Recommender System For E-Shopping Using Users’ Tipping Point

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Abstract— E-commerce is one of the rapidly growing fields now-a-days. With today’s trend, attraction of users towards online shopping is increased. In the field of online shopping, previously it was considered that users make the purchase decisions depending on their own choice. But the extensive studies have proved that the decision of user is affected by various parameters like products rating, its price and users’ own priority. The recommender system works on these parameters and suggests relevant products to the user. This powerful technique is used for filtering the large amount of products according to users’ choice. In this paper we identify the use of recommender system for online shopping of electronic product. A significant motivation behind this work is to help user to make their purchase decision easy as well as to increase sales volume of online mobile shopping. In this work we are using two effective recommendation algorithms to check the effect of products rating and to find users type. Proposed technique will give more effective results than existing technique.

Keywords—Bass Model, Recommender System, Tipping Points

I. INTRODUCTION

There is tremendous growth in the size and use of the online shopping websites. These websites have huge amount of products available on their sites. This results into confusion among users about selection of product of their choice. This is the reason why we need the improvement in previously used techniques. Therefore we are imposing new techniques of shopping through online shopping services and this will result into better services for users.

Previous techniques considered that customers make their purchase decisions according to their choices only. But the reality is there are some factors which affect users’ decision of purchase. These factors are products’ rating, type of user, users’ previous purchase history, price of product, effect of advertisement and many more.

In this paper, we present the recommendation framework for online shopping of mobile products. Here we use different techniques for capturing users’ preferences. We use the concept of type of user introduced in Roger’s diffusion theory [1]. User is of two type either innovator or imitators.

Innovators make purchase decisions based solely on their own preferences; whereas imitators’ purchase decisions are often influenced by a product’s stage of maturity [1]. Bass model is used to classify these type of user. We use method of collaborative filtering for the purpose of filter the required product according to type of user.

II. RELATED WORK

Recommendation systems can be characterized mainly as content based recommendation systems or collaborative filtering recommendation systems [1]. The Content based recommendation systems that recommend an item to a user based upon a description of the item and a profile of the user’s interests. Content-based recommendation systems may be used in a variety of domains ranging from recommending web pages, news articles, restaurants, television programs, and items for sale.

Other than content based recommendation system, Collaborative-filtering recommender systems [5] facilitate electronic commerce by helping users find appropriate products from large catalog. There are two main types of collaborative filtering techniques, namely memory-based and model-based [1].

Memory-based approaches identify the similarity between two users by comparing their ratings on a set of items. The similarity between two items is calculated based on the number of users who have purchased both items while the similarity between two users is based on the number of items purchased by both of them [2][3].

Model-based approaches use the collection of user’s behavior (ratings, purchases, etc.) to learn a model, and make predictions based on the learned model. Examples are Probabilistic Latent Semantic Indexing (PLSI), Flexible Mixture Models, and Decoupled Models etc.

In old techniques, there was no distinction between the different types of users (innovator and imitator) and those algorithms were not easy to combine with existing recommendation algorithms. Kawamae [4] considers the importance of the different roles of people in recommendation systems and proposes a recommendation algorithm via innovators.
III. RECOMMENDED FRAMEWORK

Collaborative filtering is most popular technique used by commercial systems for recommending products to their customers. In this paper, we use the proposed framework [1] (Figure 1) that allows the incorporation of users' tipping points into these collaborative filtering recommendation systems seamlessly. [1]

There are two phases: learning (or training) phase and recommendation phase.

A. Training phase or Learning phase

In this phase, we construct the Bass model for each product, and determine the tipping point of each user.

Bass model is model used to find the amount of users' receptiveness. For recommendation of product to user we need to check users' receptiveness towards the maturity of product. We refer this as tipping point of user and is based on type of user (imitator or innovator).

This phase consist of two algorithms
- BuildProductModel – This will generate bass model.
- GenerateTippingPoint – This will generate the users’ tipping points.

B. Recommendation phase

In the second phase of recommendation framework we incorporates products' maturity levels and users' receptiveness, and refine existing recommendation algorithms to take these factors into account when making a recommendation. We call the refined algorithms as KNNtipp and SVDtipp[1]. The former is a user-based recommendation algorithm using the k nearest neighbors, while the latter is an SVD-based recommendation algorithm using Singular Value Decomposition. [1] We will conduct a comprehensive set of experiments to evaluate the performance of the proposed algorithms on two real world datasets obtained from an E-commerce website and a mobile dataset.

The another two modules of this framework are

1. Sales history
   This is the database of users’ previous purchase history. The next phases will use this history in recommendation algorithms. Sales history is input for the training phase and the output generated is bass model, and users’ tipping point.

2. Recommendation list
   This is the list of recommended products which will be displayed as result of search query to user. This list will be generated as output of recommendation phase of proposed framework.

IV. EXPERIMENTAL STUDY

To test the accuracy and improvement in business revenue due to usage of recommendation framework we will test the system for the database of online shopping website of electronic products. The dataset of website will contain products of 5 categories as mobile, television, camera, laptop...
and pen-drives. The details of each product will be recorded here. The dataset will also contain the sales history records from these categories. Each history record will be a triplet \((u, i, t)\) where \(u\) denotes the user, \(i\) denotes the item ids, and \(t\) is the purchase time of that item \(i\).

In order to exclude casual users who had very few activities, a pre-processing step will be carried out to filter out those users with less than 5 purchase records. The distribution of users’ tipping points will be based on the users, products and records left after the pre-processing step.

The identification of product will be based on the product whose maturity stage will be closely matching to the users’ tipping point. To measure the improvement in performance due to correct identification of products, we will randomly inspect a small set of users.

V. CONCLUSION

In this work, we have proposed a recommendation framework that will analyze users’ receptiveness towards the products. We will use the Bass model to determine the product Maturity level at a given time point. Depending on the users’ Previous purchase history, we will determine each user’s tipping point to analyze his/her reaction to product maturity state.

We will use two most popular recommendation algorithms to find out the effect of maturity level in relation to the user’s tipping point. We will also consider the effect of products maturity stage in relation to products’ ratings, products price, new products in market, previous sales history, users’ reviews, and type of user innovator or imitator.

REFERENCES


