CityOnnet E-Commerce App Based on Collaborative Filtering

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Abstract: **E-commerce is an attractive domain where user can purchase their intended products online and get there products deliver in time to their doors, even though users are profiting huge advantage in ecommerce over traditional commerce, the one who suffering from the growth online commerce sector is local retailers, in order to prevent the local retailer business from being pushed in to the corner, we are proposing an android app with an idea of Omni-channel, online offline shopping, product reservation and recommending the products for the users based on user clicks history, which was implemented using a data mining algorithm called collaborative based filtering methods.**

Keywords: **Touch and feel; Omni-channel; product reservation; online and offline; recommendation system; collaborative filtering.**

I.   INTRODUCTION

E-commerce business plans all the way start from the 2 decades ago, right from the start its dominating the local retailers business, which local retailers suffering a huge loss in their business since user can purchase the products online with low cost, huge varieties, on door delivery, their fore local retailer business cant been able compete with online stores, huge advantage in online product side,[1] due to this local retailers business is shrinking as the online commerce business acquiring the market place at huge and fast phase, this is something to worry about the local retailer business, even though all these advantages of online shopping look very much promising it too have some flaws from the user perspective, where user can't be able to touch feel the quality of the product, need to wait for days for delivery of the products , can't be able to reserve the products, and also once the product is been opened most of the e-commerce company doesn't entertain the returns of the products, recently some of the companies allows to take back the product from the user if the user is not satisfied with product quality but this consumes much more time and user needs to wait certain amount of days in order to get back his/her money from the e-commerce retailer and also user will [2] lose the money in the form delivery charge consumption, so this is very complex task and complex procedure and not worth for the user who are leaving average life.

In - order overcome the above flaws that presents in the modern ecommerce business which includes ecommerce giants like Flipkart, amazon, Myntra, Mark m junction... etc, so new android app is going to be introduced to the market soon which allows the retailers especially local retailers to upload their products in the database of an app, which will allow the user to view the products from the user view side of an app , product he/she can reserve it if they want to check the quality of the product for couple of days, also app allow user and local retailer to converse on the reserved products and can have some discussion about the price and user can finally purchase it with full satisfaction of the product quality and worth price.

This android app was implemented using android language and Android studio as an Integrated Development Environment with minimum API-12, and minimum sdk-12, this also provide the list of recommended products for the

user to view and buy, this recommended products will be based on collaborative-filtering algorithm which is a concept of data mining [3].

II. RELATED WORK

The ability to measure the customer satisfaction about the products [4], in order to do that internet business first understood the importance of the potential customers, it also important to validate a diverse array of metrics which includes the feelings and behavior of the online customers, so these can be done using analysis of consumer preference on data collected from the diverse set of customer around the area. Though far studying this approach it's been difficult to known the privacy factor of the customer.

How to attract the customer to shop online, here they proposed OSAM (Online Shopping Acceptance Model) model [5] to attract the customer to shop online by providing an attractive discount to a customer and also by providing new brands of clothes and all they can attract the diverse set of customer to shop online. Here there are some flaws conflicts how to improve the consumer loyalty that can keep up with the long term strategies.

How to attract customer through some privacy policies [6], by providing the privacy policy to customer, the customer will believe that they can shop on online under the privacy policy which assures the genuine level of the product that they buy online, which results in much secure and satisfied shopping. As a future work they also provide privacy finder field, which plans to solicit participants to use privacy finder as a separate search engine.

How to implement collaborative filtering on huge data web services, since as the day progress the data on the web is getting huge and is difficult to process it [7], in order to overcome this the huge web services is divided in two small cluster and then applying the collaborative filter on it so the process moves faster compare to earlier.

Rating difference of each rating pairs between the target users and the candidates. LikeMinds take a target user and a set of candidate users as input, and computes the closeness based on the rating differences between the target user and the candidate users. The candidate with highest closeness score are considered as a mentor to the target user. The target user's prediction is then computed based on the mentor's rating.

III. EXISTING SYSTEM

The current e-commerce sector like Flipkart, Myntra, Amazon provides a lot of advantages like provides low cost products, gives variety of offers based on brands, gives door delivery and saves customer time though its provides customer with a huge advantages, it also lack like genuinely of the product, no physical feel of the product before purchasing it, cant be able to reserve the product, it huge commerce flaw for local retailers , cant bargain on the product price, even though it assures the product returns it includes lot of complex operations.

So in order to overcome this, CityOnnet app will be used to recover the business scope of local retailer and also used to overcome the above mention disadvantages. CityOnnet app will provide facilities like touch and feel of the product, Omni-channel commerce, multi payment mode, product reservation[8] facility, recommending the product based on user clicks which implemented using recommendation algorithm and also user can meet up the intended retailer to decide upon a price of the product.

IV. PROPOSED SYSTEM

The proposed model is, CityOnnet android app which is implemented using android technology, why android...?, because android is an open source which is so compatible throughout all the devices(android)[9], its multitasking environment allow the user to perform the various task at the same time since android app is a multitasking its used to be implemented using android language in the android studio IDE with a minimum API 12.

The purpose of the Android Application for Omni-channel Market Place is to digitize the offline shopping and enabling them to offer online shopping as well thus by providing both online and offline shopping facility. This Document is to provide a description of the design of a android application fully enough to allow for application development to proceed with an understanding of what is to be built and how it is expected to build. The Software Design Document provides information necessary to provide description of the details for the android application and system to be built.
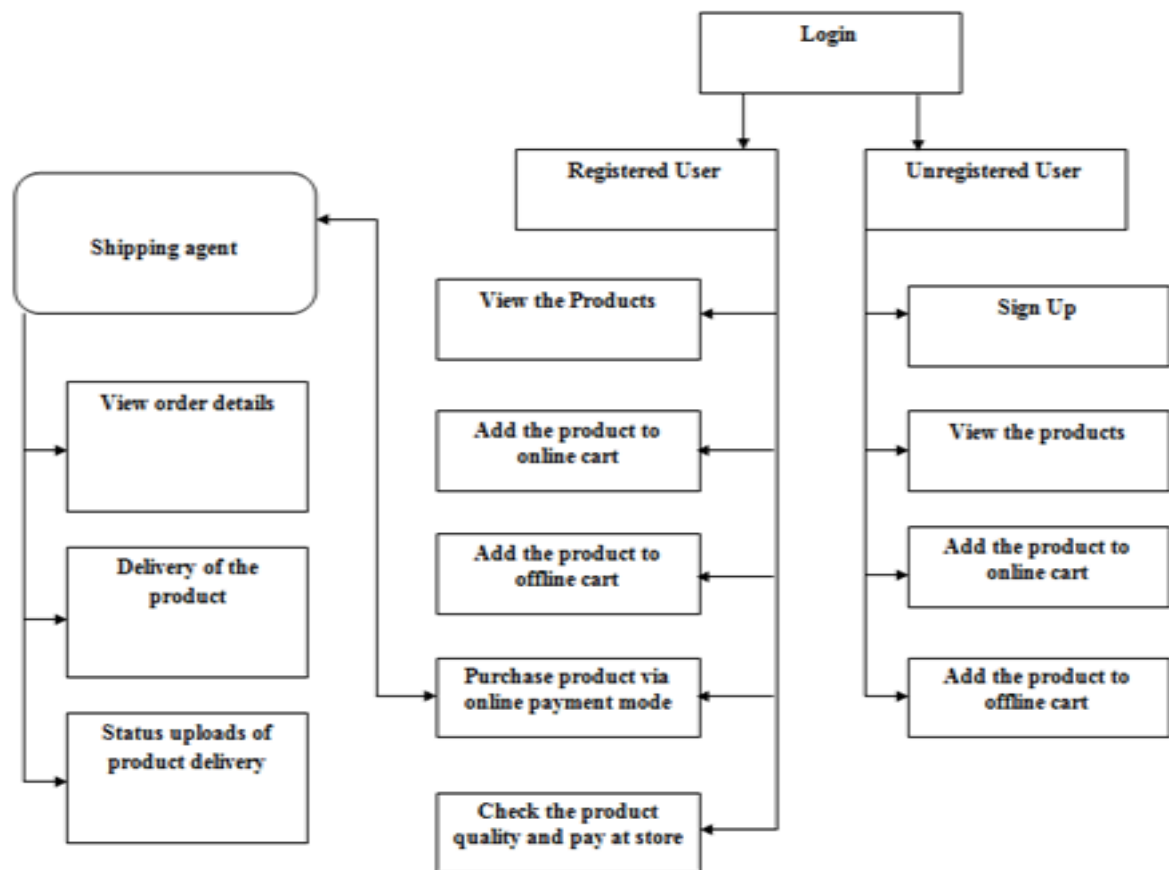
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Fig. 1 System Architecture of CityOnnet application

As shown in above figure 1 is the conceptual model that defines the structure, behavior and more view of a system. Here architecture description is a formal description and representation of the Android Application for Omni channel Market Place. System architecture comprises of system components, the externally visible properties of those components, the relationships between them. It can provide a plan from which products can be procured, and the systems developed, that will work together to implement the overall system. Any registered user or unregistered user can login to the application after installing the application. He can maintain his profile, view the products, and add the product to offline as well as online cart. Only registered user can purchase the product from the application and unregistered user can purchase the product once they register them to the application by providing correct information and can reserve the products for quality check in the shop.

CityOnnet allow the customer to shop their needed product both offline and online , if the customer wish to purchase on online if he wish to reserve the product and decide on it weather to buy the product or not and after reserving the product he can visit the shop and decide the cost of the product with the retailer. After reserving the product customer can visit the shop and can check the quality of the product weather it is in good condition or not.

A. Barcode Scanner:

Barcode scanner allow the customer to check whether the product is a genuine or not by reading the product id of it, equipped with barcode scanner which help the customer to read the barcode and retrieve the product id through that which proves the genuine of the product in terms of quality assurance and originality of the product . Barcode scanner help the user to know more about the products that user wish to buy in shops[10] , and also let the user know whether the product is genuine one or not by scanning the label placed on the product. it also eliminate the possible human error, occurrence of error is more prone to manually entered data than barcodes, barcode scan consumes much less time to entering or storing the data instead of storing th data hand written, barcode system reduces employee training time and also prevent the employee wasting time in knowing the entire paying procedures and gain familiarity about the procedures, barcode

scanner also much more cost effective since it consumes much less time and money to design, it also improves the versatility of the app, in the app barcodes also can be used to track the outgoing shipments and even equipment.

B. Google Map Navigation:

Google Map Navigation includes nearby feature in the app have three sub categories as Based on departments, Based on Shops nearer to you, Based on offers and discount. In the nearby feature the app will provide all the shops names, department's names, and all the shop names that giving offers these things are populated in widget called spinner. Spinner allows the user to scroll the content of it back and forth vertically and by this user will be able to view the content fully and will be having a cropped view of whole content, when ever user tap on the particular content or department or shops in the spinner it will redirect in to the another page that will show the Google map which implemented using Google map fragment in order use the feature of the Google map feature in our app we need access Google service library file which allows the developer to user complete functionalities of the Google map that is provided by the Google before implementing the Google map we also need to generate the Google API key which can be generate by using the jdk versions and key tool jdk's once we gain the 16 digit number, it will inputted to google.developer.com website with the project package name finally the API key will generate this will be inputted to our project then project will output the spit image of Google map, at the last by fetching the latitude and longitude of the particular shops based on department/offer and discounts or based on nearby to users current location that too based on the distance of the shop from the current position of the customer according to radius the position of the shop will get displayed in the map fragment.

C. Data fetching from the Json to the android Widgets:

Almost throughout project json fetching is an important aspects while displaying the uploaded information of the product, the product and product attributes will uploaded in to database from the dealers or any update to the user accounts in the database, will be reflected in the json, JavaScript Object Notation, is an alternative to XML it is minimal format of readable structured data, though while developing an app developer may make use of different widgets throughout the app and also fetching and populating json content to android widget may get vary according to the nature of the widget, but structure of the json for all the widget will remain same, since container widgets like listview, gridview, recyclerview is very much different in nature compare to the basic widgets like textview, button, imageview etc, data present in the database base can be fetched through volley server or appache server, as of now volley is much better compare to appache since it consumes much less time and compaitable compare to the appache.

D. Recommendation system:

Recommendation system algorithm is implemented in the CityOnnet application backend , where it keep tracks of the products in the database which how many user can click the products and also it calculates the threshold on each click of the user on the product if the certain products number of the clicks is more than the threshold value that will be included as a recommended products for other users who not yet checked the product in their respective application, so the database will get modified as the certain number of user view the products and purchase the products, the product recommendation uses the collaborative filtering algorithm also recommend the products based on the user ratings[11] but here products view had taken in to account since the product view count is much more often than the product review rating state in the ecommerce sector.

Algorithm: collaborative filtering

INPUT: Collaborative filtering algorithm first considers the user profile represent it in a matrix.

OUTPUT: Clicks are computed by a weighted average of the clicks by the neighbors.

$$r_{x,s} = \bar{r}_x + \frac{\sum_{y \in S_{xy}} (r_{y,s} - \bar{r}_x) sim(x,y)}{\sum_{y \in S_{xy}} sim(x,y)}$$

INITIALIZATION: matrix will be initialized with a each rows as user and each columns as products with initial intermediate values in the matrix.

Calculate the similarity between users and find their nearest neighbors. There are many similarity measure methods. The Pearson correlation coefficient is the most widely used and served as a benchmark for CF. Cosine similarity measure had calculated as follows.

$$sim(x, y) = \frac{\sum_{s \in S_{xy}} r_{x,s} r_{y,s}}{\sqrt{\sum_{s \in S_{xy}} r_{x,s}^2} \sqrt{\sum_{s \in S_{xy}} r_{y,s}^2}}$$

Where r_x is click of user x on item s and r_y is click of user y on item s, S_{xy} indicates the items that user x and y co-evaluated.

Nearest Neighbor:

Node NearestNeighbor(Point P)

{

Priority Queue PQ;

Float bestDist=infinity

Node bestNode

PQ.push(root,0);

While(!PQ.empty())

{

(node,bound)=PQ.pop();

if (bound >= bestDist)

return bestNode.p;

float dist = distance(P, node.p);

if (dist < bestDist)

{

   bestDist = dist;

   bestNode = node;

   }

  if (node.test(P))

  {

PQ.push(node.left, P[node.feat] –node.thresh);

PQ.push(node.right, 0);

}

Else

{

PQ.push(node.left, 0);

PQ.push(node.right,node.thresh - P[node.feat]);

}

}

p; return bestNode.p; }

Advantages of collaborative filtering algorithm are, collaborative algorithm does not require content information, assessment of quality is based on user .
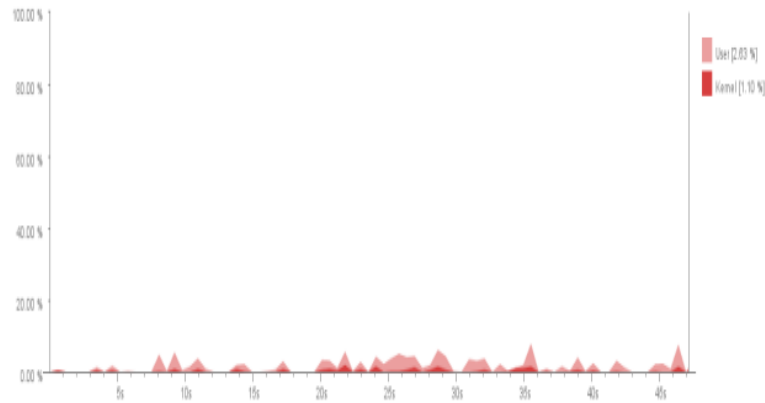
V.   PERFORMANCE ANALYSIS

Fig 2: CPU usage graph

The above graph shows the CPU usage from CityOnnet application, which defines the amount. User space consumes by the CityOnnet application. In the above graph light portion defines the amount of user space consume by the application. Is shown in above figure 2.
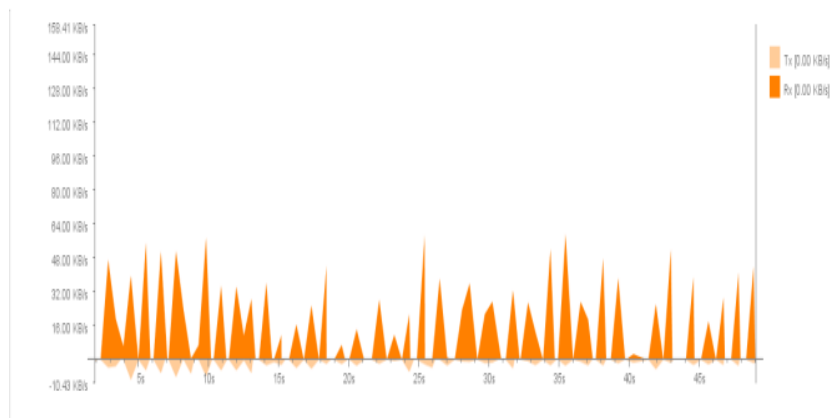

Fig 3: Network usage graph

Network usage graph shows the amount of data   consumed by the application, in the above view lighter portion of the graph show the amount of data consumed by the app in KB's. Is shown in above figure 3.

Memory usage graph shows the amount of memory allocated and used by the graph the blue darker portion shows amount of memory consumed by the graph and lighter blue portion shows the amount of garbage collected. Is shown in the below figure 4.
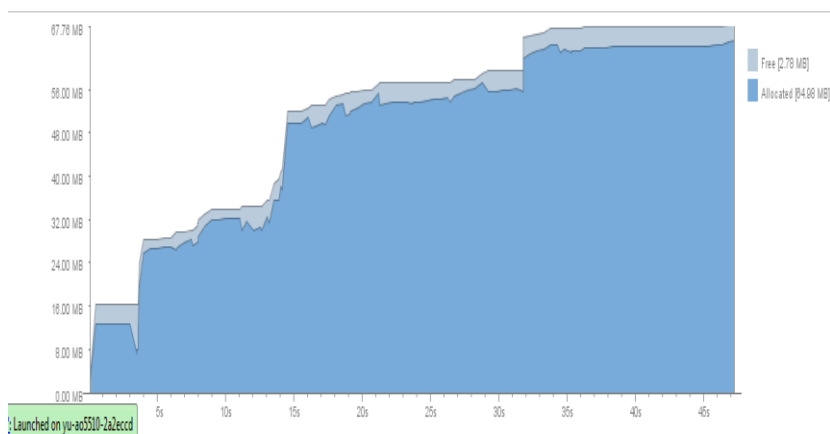

Fig 4: Memory Consumption graph

VI.   CONCLUSION & FUTUREWORK

However the cityOnnet app completely worth for both user and local retailer, it's become very user friendly where app suggest the popular products based on recommendation system, however in the future work it's been planning implement the collaborative algorithm with the map reduce concept where it will consume much more less time to produce the result and also planned to implement the product search based on image search by extracting the image attributes like color and shape.

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[11] "www.codeproject.com" the work (as defined below) is provided under the terms of this code project open license ("license").