findings.

## II. LITERATURE SURVEY

A. NOVA: Hybrid Book Recommendation Engine By Dharmendra Pathak, Sandeep Matharia And C. N. S. Murthy Chameli Devi School Of Engineering Indore, India: Here the main concepts of hybrid recommendation techniques have been extracted. It mainly describes combining the advantages of algorithms to form into one useful and effective

algorithms which gives an edge over its base algorithms .It helps to incorporate the information from metadata into recommendation algorithms. Content based inputs have been used from this paper. Content based generally consists the information about the user such as their interests, name, address, age etc. This helps a lot to improve the recommendation engine. This is done by providing more information about users interest and basic information about user which can be used by the recommendation engine to filter more items according to user interests. The accuracy and precision of hybrid system is more as compared to basic individual algorithms.

B. An Item-Based Collaborative Filtering Recommendation Algorithm Using Slope One Scheme Smoothing, Deji Zhang, Wenzhou Vocational And Technical College, Wenzhou 325035, China,2009: Collaborative filtering is one of the most important technologies in electronic commerce. With the development of recommender systems, the magnitudes of users and items grow rapidly, resulted in the extreme sparsity of user rating data set. Traditional similarity measure methods work poor in this situation, make the quality of recommendation system decreased dramatically. Poor quality is one major challenge in collaborative filtering recommender systems. Sparsity of user’s ratings is the major reason causing the poor quality. To address this issue, an item-based collaborative filtering recommendation algorithm using slope one scheme smoothing is presented. This approach predicts item ratings that users have not rated by the employ of slope one method, and then uses Pearson correlation similarity measurement to find the target items neighbours, lastly produces the recommendations. The experiments are made on a common data set using different recommender algorithms. The results show that the proposed approach can improve the accuracy of the collaborative filtering recommender system.

C. Similar Pair Identification Using Locality-Sensitive Hashing Technique, Kyung Mi Lee, Keon Myung Lee,2012: Huge volumes of data stored pose many opportunities and challenges in business and information sector. The similar pair identification problem happens in various fields such as image retrieval, near-duplicate document identification, plagiarism analysis, entity resolution, and so on. With the increasing number of items, it is not efficient to make pair-wise similarity comparisons. To handle this problem in an efficient way, various techniques have been developed. The locality-sensitive hashing is one of such techniques to avoid pair-wise comparisons in avoiding similar pairs. This paper introduces a modified method of the projection-based locality sensitive hashing technique. The proposed method reduces the chances that similar pairs fall into different buckets which is one of major drawbacks in the projection-based technique. We have observed that the proposed method outperforms the conventional projection-based method in that it gets better recall rate with some additional memory and computation costs.

D. Hybrid Recommender Systems, Vipul Vekariya and G.R. Kulkarni,2012: Recommender systems represent user preferred choices for the purpose of suggesting items to purchase or examine whether to buy or not. They have become basic required applications in e-commerce and information access, providing suggestions that effectively neglect large information spaces so that users are directed toward those items that best meet their needs and preferences. A variety of techniques have been proposed for performing recommendation, including content-based, collaborative, knowledge-based and other techniques. To improve performance and to enhance the results of all these methods have sometimes been combined in hybrid recommenders. Hybrid recommender systems combine two or more recommendation techniques to gain better performance with fewer of the drawbacks of any individual one. Most commonly, collaborative filtering is combined with some other technique in an attempt to avoid the ramp-up problem. Some of them are weighted, Switching. In these paper they made a hybrid recommender for Hostels and shown the difference between the normal and hybrid one. Due to these results it helped us to take the decision of making the hybrid recommendation.

### III. BLOCK DIAGRAM

Given below is the block diagram which showing the flow of online grocery recommendation system.

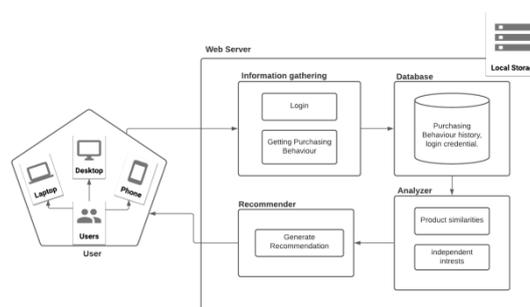


Fig 1. Block Diagram.

#### Block Diagram Description

In the given figure, figure showing block diagram for online grocery recommendation system.

In this system, user is connected with the system with the help of website which is designed by Python flask. Firstly user has to register the system using his credentials as name, email, password, address. The registered data should be stored in the MySQL database.

After registering to the system user can login to the system. When user logging in to the system user gets an recommendation on the basis of most buying product on the website. By fetching the address of the user, from the buying history of the persons belongs to users address area, system should recommend products and grocery to the user.

Further explanation is as follows

- Information gathering: In this part we are gathering the basic information of user i.e. Name, gender, age, occupation etc. With this we can track the browsing history of user as well as recording the purchasing behaviour of that user.
- Database: This part is to store all purchasing behaviour and purchase histories of a user.
- Analyzer: This part is to analyze database contents for obtaining product similarities, individual interests so with these details we can estimate user preferences. We use these user preferences to absolutely evaluate the needs of a user.
- Recommender: This part is to produce a recommendation list for a specific user according to the analysis result. The recommendation list shows the products which are most likely to be purchased.

#### IV. ADVANTAGES AND APPLICATIONS

- This system can be used by various devices e.g. PC, Smart Phone.
- Easy to access this system anywhere and anytime.
- Recommendation system can bring traffic to your site.
- Increase average order value.
- Customers being more engaged in the website when individual item recommendations are made.
- This system makes so convenient purchasing experience.

#### V. CONCLUSION

In this paper we are designing and developing a website for Online Grocery Shopping, and our main aspect is recommending the right product to the user and take their shopping experience next level, as well as we are also focusing to save their precious time. These are all things we are achieving by using,

- Tracking purchasing behaviour
- Viewing the product information
- adding product to shopping basket
- purchasing product
- Individual interests

By these details of user we are analysing and making a recommendation for user.

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