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BUSINESS DIARY - An Interactive and Intelligent Platform for SME's

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***Abstract*—**There are currently many online trading platforms in the Internet. However, they have various drawbacks and are not welcome by sellers who just want a simple and yet intelligent and user-friendly platform for reaching buyers. Traditional methods are costly and not suitable for small and medium enterprises. This project focuses on creating such a platform that allows sellers to reach buyers efficiently. With advent of several successful e-commerce web portals like amazon.com, ebay.com, flipkart.com etc., world is witnessing an explosion of service providers as well as service consumers. The approach is to attain beneficial flow for end users who are looking for services which match their custom requirements rather that best (and hence more costly) service.This idea is focused on the development of web application to facilitate such a need with an aim to providing an intelligent user-interface to both the sellers and the buyers.

Keywords*-e-commerce, buyers, sellers*

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I. INTRODUCTION

Categories have become one of the main entrances to access e-commerce websites. To build recommendation systems for products proliferation, a hierarchy in which products are categorized is needed, so the users are able to efficiently filter the kind of products that are desired [1]. In a categorized information space, predicting users' information needs at the category level can facilitate personalization of products for users.

The rapid development of information technology has facilitated an elegant trading environment in the Internet. There are many trading platforms nowadays but there is no good platform designed for direct seller-to-consumer (S2C) trading primarily for regular chores goods, to buy and sell their goods and services directly to consumer within their locality or city. Such a need arises in a social network where items should be traded or exchanged easily with a small community. The famous websites such as Amazon or eBay are too global in nature and does not support the direct trading of goods and services among the consumer in a small social network such as a locality environment.

The platform is targeted for direct seller-to-consumer trading among regions. The items for trading include books, household items, electronics, housing rental, sports equipment tutoring services and many more. The web application design needs to be modern, fast, and very simple to use. It is developed using PHP, HTML, CSS, CASSANDRA and MySQL. The main contribution of this paper is on the design intelligence of the Service-Trade web application. The objective is to help the seller to decide on the selling price of the sale item. In addition, the web application can also have features of a recommender system [1]. That is, the trading system would also have the intelligence of recommending items or products to a potential buyer given his previous purchase patterns. The decision support system is embedded with a hybrid neighborhood search algorithm, with emphasis on solving a price-recommendation problem in a real-world internet trading platform additionally advertisement creation and posting them is also available to the buyer. The solution to the price- recommendation problem would require techniques from decision-support systems as well as data-mining on a database of used items already traded or currently available entity.

For a seller, the intelligent trading platform has provided real-time search on related items in the marketplace and would suggest a price for the sale item. This helps a seller to post sale items in line with the market. Techniques from data mining, decision-support system and neural network have contributed to the process of software development.

For a buyer, the intelligent trading platform allows to express his interests or post requests for certain desirable items. The platform also has a recommendation system that recommends sale items to the potential buyer.

II. REVIEW ON RECOMMENDER SYSTEMS

A common formulation of the recommendation problem can be found in [5,6].
The research issues are as follows:
•Representing user behavior and the information about the items to be recommended;
•More advanced recommendation modeling methods;
•Incorporation of various contextual information into the recommendation process;
•Utilization of multcriteria ratings;
•Development of less intrusive and more flexible recommendation methods that also rely on the measures that more effectively determine performanc of recommender systems.

The suggested recommendation is therefore simply a ranking of the items with high estimated ratings. A product can be represented with a profile that includes its characteristics such as quality.material,specification, etc. whereas each item is defined with a set of characteristics. For example, a song can be represented by its title, singer, genre, country, year of release, etc. On the estimation of item ratings, heuristics

andmethods from machine learning and approximation theory have been used. Broadly speaking, recommendation systems can be classified into the following categories.

1. Content-based: The focus is on the characteristics of theitems, and items similar to the previous choices of the userwill be recommended; This approach is based on ideas ofinformation retrieval [6] and information filtering [7].

Before the recommendation, the user profile is needed, which can be collected through questionnaires or thetransactional behaviors of the user. An item profile, createdbased on the attributes of the item, is needed for each item. Itis common that both profiles are defined by a vector ofweights, and the score is computed by the cosine similarity
measure [6].

2. Collaborative-based: The focus is on the characteristicsof all the users. The taste and preference of the users isanalyzed, and the current user will be recommended itemsthat other users with similar characteristics have acquired.The algorithms are grouped into memory-based [8] ormodel-based methods [9,10].

III. Architecture Of The Decision Support System

The decision support system (DSS) aims to provide a flexible and interactive tool to help solve the price- recommendation problem. Employing the methods of the information technology, the DSS is designed as a distributed intelligent system with a user- friendly interface. It is a graphical interface that facilities the seller's decision making process on determining a price for sale in the Internet marketplace. The information of related items in the database would be needed in the decision support process. Data mining on the vast amount of information is needed in order to provide real-time response to the seller. In this paper, a hybrid neighborhood search algorithm has been used. Figure I hows the architecture of the dss.

It is necessary to develop a robust and fast algorithm to deal with an online user request for selling price recommendation. The price of the item if brand new has to be determined or provided by the seller. A reasonably detailed description of the item for sale, along with its used condition and number ofyears of usage would be needed. A hybrid neighborhood search algorithm [21, 22] is proposed here to tackle the problem online.

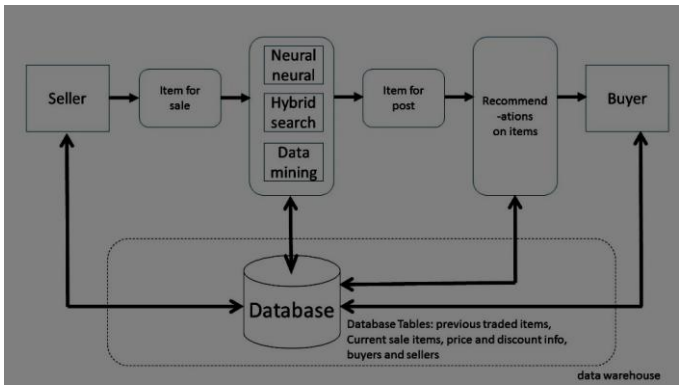

Figure 1 Decision Support System

IV. Algorithms

A. Product Recommendation

Step 1: Build Similar Items Table (Offline) [5]
For each item in database, I1
For each customer C who rated or visited I1 [2]
For each item I2 rated or visited by customer C
Record that a customer rated or visited I1 and I2
For each item I2 Compute the similarity between I1 and I2

Step 2: Recommend (Online)
Recommends the most popular or correlated items.
Time Complexity - $O(N^2.M)$
where N - |Items| & M - |customers|.

B. Search

Anveshana ranks services in 4 steps. [4]
Step 1: Calculation of Individual Variance For each QoS parameter "i" $\mathbf{L_i = |R_i - A_i| / Range.}$

Step 2: Priority Consideration
Let priority values be denoted by "P". Let weight of a QoS parameter be denoted by "W" For each QoS parameter "i" $\mathbf{W_i = [\ n - P_i + 1\ ] / \Sigma n}$

Step 3: Calculation of Individual Relevance
For each QoS parameter "i" $\mathbf{I_i = 1 - [L_i * W_i]}$
Step 4: Calculation of Total Relevance
Total Relevance be denoted as "T". $\mathbf{T = (\ \Sigma I_i\ ) / n}$

C. Price Recommendation

Step 1: Determine the set of N_k, *for k=1,…,kmax, that* will be used in VNS; - Find an initial solution *x* by any construction heuristic and its objective function value f(*x*), set xbest← x, fbest← f(*x*); choose a stopping condition;
Step 2:the following operations as long as the stopping conditions are not met:

(1) Set $k \leftarrow 1$;
(2) Repeat the below steps until $k=kmax$:
(a) ***Shaking.*** Generate a random solution point *x' and in the kth*neighborhood of *x*;
(b) ***Local search.*** Find a solution point *x*'' as the local optimum applying some local search method with *x'* as initial solution;
(c) ***Check for improvements.*** If f(*x'*)'is better than f(*x*), set fbestt← f(*x*'') and xbest←x'' and *k*=1, otherwise set *k*=*k*+1 (or if *k*=*kmax*, set *k*=1); go to Step 1. [3]

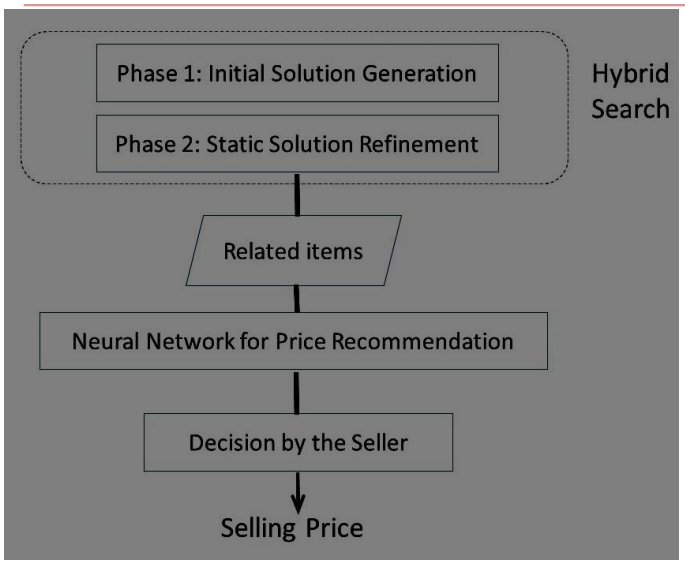

Figure 2 Hybrid search and price recommendation

V. IMPLEMENTATION OF THE INTELLIGENT TRADING PLATFORM

One important motivation for the current implementation is for seller within a small community or buyer to buy or sell within the same community. Therefore, a registered seller can submit an item post to his/her needs on webiste only. Registered buyers can also select to only view items being sold by those within the same community .Since all seller within the same locality must be verified to be a authentic seller of that product, still it is much easier for a seller to organize and complete a sale. Figure 3 illustrates that.

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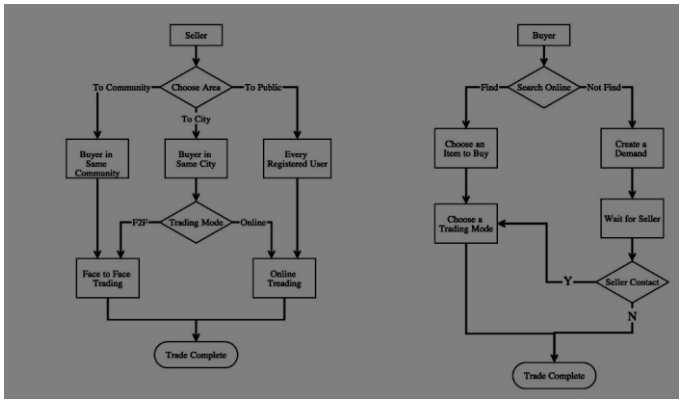

Figure 3 Trading process of a seller and a buyer

VI. DISCUSSIONS AND CONCLUSIONS

There are currently many online trading platforms in the Internet. However, they have various drawbacks and are notoptimized more for sellers and buyers who just want a simple and yet intelligent and user-friendly platform for trading on daily basis(or within a small locality). For people trading within a small locality, they would avoid any troubles to setup payment account or mailing of items to the buyer. This paper is focused on the development of web application to facilitate such a need with an aim to providing an intelligent user-interface to both the sellers and the buyers.

For a seller, the intelligent trading platform has provided real-time search on related items in the marketplace and would suggest a price for the sale item. This help a seller to post sale items in line with the market. Techniques from data mining,decision-support system have contributed to the process of software development.

For a buyer, the intelligent trading platform can gather information on his previous purchased items from the databases. Also, buyer can express his interests or post requests for certain desirable items. The recommender system would then recommend sale items to the potential buyer. Overall, the platform targeted for direct seller-to-consumer trading would be more intelligent, simpler-to-use and more user- friendly

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