Recommendation System Application using Naïve Bayes’ Algorithm

Sahil Pathan¹, Nitin Yadav², Karan Panjwani³, Shreyas Lokhande⁴, Bhushan Thakare⁵

¹,²,³,⁴B.E. Computer Engineering, Sinhgad Academy of Engineering, Pune, Maharashtra, India.
³Asst. Professor, Sinhgad Academy of Engineering, Pune, Maharashtra, India.

Abstract- Recommendation is the most important feature in any kind of web based user centric application. Such systems are used to increase the growth of online businesses. In case of a business enterprise user’s data is available in large volume of data. So that they can perform various data mining algorithm to extract the necessary data. Thus this extracts data can be useful to find users specific habits, purchase patterns, users favourite category and using this kind of information recommendation systems calculates suggestion for user. If these recommendations are up to the mark then it eventually helps to increase user’s interest. This system when implemented on a comparatively new Hyper-Local Based Services market, it would definitely help grow this market.

General Terms- Recommendations, Hyper-Local Based Service, SQL database, Android.
Index Terms- Android, Smart phone, Recommendation System, Naive Bayes’ Algorithm, Java Swing, Java Desktop Standalone Application

I. INTRODUCTION

This system is mainly divided into three parts such as Admin Side, Server running various Services and a user side Android App. Admin side desktop standalone application helps all the product management activities such as add products, remove products, search products etc. This application store all this data in a relational open source database MySQL. Server runs all the required services for the recommendation system. These services gets called as and when required. It is a good practice to use a separate service handler for different services requirements. Then a client side Android app helps to get the processing done from user. All user specific operation such as viewing the products, select and buy product are performed in an android app. All the user actions are recorded and sent to database for calculation purpose. Calculation are performed using Naive Bayes’ Theorem and displayed in a suggestion tab.

II. Recommendations for Hyper-Local Based Service

This Hyper-Local based service is comparatively new form of commerce taken place using internet. It make use of a distributed and already available local market. But the problem with this is, to handle a cold start problem. Data available is so less comparatively to the e-commerce sector which in terms make recommending operations less predictive. To cope up with this problem a Naive Bayes’ Algorithm is applied to the dataset. Parameters which are considered while calculating recommendations are category ID, search count, user ratings for a specific product and count of the likes given to a specific category product. This dataset helps to find user's buying habits. With the help of this information suggestions are calculated.

2.1 Android App

The client side applications is developed using android development environment. The reason behind selection of this particular environment is its vast user base. Number of users using android smart phones outcasts other platform with huge difference. It is mainly because of a stable environment which android provides.

User side application handles activities such as login, create users, display data. User views different available products and selects the required. User specific data such as search history, category like count, ratings for a specific category is recorded via this client side app. This recorded information is passed as parameters for recommendation calculation.
2.2 Admin Application
This application is for management purpose. All the listed products are managed using this desktop standalone application. Java Swing is used to develop admin application. Swing library is an official Java GUI toolkit released by Sun Microsystems. It is used to create Graphical user interfaces with Java. Characteristics of the Swing toolkit are platform independent, extensible, customizable, lightweight and configurable. Swing is an advanced GUI toolkit. It has a rich set of widgets. From basic widgets like buttons, labels, scrollbars to advanced widgets like trees and tables. Swing itself is written in Java.
2.3 kSOAP
In this kSOAP library is used to parse WSDL (Web Service Definition Language) and SOAP (Simple Object Access Protocol) messages. KSOAP was specially designed or developed to deal with small embedded devices like mobile devices. SOAP can be a very complex realm to explore, especially the XML mechanisms used to transfer data between disparate systems, languages, and toolkits. The wireless world requires tools of small stature and great power. Luckily when it comes to SOAP, the kSOAP toolkit provides not only small size and great functionality, but also relative simplicity and ease of use for the developer. Using kSOAP, a developer can develop complex SOAP Web services clients in a remarkably short time. KSOAP is a lightweight and efficient SOAP library for the Android platform. “SOAP” is a protocol used for building web services, and which defines a format used for the exchange of messages that uses XML as base.

2.4 SQL Database
It is an Open source relational database use to store all the required information of product as well as user's data. Product details such as Product Name, Cost of the product, Product Image (calculated pixel values of an image). User specific data is also stored. Such kind of data includes values such as Users search count, like count, ratings given to the products. These stored values are used as parameters for Naive Bayes’ Algorithm which further calculates recommendations. Every user contributes to this system by adding input of their shopping. This system shows correct recommendations as user history parameters increases exponentially.

III. DEVELOPMENT
For developing this entire system a bunch of Integrated Development Environment (IDE) are used. Such as Net beans 8.0 for Admin application as well as for deploying a server. Server maintains a set of application specific services. Netbeans has a very different UI and workflow. There are no perspectives, but toolbars and such will auto appear/hide as needed (i.e. debugging). Netbeans focuses on a smooth, integrated experience sometimes at the expense of features.

Figure 6: Admin Application Manager
Figure 7: User Table in Database
Figure 8: User History stored in Database
Figure 9: Net Beans IDE for Product Admin
Android Studio IDE was used for Android app development, primarily because it is the recommended platform to develop Android applications on and is also very easy and convenient to use. The GUI design is easy to make by providing a layout editor with drag and drop functionality. The built-in tools make it easy to spot possible error conditions and provide fixes.

**Figure 10: Android Studio IDE**

IV. BENEFITS

- Recommendations help to increase user experience.
- Works with already existing large user based smart phone environment Android.
- Feasible to implement on other platforms such as web, iOS, windows because of XML representation of data.
- Admin side application is easier to use for not so technically sound shopkeeper.
- Can be easily integrated with other platforms.

**Figure 11: Net Beans IDE for Server**

V. CHALLENGES

- Admin applications needs to be installed at every local shop.
- System is designed considering Android smart phone as a user application.
- Cold start problem, as vast volume of data is not available at start.

VI. FUTURE SCOPE

The design and implementation of this project has helped local businesses grow virtually. At the moment, the recommendation algorithms are not the issue, but the entire architecture of how we generate recommendations. It is very naive to assume that per-user recommendations would be the thing to do, because it is based upon naive assumption of the users being static, while they are dynamic. In this fast moving environment recommendation system should also match up with user. This system can be integrated with other platforms when required. There is no need to design entire system from scratch for another platform like iOS or windows because of the use of XML, just a User Interface needs to create for that platform.

VII. CONCLUSION

In This, recommendations system helps to grow sales if exact suggestions are displayed for users. Hyper-Local Services can get a huge amount of benefit by using this system. For improvement purpose a steady user base which is increasing exponentially is a requirement.

REFERENCES


