International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 05 | May - 2023 SJIF 2023: 8.176 ISSN: 2582-3930

# Review Based Tool Recommendation System for Industrial E-Commerce

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**Abstract -** Nowadays, e-commerce websites are at boom in India by making billions of revenues per year by providing online platform to sell and buy products to the customers. For all categorical product the separate e-commerce websites are now coming in the market. Like for the clothes separate e-commerce websites like the messo, myntra are present. But there is huge demand for the industrial tools in the market and still there are only few e-commerce website present on the internet for the industrial tools.
So, purpose of this paper is to fill the gap of industrial products in the Indian market and makes available a best e-commerce store for the users to help them to get any industrial product at their doorstep. E-commerce provides one of the largest and unique platforms where users can buy or sell products. We are using a rating-based recommendation system to build user engagement on the site and increase sales of industrial equipment. So that the next time the user lands on the site, he will find the most rated industrial equipment according to his interest. The main feature of this project is the rating-based recommendation system used in this website.
used in this website.

Key Words: Recommendation System, E-commerce, frontend, Machine Learning

## 1.INTRODUCTION

E-commerce offers one of the largest and unique platforms where people can start their online store and start selling their products online all over the world. It also provides the easiest way for the consumer to order the products online and have them delivered at their doorstep. Consumers buy products from these e-commerce websites and give reviews as their opinions about the products after using them. Consumer reviews, opinions, and product usage experiences are a powerful source of information about consumer preferences that can be used in recommender systems.

A recommendation system is a machine learning model that recommends the best products available based on a 's interests. It simplifies the 's selection process in such a way that the recommended products based on other 's reviews are the best. According to a report, popular e-commerce companies like Amazon, Flipkart etc. have increased their sales using recommendation systems. This system really helps in increasing sales. Earlier recommendations were based on product trends meaning that the product that was used the most was recommended to almost everyone. Later researchers discovered that user reviews can act as an important data source as input to recommendation systems. Therefore, both textual reviews as well as ratings can be used as input to provide the best prediction of products in a review-based recommendation system.

Food, daily life shopping, electronics, clothing and more. There are many e-commerce websites for these products, but very few websites related to the e-commerce industry. A big industry like mechanical equipment is growing rapidly every day and all the equipment sold is necessary for daily life needs. In this study, we will focus more on equipment related to the industry and how to create a good e-commerce website for industrial equipment. Therefore, it will be easy for customers and manufacturers to use the website to buy and sell products.

## 2.PROPOSED SYSTEM

The proposed system is provided with user rating dataset as a input. To recommend a product the collaborative filtering methodology is used. The rating data retrieve from the dataset. Cosine based similarity finding method have been used to find the similarity between two users by using rating given by the user to product.

## 1. Web Interface

User can login in with their credentials. The primary graphical user interface (GUI) for ecommerce site will be list of list of products, product filtering based on different categories and brands. In given website recommended products button is added. After clicking on the button user can see the recommended products based on collaborative filtering.

User can search the product by using keywords. So it is very useful for the users to see a required product. can see the all the details of the product with reviews and ratings given by the other users. User also able to add the multiple products into the cart with quantity of product.

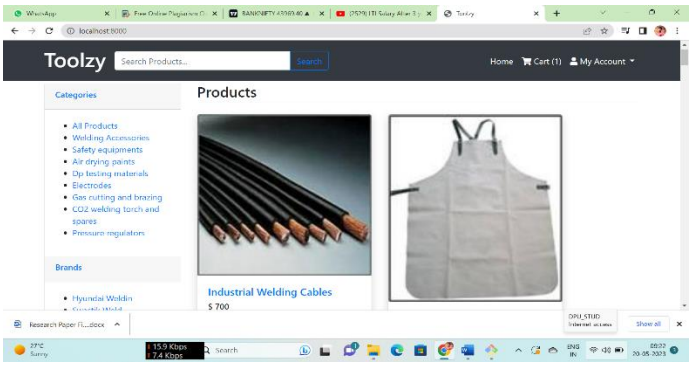


**Fig-1**: Home page

## 2. Admin Interface

In ecommerce site the admin interface is very critical in terms of data. Admin is solely responsible for the database management of the ecommerce site.

Admin can manage the users and admin also can appoint a user as staff member or super status. In staff member status user can log into the admin site and can see the database. In super status user can log into the admin site and user will have all the permission to change the database.

Admin also responsible for managing the orders created by user. Admin can change the status of order into In process, Shipped and delivered respectively. Admin can add the products , categories and brands in the database table. Also admin can see and delete the review and rating given by the users.

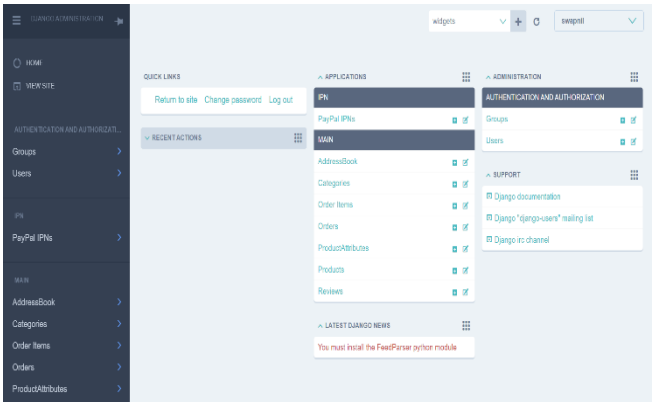


**Fig-2**: Admin page

## 3. Payment

For any ecommerce website the payment system is very much important so it will be very much easy method for seller and users. In given ecommerce system user can make the payment of ordered product using PayPal payment system.

The first step of payment integration in the website is we have to register as a business account on the PayPal sandbox. After creation of account in PayPal sandbox IPN has to be use. So IPN (Instant Payment Notification) is standard method used by retailers to track the transactions. An IPN (Instant Payment Notification) message represents payment success or failure.

for PayPal transaction In Django settings setup the PayPal receiver email where email will be of seller. So all the transactions will be in sellers email account connected to PayPal sandbox.

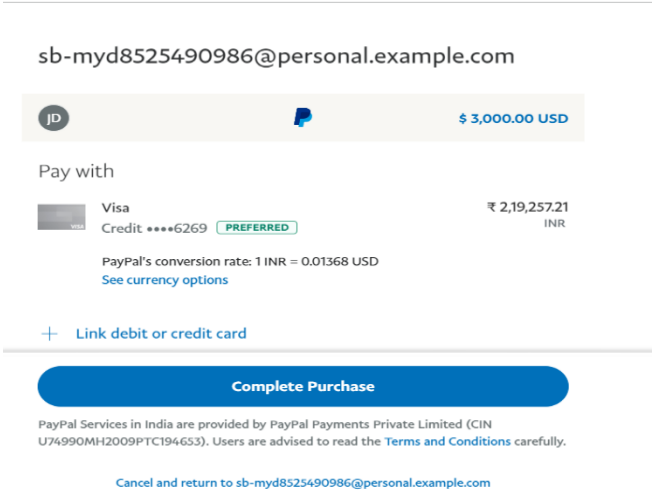


**Fig-3**: Payment page

### 4. Invoice

In a ecommerce site the invoice is the essential thing. So after successful purchase of order user must have the physical evidence of purchasing the products from the ecommerce site.

Efficient payment collection and invoice generation can improve the customer satisfaction. Also invoice generation builds the trust between the customer and seller. The most important benefit of invoice generations is it can be access anywhere from online. So online invoices keep the seller organized and they can manage the records of payments from the past or pending.

In a given research paper invoice system is implemented. After successfully completion of online payment customer will receives the invoice on the registered e-mail. Also in given proposed system customer can print the dynamic generated invoice in dashboard.

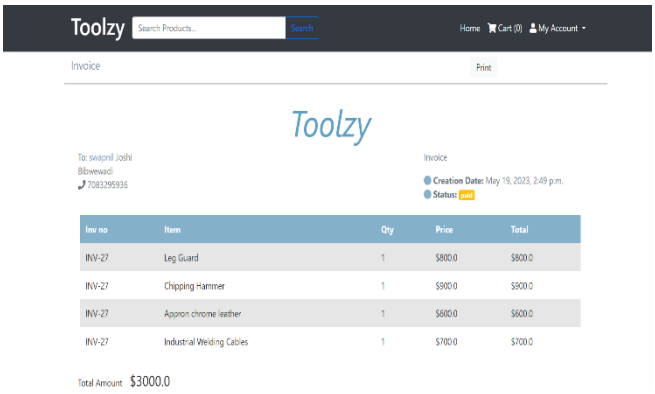


**Fig-4**: User Dashboard

### 5. Review and Rating

For ecommerce site the customer satisfaction is very much important. So in ecommerce site review and rating of product tells the seller which products are high demanding. Also reviews and rating helps other users to know product review and by the help of review customer can choose whether buy the product or not.

In a given website reviews and ratings has been added. After completion of successful order customer can give the rating in number and also can give review in textual format. In a given ecommerce site ratings are used for recommendation using collaborative filtering and cosine similarity.

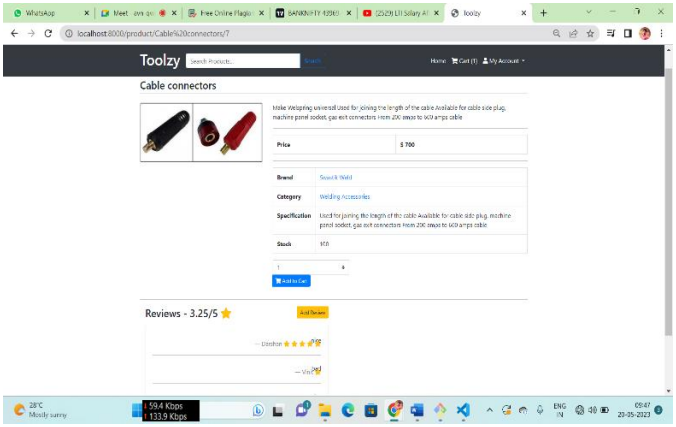


**Fig-5**: Product Details,Review and rating page

### 6. User Dashboard

In ecommerce site the information about users can be view in user dashboard also with information can able to edit the information about himself. So user dashboard is major component of any ecommerce website.

In user dashboard we have 4 main components which are profile, orders, reviews, address respectively. In profile section user can update his information e.g. name, email, name.

In orders section user can see ordered products with status of order and status of ordered payment as paid or unpaid. Also user can see the date and time of order. can print the dynamically generated invoice of particular order. In reviews section user can see the reviews given by himself to the products. In address section user also able to add multiple addresses.

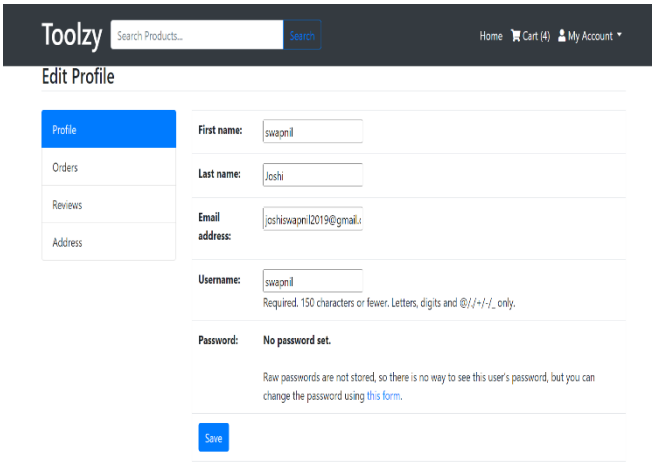


**Fig-6**: User Dashboard

## 7. Working of architecture

When user first visit the website user will be redirected to the home page. On home page user can see the different products. Also user can filter the products based on the different categories and brands. The search functionality is also given to the user so Customer can search the product by using keywords. also user can see the particular product with all product details and rating given to the product by other users.

For purchasing the product use must be logged in or has to create a new user account. After completion of authentication process user can view product details and can add product to cart. From cart user can checkout the product and pay for it using PayPal payment integration. will receive the order invoice on email and also user can print the invoice from use dashboard. After purchasing the product user can give the rating and review to a product. And also user will be able to see the status of the order. Based on the ratings given for the previous products we can also recommend new products to the user by using collaborative based filtering technique.

In admin site admin is responsible for the database management in admin area admin has all the rights to change the database.

In given website there are multiple database tables as, Product, Categories , Brands , Reviews , Orders. Admin manages the user and he can appoints the user as super user so can also able to see the database. Admin can adds the new categories, products , brands to existing database.

Admin Can see all the orders by using order database. Can change the order status as In Process, Delivered and shipped. Admin has also right to delete the rating given by the users for product.

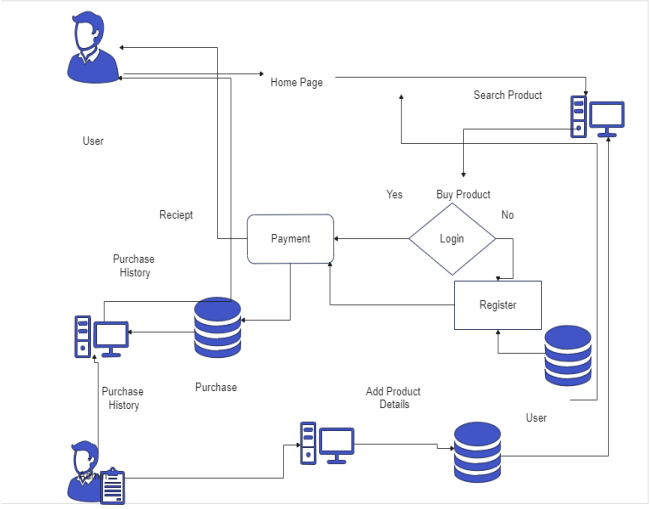


**Fig-7**: System Architecture

## 3.ALGORITHM & RELETED MATHEMATICS

### 1.Colaborative Filtering Technique

Collaborative filtering is a popular algorithmic approach used in recommender systems to predict user preferences based on the preferences of similar users.

Collaborative filtering approach is mainly classifying into two types such as memory based and model based. In this given research paper, we will be focusing on memory based collaborative filtering technique.

### 2.Memory Based Collaborative filtering

Memory based collaborative filtering is a popular recommendation algorithm used in various applications, such as movie or product recommendations, based on user preferences and similarities. The basic idea of collaborative filtering is to leverage the behavior and opinions of a group of users to make recommendations. It assumes that users who have similar tastes and preferences in the past will have similar preferences in the future. By identifying users who have liked or disliked similar items in the past, the algorithm can recommend items that similar users have liked but the current user has not yet encountered.

Following is the step-by-step representation of how memory based collaborative filtering works:

**2.1.Data Representation**: First, you need a dataset that captures user-item interactions or preferences. This dataset is typically represented as a matrix, where rows correspond to users and columns correspond to items. Each cell in the matrix represents a user's rating or preference for an item. For example, if user A rates item X with a score of 4, you would have a cell value of 4 at the intersection of user A's row and item X's column.

**2.2.User-Item Matrix**: From the dataset, construct a user-item matrix. This matrix represents the preferences of users for various items. Each row corresponds to a user, and each column corresponds to an item. The matrix can be sparse, meaning that not all users rate all items.

**2.3.Similarity Calculation**: To identify similar users, a similarity metric is required. In user-based collaborative filtering, cosine similarity is commonly used due to its effectiveness in measuring the similarity between two vectors. It is calculated using the dot product of the vectors divided by the product of their magnitudes.

The cosine similarity value ranges between -1 and 1, with 1 indicating perfect similarity and -1 indicating complete dissimilarity. The formula to compute cosine similarity between two users, u and v, is as follows:

Cosine (u, v) = (u • v) / (||u|| * ||v||)

Here, u • v represents the dot product of user vectors, and ||u|| and ||v|| denote the Euclidean norms of the user vectors.

**2.4.Nearest Neighbors**: Once you have calculated the similarity between users, you can identify the k nearest neighbors for a target user. These neighbors are users who have similar preferences to the target user. The value of k is a parameter that you can adjust based on the desired level of similarity. Sort the users by their similarity score and choose the top K users as neighbors.

**2.5.Rating Prediction**: To predict the rating of an item for a target user, you consider the ratings of the nearest neighbors who have rated that item. The predicted rating is calculated as the weighted average of the ratings of the nearest neighbors, where the weights are the similarities between the target user and the neighbors. The formula for the predicted rating is:

predicted_rating = sum (similarity(target_user, neighbor) * neighbor_rating) / sum(similarity(target_user, neighbor))

Here, similarity (target_user, neighbor) represents the similarity between the target user and a neighbor, and neighbor_rating is the rating given by the neighbor for the item.

**2.6.Top-N Recommendations**: Finally, you can generate a list of top-N recommendations for the target user based on the predicted ratings. Sort the items by their predicted ratings and recommend the top-N items to the user.

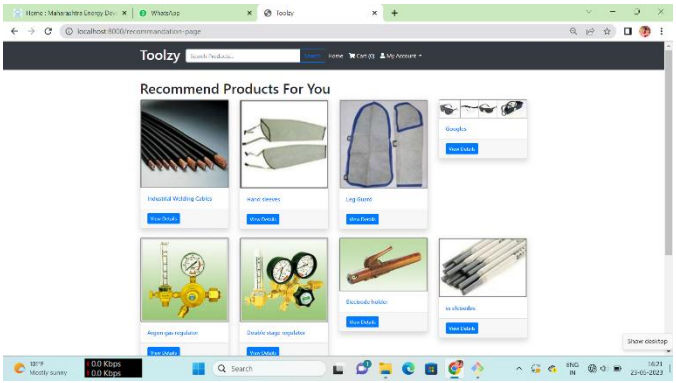


**Fig-8**: Recommendation Page

## 4. CONCLUSIONS

This paper implements the best e-commerce store specifically for industrial tools. Review based recommendation system is used to recommend best products to the customers of their interest based on reviews of similar customers. The proposed system will help people to ease of buying the industrial products online at the amazing price. As for future work, the improvement in the sales can be made and the best service to the users can be provided by using different machine learning and artificial intelligence techniques.

Sentiment analysis of the user's reviews can be made to further categories the reviews as positive or negative reviews based on users sentiment. Further the recommendation system can be improved by adding different parameters to filter the products. More efforts can be taken to make this leading e-commerce company in this industrial tools category as there are very few competitors in this category as of now.

## ACKNOWLEDGEMENT

This paper and the research behind it would not have been possible without the exceptional support of our project guide, Dr . Chaya Jadhav. Her enthusiasm, knowledge and exacting attention to detail have been an inspiration and kept oir work on track .

I want to express our gratitude to Dr . D. Y. Patil Institute Of Technology for supporting us throughout the process of publishing the research paper .

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