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INTELLIGENCE IN E-COMMERCE

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Abstract: The number of Internet users around the world has been steadily growing and this growth has the opportunities for global and regional e-commerce. This paper analyzes the impact of e-commerce on markets where established firms face competition from Internet-based entrants with focused offerings. We discuss the relevance of our findings for quality differentiation, price convergence and profit decline in a variety of markets where traditional incumbents are faced with changes in the competitive landscape as a result of e-commerce. We also find that the online entrant chooses a lower quality of trade execution when faced with direct competition from the incumbent's unbundled offering. A recommender system based on web mining techniques to trace customer's behavior and learn his/her preference adaptively. The system can give sensible recommendations, and is able to help web users to save enormous time for internet browsing. "With Web Intelligence, we can deploy a supply-chain to customers and suppliers so they can analyze pattern and identify processes that will save considerable time and money."

Keywords: E-commerce, Business intelligence, Recommender System, Web mining.

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INTRODUCTION

E-commerce deals with selling and purchasing of goods and services through internet and computer networks. E-commerce can enhance economic growth, increase business opportunities, competitiveness, better and profitable access to markets.

This paper analyzes the impact of e-commerce on markets where established full-service firms offering a broad range of goods and services face competition from Web-based entrants with narrower product offerings

Recommender systems were originally defined as ones in which "people provide recommendations as inputs, which the system then aggregates and directs to appropriate recipients"

Advantages of E-Commerce:

- **Boundary less (global location):**

E-commerce can be dealt globally as no specific boundary is required. It enables all the companies to expand them to global level.

- **Time saving:**

It saves time of customer, because there is no need to go anywhere physically.

- **No time constraints:**

It can be used any where any time as there is no time constraints.

- **Price/Product comparison:**

It helps consumers to compare price and product effectively and efficiently.

- **Cost effective:**

Reduces logistical problems and puts a small business on a par with giants.

- **Direct communication with consumer:**

Social networking sites, online advertising networks can be mediums to buzz about online store.

- **Improved customer interaction:**

Quick feedback and comment forms are main features to interact with customers.

- **Flexible target market segmentation:**

Target market segment here in e commerce is flexible can be modified any time.

- **Simple and easier exchange of information:**

Improves information sharing among merchants and customers and enables prompt quick just in time deliveries.

- **Lowers transaction cost:**

Things can be automated in a well implemented online store. If online download facility is available then distribution cost can be cut off.

- **Easy arrangement of products:**

Products can be arranged in the shelves within minutes. With online store it is quite easy.

- **Faster buying procedure:**

E commerce means better and quick customer services. Online customer services make customer happier, Due to absence of intermediaries for buying products. So buying procedure will be fast and quick.

- **No physical company set up:**

Doing e business is cost effective because no physical set up is required for that.

- **Easy transactions:**

Financial transactions through electronic fund transfer are very fast and can be done from any part of the world.

- **Niche Products:**

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Almost everything can be sold on internet. Even if products targeted to smaller markets the buyer will be somewhere on net.

- **Low operating cost**:

It can be started and continued with very low investment. Staff cost is very low.

Objective of Paper

As the World Wide Web continues to grow at an exponential rate, the size and complexity of many web sites grow along with it. For the users of these web sites it becomes increasingly difficult and time consuming to find the information they are looking for. To help users find the information that is in accordance with their interests a web site can be personalized. Recommender systems can improve a website for individual users by dynamically adding hyperlinks.

Recommender both Personalized and Non-Personalized can be built using a number of algorithms. Examples include Amazon uses organic navigation and Request recommendation lists. One of the most commonly used algorithms in recommender systems is Nearest Neighborhood approach. Some others include Bayesian based approach; model based filtering approach, clustering approach.

- Existing recommender systems face the limitation of requirement of lot of data to make recommendations.

- Changing data is another limitation since trends are always changing. Certain items are unpredictable like movies, music.

- These algorithms are able to search tens of thousands of potential neighbors in real-time, but the demands of modern E-commerce systems are to search tens of millions of potential neighbors.

- Quality of Recommendations is not at par with customers requirements.

- Collaborative filtering experiences sparsely and cold start problems.

Recommendation Techniques:

Recommendation techniques have a number of possible classifications. Of interest in this discussion is not the type of interface or the properties of the user's interaction with the recommender, but rather the sources of data on which recommendation is based and the use to which that data is put. Specifically, recommender systems have

(i) Background data, the information that the system has before the recommendation process begins,

(ii) Input data, the information that user must communicate to the system in order to generate a recommendation, and

(iii) An algorithm that combines background and input data to arrive at its suggestions. On this basis, we can distinguish three different recommendation techniques as shown in Table I

Table I: Comparing Recommendation Techniques Process

Technique	Background	Input	Process	Problem field
CONTENT BASED FILTERING	The content-based filtering approach has its origins in information retrieval and information filtering. The item recommended by content-based filtering often indicates textual information, such as news webs and documents and these items usually describe with keywords and its weights.	u's ratings of items in i.	Generate a classifier that fits u's rating behavior and use it on i.	It parsed text or the features that assigned to items manually. Retrieval techniques work well in extracting features from text documents extraction methods are much harder to apply to multimedia data, e.g., graphical images, audio streams, and video streams.
COLLABORATIVE	As one of the most successful and earliest	Ratings from u of	Identify users in U	Collaborative systems rely solely on users'

FILTERING	recommendation technology, collaborative filtering approach works on building a customer dataset from customers and present recommendation by collaborative algorithm. Collaborative filtering approach lies in searching the similar preference customers with the active customer.	items in i.	similar to u, and extrapolate from their ratings of i.	preferences to make recommendations. Therefore, until the new item is rated by a substantial number of users, the recommender system would not be able to recommend it.
HYBRID FILTERING:	Features of items in I. Knowledge of how these items meet a user's needs. The algorithm first calculates the similarity ("weight") between two users or two items. The algorithm then computes the weighted average.	A description of u's needs or interests.	Infer a match between i and u's need.	cold-start problem and stability & plasticity problem. Cold-start problem occurs when learning based techniques. Stability /plasticity problem means that it is sometimes hard to change established users' profiles

Considering all the above problems, I propose an idea that can be counted as a possible, Plausible, tenable and efficient solution, which will include the study of relevant issues and the current scenarios.

The crucial point is that AI is concerned with representations, and how they can be constructed, stored, accessed, compared, and transformed. A computer program is itself a set of representations, a symbol system that models the world more or less adequately

The recommender system based on web mining is proposed to solve problems in earlier system. It utilized a variety of data mining techniques such as web usage mining, association rule mining etc. Based on these techniques, the system can trace the customer's behavior and learn his/her up-to-date preferences adaptively.

Why Recommender system?

A recommendation system is a valid mechanism to solve the problem of information overload in Internet. It is of importance to develop the high efficient learning algorithm to capture what customers need and help them what to search.

Web Intelligence is evolving with development of web as a media for information gathering, processing, storage and utilization. It is ever-changing and inseparable branch of computer science. As the web offers the new means of execute and transmit information eminent beyond the other media. So it is a new revolution in information intelligence.

The main task of the recommender system is to acquire the customers' up-to-date preferences using web mining techniques, in order to provide decision support for their Internet shopping. Figure 3 gives an overview of the personalized recommender process of the system. We only select some member customers as the target customers for providing recommender services, considering the efficiency of the system running and maintenance. The recommender process consists of three phases as shown in figure 3.

- After necessary data cleansing and transformed in the form usable in the system, target customer's preferences are mined first in phase 1. In this phase, how to trace the customer's previous shopping behavior effectively in the system is very important and can be used to make preference analysis.

- To set different association rule that are mined from the customer purchase database, integrated and used for discovering product associations between products.

- To use the match algorithm to find customer preferences and product associations discovered in the previous two phases, so the recommendation products list, comprising the products with the highest scores, are returned to a given target customer.

Formulating Problem and Research Methodology

I have tried to mention all those activity or procedures which were carried out during analysis and design of the system which will ultimately lead to final implementation of the recommender system. Descriptive research methodology used to survey which will include the study of relevant issues and the current scenarios & based on data, explanatory method based on quantitative technique used to clarify & explain how to overcome problem arises in existing system and tried to solve those problem and have developed a recommendation system to provide personalized information services in making a successful Internet business.

Content/ Findings

How AI based Recommender system is beneficial?

Basically e-commerce is the buying and selling of goods and services on the internet and on different online networks especially World Wide Web. The development of e-commerce has led to companies moving much of their business efforts to online environments. Dot com craze has stimulated a global commercial environment which is now being exploited by many firms who are engaged in e-commerce.

The concept of local storage and remote access are the obsolete methods in globalization. The web with its integration with the methods, people is getting higher position than any other media for information analysis for business. Size and complexity are the features of WI to make it useful and unique for the companies, application and research. The diaphanous size of the web leads to difficulties in efficient and effective storage and retrieval of web pages. WI is not just the networking pipeline, it is the actual application platform on par with – indeed, seamlessly integrated within- major operating system. These applications are known as thin clients. Web documents have heterogeneous collection and links of structured, semi-structured or unstructured information. The diversity of web pages forces the user to reconsider many methodology and technology of existing information system. So a new sub-disciple devoted to web related research and application is required that might have a significant value. To accommodate the information of web users need to have a study the design and implementation of web information system.

- First, the customer preference and product association are automatically mined from click streams of customers.

- Improved Collaboration filtering that aims to identify customers whose interests are similar to those of the current customer, and recommend products that similar customers have liked.

- One of the important features of this is its ability to address the issue of higher recommendation scores being accepted over lower scores .This is done by comparing the distribution of scores for accepted recommendations with analogous distribution for offered recommendations.

- The methodology used in this system improves scalability and also buying precision.

- In the system, the chosen strategy is adopted that for all products in the same classes, those products which were purchased in the latest period would be assumed to be the most popular and the more buyable products. Therefore, we use this choice strategy to provide the recommender services for the target customers.

Suggestions/ Strategies

The System

The proposed system is using PHP based system. The reason behind making it php based system is its sheer popularity and it's easily available open source libraries for developing applications. PHP is an Open Source solution, freely available for a wide variety of platforms. It is a full-featured environment that has been available for years and is in widespread use on the Web. Any user can download both the source code and executables and install them on their computer for free. PHP is constantly being improved by many experienced programmers from all over the world. It is currently available for all major platforms the system should be able to run on any android based tab or mobile phone.

The recommender process consists of three phases:

- After necessary data cleansing and transformed in the form usable in the system, target customer's preference are mined first in phase 1. In this phase, how to trace the customer's previous shopping behavior effectively in the system is very important and can be used to make preference analysis.

- In phase 2, different association rule sets are mined from the customer purchase database, integrated and used for discovering product associations between products.

- In phase 3, we use the match algorithm to match customer preferences and product associations discovered in the previous two phases, so the recommendation products list, comprising the products with the highest scores, are returned to a given target customer.

ALGORITHM OF THE PROPOSED SYSTEM

The overall recommendation process consists of following three steps:

- Customer preference mining

- Product association mining

- Matching algorithm for recommendation

The matching score σ_{mn} between customer m and product class n can be computed as follows:

$$\sigma_{mn} = \frac{\sum_{k=1}^{N} c_{mk}\, p_{kn}}{\sqrt{\sum_{k=1}^{N} c_{mk}^{2}} \cdot \sqrt{\sum_{k=1}^{N} p_{kn}^{2}}}$$

Where,

C(m)   -   row vector of the M × N customer preference matrix C

P(n)   -   a row vector of the N × N product association matrix P

M   -   total number of target customers

N   -   total number of product classes.

the matching score σ_{mn} ranges from 0 to 1, where more similarity between $C(m)$ and $P(n)$ result in bigger value.
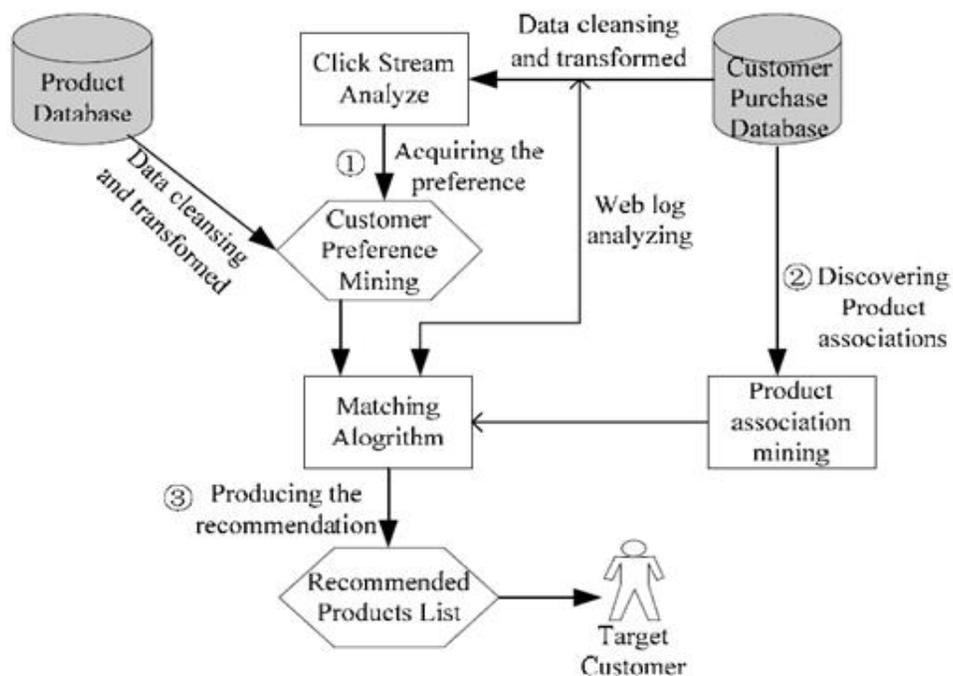
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Figure: Overview of the recommender process of the system

CONCLUSION

Web Intelligence is regarded as the key research field for the development of the Wisdom Web (including the Semantic Web). WI has given environment for analysis and distribution of information to all the concerns for development of business.

The customer preference and product association are automatically mined from click streams of customers.

The matching algorithm which combines the customer preference and product association is utilized to score each product and produce the recommended product lists for a specific customer.

An important issue addressed here is evaluating the recommender quality is the extent to which recommendations with higher recommender scores are accepted preferentially over recommendations with lower scores. We address this issue by comparing the distribution of scores computed from the formula of calculating matching score for accepted recommendations with the analogous distribution for offered recommendations.

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