

MINING THE GIFT RECEIVER'S MIND

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ABSTRACT

Choosing an appropriate gift is difficult because the purpose of gift giving is to arouse affection in the receiver, not the giver, and too many variables that influence the results. Utilizing 600 samples and a hybrid method combining the decision tree and K-nearest neighbor approaches, this study builds a DTKNN two-stepped recommendation system which achieves a precision rate higher than 80%. The contribution of this research is to propose a new data mining technique to solve the problem of a recommendation system for altruistic gift selection which allows the receiver to perceive the affection desired by the giver.

KEYWORDS:

Recommendation system, Gift giving, Decision tree, K-nearest neighbor.

1. INTRODUCTION

Making decisions about gift giving is very different from other consumer behaviors and is sometimes quite difficult for the decision maker. The purpose of gift giving is to enhance or maintain the closeness between the receiver and the giver by pleasing the receiver, not the buyer himself/herself [8, 25]. The resulting closeness enhancement is closely related to the emotion aroused in the recipient's mind by receiving the gift and the scenario under which the gift giving is proposed [22]. Therefore, when making a decision one should consider the affection expected to be aroused by the giver.

This affection varies depending on the contextual situation [20, 22]. The same gifts may create different reactions in different situations. It is also possible for different gifts to arouse the same feelings. For example, a gift of a laptop may be perceived as a "surprise" to a teen-aged son but be perceived as "functional" to a fifty year old father. In other cases, to a mother, a cooking pot, a robot for cleaning the house, or a cell phone, may all be perceived as functional gifts and produce the "functionality" affection. Since creating specific expected reactions are critical to the decision of gift selection, this study considers searching for the most appropriate recommendation to the buyer from the pool of choices which can create the specified emotional response in the receiver. They type of affection expected to be aroused depends on variables such as the receiver's preferences. Therefore, finding the critical factors related to the affection aroused is one of the purposes of this study.

Previous research has focused on the conceptual framework or procedures for choosing gifts [25]. It helps to clarify the possible decisions for the gift giving behavior. Other related works help to understand the closeness between gift giving and the critical influential variables in some gift giving situations [19, 20]. For example, the closeness between giver and recipient may influence the cost of the gift which the giver would like to buy [20].

The lack of previous related works examining the affection aroused by gift giving creates insufficient references to decision making of gift selection. Previous studies can only help the giver to realize which one are the important variables in the gift giving decision making process. In some special situations, gift giving may produce closeness between giver and receiver. Decision making in the gift giving process is still very complicated. Furthermore, in practice, since the logical thinking involved in decisions for gift selection is usually goal seeking oriented, one must focus on the possible affection aroused to infer what are the important influential variables, instead of caring about all possible variables. The current available websites for supporting gift selection, such as Gift.com, Gifftree.com, Giftbaskets.com, Buggift.co.uk, and so on, with their primary design logic being to categorize gifts, seem too rough to help the giver to make a good choice. These websites do not give full consideration of the relationships between the variables of influence and affection aroused. As a consequence they often propose suggestions that are impractical. For example, those websites usually just provide simple classification and improper lists of gifts for information searching. For example, gift recommendations for a girl friend will often be comprised of a list of goods with heart shaped decorations.

In efforts to consider the importance of the expected affection aroused from the gift giving, this study proposes a hybrid approach that integrates two data mining techniques: the decision tree and k-nearest neighbor method, to fit the needs of two-step decisions for gift giving selection. This study considers that the same gift may produce different reactions to different receivers and/or in different scenarios. Hence, in the first stage we create an affection filter. The recommendation system uses the decision tree method to filter the gifts and scenarios which may produce the same affection. The k-nearest neighbor approach is then applied to match the user profile with the dataset of expected affections aroused to determine the list of recommended gifts. This study uses a systematic procedure composed of website development methods, including variable analysis, questionnaire design, data collection, data mining, evaluation and implementation, to ensure the precision and usability of the proposed hybrid approach.

2. LITERATURE REVIEW

A gift giver usually searches one's inner memories and self-experiences when making decisions on gift giving. If he/she perceives that his/her inner information is not adequate enough to make a gifting decision, he/she will search for outside information, such as asking other, more experienced, people. Since the popularity of Internet usage has risen, web sites have become another resource for outside information, and this is the focus of this research.

2.1 Insights on Motives and Behaviors for Gift-giving

The greatest difference between purchasing for personal use and purchasing for gift giving might be the motive for purchasing [3]. The behavior of gift giving is of course to please the receiver, but the motives might not always be simply altruistic. Sometimes, gift giving is carried out for cultural customs or as a courtesy. For example, the feeling of obligation created by mutual gift giving at

Christmas, or at holidays and birthdays between friends and families, as well as at weddings, housewarmings, and graduations. Gift giving may be for a special purpose, such as a wife seeking to regain affection from an alienated husband or expressing belonging to the same group between the giver and receiver [2, 3]. All the above motives for gift giving are egoistic but the former tend to be more based on perceived obligations [12]. The latter tend more to be voluntary gift giving such as to cheer up a depressed friend, to share a unique object found in the shopping mall, or to express an apology, concern or affection [12]. The effort or cost one is willing to spend for voluntary gift giving is usually more than for obligatory gift giving. In contrast to egoistic motives which are self serving, altruistic motives are selfless (e.g., a father expressing esteem for his child) [25]. Givers with altruistic gift giving motives might spent more effort in searching for a gift than those with egoistic motives [3, 12].

Motives for gift giving, such as obligatory or voluntary, egoistic or altruistic, are like two sides of the spectrum, and can be used to predict decision makers' consequent processes and the effort or cost they are willing to put in gift giving. Furthermore, there exist other factors that also influence a giver's choice of a gift, such as gender, age, income, closeness between the giver and receiver, and so on. In general, females like sending gifts to friends more than males [6]. Older people and low income people do less gift giving [15]. Empirical studies also show that young men will spend more money on gifts to their girl friends than to the friends of the same sex [6, 19]. The budget for a gift to a girl friend should much greater than to older relatives [23]. Age is considered another factor, with elders displaying less gift giving behavior than youths [15]. Moreover, the closer the relationship between the giver and receiver is, the more the giver is willing to pay [24].

The income of the giver and the receiver could also influence gift selection. Gift-giving actually includes several functions in social communication, giving tangible expressions of social relationships, social exchange, or economic exchange. The decision maker should consider the perceptions of the receiver of the gift [3, 5, 8, 20]. To avoid appearing rude, making a decision about the budget for a gift often requires consideration of both the social and economic level of the receiver and giver. For example, when sending dinnerware as a gift, friends with higher incomes would choose higher priced items.

Studies of cultural customs on gift giving indicate that differences exist among countries. For example, the most important holiday for gift giving in western countries is Christmas, where all family members, friends and close relatives give gifts to each other [1]. However, in Asia, Chinese perceive gift giving to romantic partners as being important and, occasionally, close friends who become "like family." In family and family-like contexts, reciprocity is discouraged, there is no need to build closeness through gift giving [13]. On Chinese New Year, the most important festival, elders in the family give red envelopes containing money, instead of gifts, to children and grandchildren. Red envelopes are also given as gifts in other celebrations, such as weddings and births.

2.2 Insights into the Process and the Affection Aroused by Gift-giving

The actual giving of a gift occurs in three stages: (1) the gestation stage for the giver to think of and decide on a gift to express a symbolic special meaning to the receiver. Not only the content of the gift is decided, but also the price and quality of the gift, and the interpretation and possible effect of receiving the gift. What gifts are conceived of sometimes depends on the combination of motivations for the gift giving, the receiver's character traits, the function of the gift, and so on [3].

(2) The presentation stage, where the way in which the gift is presented affects the final outcome; and (3) the reformulation stage, where the receiver reforms his/her relation to the giver after he/she receives the gift. The closeness will either be strengthened, left unchanged, or lessened due to receiving the gift [20, 26].

Rational decision makers are better at predicting the possible results of gift giving and at choose a gift and method of presentation based on the expected results. However, those decisions are not easy. Although the purposes of giving gifts are to enhance social integration (i.e., membership in a group) or to shorten the social distance (i.e., relative intimacy of relationships) [25], gift giving does not always enhance closeness or reach the expected results. The decisions of gift giving sometimes make the decision maker nervous because it is risky and can produce unexpected results [29].

If the giver hopes to reach the effect of enhancing closeness, the most important thing is he/she needs is to predict the emotion aroused by the gift giving, either positive emotions of surprise or joyfulness, neutral feelings, or a negative emotion like disappointment. Because of the inherent stages involved, gift giving differs from simple purchasing decisions in that the giver is concerned with the emotional effect aroused in the receiver and how the gift will be interpreted. Therefore, the two primary steps of decision making are reasonable targets for a two-step gift suggestion solution. First, one decides on the expected effect of the gift giving and then, the gift which can create the expected effect is selected.

The difficulty is that the feeling aroused by gift giving is very subjective and individualized which may bother the person who must choose the gift and is also certainly related to the preferences of the receiver. For example, if a child gives a book of recipes to his/her mother who is interested in cooking, she may perceive it positively, but if the same gift is given to a mother who is a bad cook, she may misperceive it as criticism or satire. The relationship of the receiver to the giver and the motive of gift giving also have an important impact on the sentiment aroused. Gifts which are too expensive or unexpected do not always produce surprise associated with joy, but may arouse suspicion in the receiver. For example, if a lady receives a birthday gift of jewelry from a man whom she does not intend to maintain close contact with, she will probably be suspicious of his motives. Therefore to build a recommendation system for gift giving, it is necessary to take into consideration past studies detailing the emotions aroused by the environment and behaviors of other people.

No previous studies have dealt with validating the emotion aroused by gift giving. However, it can be inferred from previous works on cognition and environment that a gift can be defines as having a cognitive meaning and an affective meaning. Affection may or may not be aroused by the perceived environment and if so, it could be pleasant, neutral, or unpleasant [21]. For example, in relation to the cognitive meaning, a receiver recognizes that he/she has received a bicycle as a birthday gift. The affective meaning is related to the feelings of surprise, being loved or emotionally un-aroused by any affection or disappointed, and so on. The words used to describe the intensity of affection as a consequence of receiving a gift include: surprise, pride, disappointment, embarrassment, sacrifice, altruism, luxury, appropriateness, delight, and so on [4, 20, 22].

Based on the complexity of the decision making process involved in gift giving and the importance of affection aroused due to receiving a gift, this study tries to develop a recommendation system which is easy to use and take into consideration the desired affection aroused by the gift giving.

2.3 Data Mining Techniques

Based on the rate at which internet web services and information technology are increasing, no matter the goods or the services, electronic commerce is growing in every category. Personalized and customized services are becoming more and more important for service or goods providers. As we know, some previous studies have discussed the personalized recommendation techniques that suggest products or services to the customers based on their demographics or past purchasing behavior [14]. The common recommendation techniques include statistics, data mining, artificial intelligence, and so on.

Data mining is a knowledge discovery method consisting of specific processes for extracting patterns from data. There are many techniques of statistical analysis and modeling that can be used for data mining [9, 11]. Combining the data mining techniques and collecting the consumer's behavior data sets comprise a useful tool to help a user make consumer decisions [16, 18, 28]. This work proposes a 2-stepped recommendation technique, which combines the decision tree and K-nearest neighbor method. Using the tree induction techniques, data-mining tools can generate a gift affection tree, in other words a decision tree could help the gift giver to determine what affections those gifts may arouse, where other users' questionnaire responses are utilized to classify each gift into an affection class.

A decision tree is a decision support tool that uses a tree-like graph to model decisions and their possible consequences. Decision tree learning, is used in data mining to create a predictive model which maps observations [27]. Decision trees can be used to classify large amounts of data into specific classes based on the attributes of the data. One advantage is less processing time spent. This technique can also find patterns in the branches using GINI values as shown in Formula (1)

$$GINI(t) = 1 - \sum_{i=0}^{c-1} [p(i|t)]^2. \quad (1)$$

Let $p(i|t)$ denote the fraction of records belonging to class i at a given node t , and c be the number of the classes. $GINI(t)$ represents the impurity measure in c classes of a splitting attribute at a given node t . The lower values of $GINI$ indicate that they are more properly assigned to a node of the branch.

In the second stepped, this study suggests using the KNN (K-nearest neighbor) approach to recommend a gift to a giver. If we consider the classification framework as involving a two-step process: (1) an inductive step for constructing a classification model form data, and (2) deductive step for applying the model to a test example. The decision tree is an example for eager learners because it is designed for model training, to map the input attributes to the class label as soon as the training data becomes available. An opposite strategy would be to delay the process of modeling the training data until it is needed to classify the test examples. Techniques that employ this strategy are known as lazy learners and the KNN method is one of these examples.

The KNN methodology allows for greater flexibility in the classification work needed to find all the training examples that are relatively similar to the attributes of the test example. These examples, which are known as nearest neighbors, can be used to determine the class label of the test example. A nearest neighbor classifier represents each example as a data point in a d -dimensional space, where d is the number of the attributes. Given a test example, researchers can compute its similarity to the rest of the data points in the training set, using one of the similarity

measures, such as simple matching coefficient (SMC), Jaccard similarity coefficient, Euclidean distance, cosine similarity, Hamming distance, etc. The k -nearest neighbors of a given example x refers to the k points that are closet to x . The target x will be classified by the class labels of its k -nearest neighbors. In the case where the neighbors have more than one label, the data point is assigned to the majority class of its nearest neighbors. To choose the value for k is also a critical problem in KNN methods. If k is too small, then the nearest-neighbor classifier may be susceptible to overfitting because of noise in the training data. On the other hand, if k is too large, the nearest-neighbor classifier may misclassify the test instance because its list of nearest neighbors may include data points that are located far away from its neighborhood [27].

The KNN method is popularly used in collaborative filtering recommendation systems [7, 10, 17, 30]. In this study, the traditional KNN method is revised and adapted to the gift giving model. The class of the gift affection will be labeled in the decision tree stage; the KNN stage here just helps the giver to select the gift for the receiver based on attributes similar to the target receiver. Consequently, this study chooses $k=10$ which means 10 ideal gifts which can not only arouse the same sentiments but are also similar to the receiver's expectations, based on the neighbors who have similar properties.

The data mining technique is used to find better suggestions for gift planning during the gestation stage of the gift giving process. The decision tree and KNN methods are selected as the data mining techniques to be used in this study. Both techniques are useful for the task of classification, which suits the needs of gift giving decision making. These results suggest that just one of the methods alone would not be sufficient to perform the task of choosing a gift well.

While a decision tree can only categorize data into specific affection classes, it can propose an affection class for each gift. Using the decision tree technique alone produces gift categories that are too specific, making the classification precision relatively low.

Unlike the decision tree technique, the KNN method compares attribute data one by one, looking for the degree of similarity between neighbors and using the neighbor's expectations as a recommendation. Hence, the result will be more precise than using the decision tree method only. However, KNN takes more time to compare all the data. Based on altruistic love concept, the giver wants the receiver to perceive the desired type of affection. In applications to gift giving, gift receivers with the most similar attributes may not actually like the same gifts, if their mental state or affections are different.

Since the gift giving attributes of users are so different from each other, this means the database is sparsely populated with data, so it makes sense to use the KNN method to create a model to determine which gift is most suitable in the affection tree node. Comparing the decision tree and KNN methods alone for classification tasks, the results show they both have advantages and disadvantages which are highlighted below in Table 1.

Table 1. Comparison of the Advantages and Disadvantages of Decision Tree and KNN Techniques

Technique	Advantages	Disadvantages
Decision Tree	<ul style="list-style-type: none"> ◇ Saves processing time ◇ Finds patterns and rules 	Lower precision than KNN
KNN	Higher precision than decision tree	<ul style="list-style-type: none"> ◇ Long processing time ◇ Gift receivers with the most similar attributes may not like the same gifts if their expected mental states or affections are different.
DTKNN	<ul style="list-style-type: none"> ◇ Affection tree can save processing time ◇ Find the affection patterns and rules ◇ Recommend a gift based on the giver's expected mental states ◇ Higher precision 	<ul style="list-style-type: none"> ◇ More complicated than using a single method

3. RESEARCH METHODOLOGY

3.1. Conceptual Framework of the altruistic gift giving model

Based on the literature review and the investigation of posts from BBS newsgroups, a 2-stepped decision model for gift-giving, first affection classification and then gift recommendation is proposed, as in Fig. 1. A 2-stepped model is better for decision making for gift-giving because there are two decisions to be made. The decision maker not only needs to decide what gifts are appropriate for the receiver but also must consider what affection the giver expects to be aroused by the gift-giving behavior.

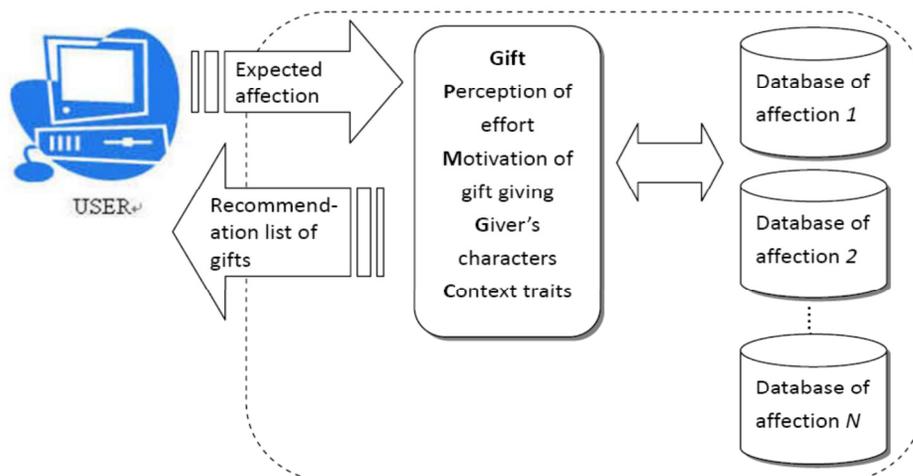


Fig. 2. Conceptual framework of the DTKNN gift recommendation system

The affection of gift receiving may not be aroused by the gift itself but from the other variables such as perception of effort, motivation for gift giving, giver's characteristics, and context traits. This study establishes a database of affections aroused which connects and groups gifts with related variables and their influence and affections aroused. Therefore, a gift might be classified into more than one database of affection. For example, a gift of flowers would be perceived as romantic and surprising if sent from a lover, but it might be perceived as warm from a daughter to a mother.

During the query stage, the recommended list of gifts is compiled from a specific database of these affections. The query scenario includes budget, receiver's character, closeness between giver and receiver, and so on, and compares these factors to previous users in a dataset within the specific subset of the affection database, not all databases, to find the most similar one. It can thus avoid the suggestion of gifts which would not create the specified affection.

3.2. Hybrid Approach of Decision Tree and K-Nearest Neighbor Models for Altruistic Gift Giving

In conformity with the 2-stepped decision making model mentioned above, two techniques of data mining were selected, the Decision Tree and K-Nearest Neighbor approach or DTKNN. The decision tree classification technique was first used to categorize the target classes of affection aroused by receiving a gift from large volumes of empirical data. This method was used to induce the critical variables and their relations to the target classes of affection. For example, based on the literature reviews and posts on BBS, the target classes of affection aroused would be "functionality", "surprise" or "warmth". By using the decision tree technique to classify the data, we determined the rules which would make the receiver perceive the gift as "functional", "surprising" or "warm".

As we know, some attributes are needed to construct the tree in the decision tree method. In addition, the ordering of the branches will make one tree very different from another. The values of the GINI index for each influencing variable were calculated as a measure for which variable would have the ability to discriminate different affections. Lower values of GINI represent node purity and indicate they are more appropriate to being selected for the decision tree branch first.

The k-nearest neighbor approach is used in the second step of the DTKNN. The decision tree step produces rules to help the decision maker determine which gift will lead to what affection. However, as mentioned above, there may be different degrees of affection associated with each gift. Hence, in the second step, the receiver's profile is used to determine the nearest neighbors to the target receiver in the database. The nearest neighbor's preferences will be used to predict and recommend gifts to the decision maker. For example, a cooking pot, a razor or a schoolbag may be classified as functional gifts. But when a gift giver wants to create "functionality" affection to his/her mother, the DTKNN will look for the person in the database who has the characteristics most similar to the gift giver's mother, and recommend the most appropriate gift.

4. SYSTEM DEVELOPMENT OF DTKNN

In order to implement the 2-stepped gift giving recommendation approach, DTKNN, and to validate whether the approach is suitable for altruistic gift giving decisions, this study tries to develop an intelligent DTKNN gift recommendation website utilizing conceptual model and

approach. The processes includes variable analysis, questionnaire design, data collection and analyses through DTKNN, plus evaluation and implementation as shown below in Fig. 2.

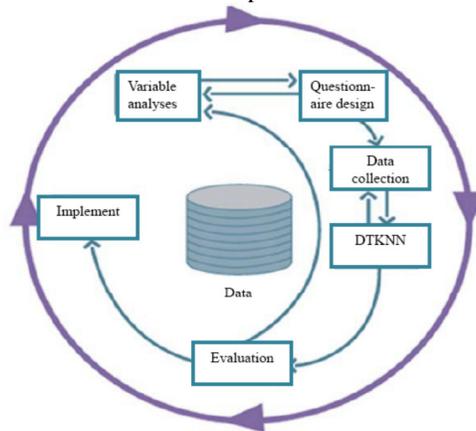


Fig. 3. Procedure for the development and evaluation of the gift giving website

4.1. Variable Analyses in Gift giving

As a prelude to this study, we carried out content analyses to find related variables and possible sentiments aroused by gift giving. We investigated more than 7000 discussions posted to the boardroom of the BBS newsgroup in Taiwan. The results showed that closeness might exist between gift cognition and affection aroused from receiving gifts. Furthermore, we also investigated the words, also called terms, used to describe sentiments created by receiving gifts such as warmth, functionality, pleasantness, consideration, and so on.

4.2. Questionnaire Design

A questionnaire was used to describe a scenario detailing a good experience about receiving a gift. It explored four dimensions: (1) perception of effort, such as whether the gift was handmade or not, unique, favorite, and the attraction classification of the gift; (2) giver's motivation for the gift-giving, such as a culturally mandated gift (holidays, birthdays, weddings etc.) or for a specific purpose; (3) giver's character traits, such as age, gender, income, hobby, closeness to the giver, and so on; and (4) context traits, such as budget for buying the gift, place and participants when presenting the gift, and so on. All questions in the gift survey were multiple-choice.

4.3. Data Collection: Survey

As data mining can only uncover patterns already present in the data, the dataset for establishing the model must be large enough to contain these patterns while remaining concise enough to be mined in an acceptable time frame [11]. Data were collected by a survey. The subjects were six hundred volunteer undergraduate students who represented youthful web users.

4.4. DTKNN Website Implementation

The GINI index of each influential variable was calculated as shown in Table 2. The top 5 critical factors with lowest GINI values in the decision tree were those that had the most

influence on the gift receiver’s affection. They are listed in sequence according to their importance as follows:

- major reason is to satisfy the receiver and make the receiver classify the gift as the best gift;
- gender of the receiver;
- whether the gift was made by the giver;
- closeness between the giver and the receiver;
- price of the gift.
- In the second stage, the KNN method uses the attributes listed in Table 2 to compute the top 10 nearest neighbor’s gifts proposed to the giver.

Table 2. Attributes used in the KNN method

Attributes	Attributes
Price of the gift	The design of the scenario and location
Closeness between the giver and receiver	Concept of money
Handmade or not	Degree of closeness
Reasons for giving the gift	Interests
Gift category	Whether the receiver likes surprises or not
Scenario	Location
The major reason is to satisfy the receiver and make the receiver classify the gift as a best gift	Whether the gift is handmade by the giver
Characteristics of the receiver	Impression
Like the gift itself or not	Gender of the receiver
Participators in the gift receiving scenario	Economic condition of the receiver

*Bold values indicate the top 5 attributes for discriminating the “functionality” and “others” affection categories.

4.5.Evaluation

There are two common indices usually used to evaluate the effectiveness of the data mining prediction work, namely precision and recall. In this study, we decided that the model should recommend the top 10 choices for users using the KNN with the parameter $K=10$. If data show similar scenarios of gift giving and the arousal of the same affection as expected, they could be considered as potential gifts for recommendation. It is not inappropriate to list all potential gifts, nor should only one choice be given because it is better to give users the right to make a choice with the proper amount of information. Therefore, this study suggests that precision index, calculating the correct ratio of gift recommendation gifts, is better than recall index in this work which represents the portion of the total set of correct answers are found.

From the survey data, 400 samples were randomly selected to form the decision rules and another 200 samples were used to validate the DTKNN algorithm for precision effectiveness. The precision of classification of affection aroused in the receivers by the decision rules was 86%. This meant 86% of the correct answers were included in the model’s suggested answers. Furthermore,

within the same affection group, utilizing the similarity algorithm, the precision rate for the top 10 suggested gifts' matching the subjects' answer is 81%. The precision obtained with this hybrid DTKNN is higher than using the decision tree alone (precision of 70%). Although the pure KNN approach can look up the full database, it is not only the affection tree node which may get the most similar neighbor in the whole database. The gift recommendation from the pure KNN method may not arouse the giver's desired affection with the receiver. Consequently, the DTKNN can not only satisfy the affection requirement but also has higher precision than the decision tree method in practical works.

4.6. Implementation

Based on the DTKNN algorithm, the critical five attributes and rules proposed from SPSS which is a well-known data mining and statistics tool, a decision tree algorithm is proposed. The characteristics in Table 2 are used for modeling with the KNN method for data mining. The web development language, PHP, is used to classify the data for affection trees and to compare the characteristics of the decision maker with the dataset in the same affection group to find the 10 most similar suggested gifts. The interface is designed as an animation with a picture of the gift, the price, and the suggested order, as shown in Fig. 3. By using the Flash software, the picture gets larger when the user places the cursor over the item.

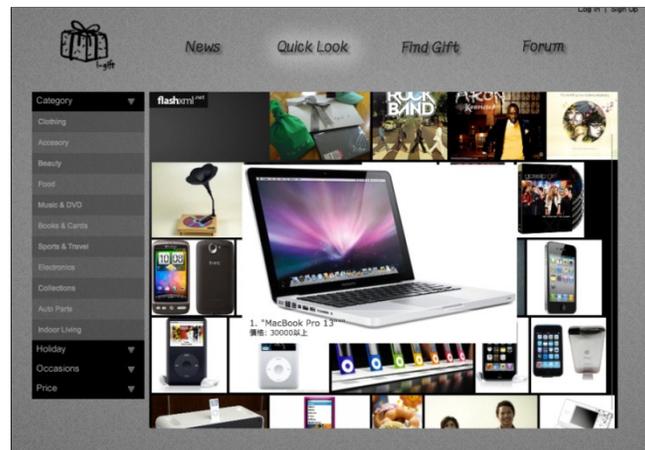


Fig. 4. Interface for the DTKNN gift recommendation website

CONCLUSIONS

Making decisions in gift-giving is a complicated and difficult process. From literature reviews and analysis of 7000 discussions posted in the boardroom of the BBS newsgroup in Taiwan, this study suggests the variables that influence a decision for gift-giving. Among the variables, two goals must be met by the recommended gift: one is it arouses the correct affection response in the receiver and the other is that the recommended list of gifts matches the other required conditions, such as the receiver's preferences, budget for the gift, the closeness between the giver and the receiver, and so on.

Based on the two goals for the recommendation system, a hybrid decision method named DTKNN is proposed. First the recommendation system utilizes the decision tree to classify the gift and

scenario variables into different groups related to the type of affection aroused. The KNN method is then used to compile a recommendation list of 10 gifts that most closely matched the required conditions and scenarios in the specified affection dataset. The DTKNN method was implemented to produce a website with a recommendation system for gift-giving.

There are two contributions from this work. In academic areas, this study proposes a better decision model for gift giving, DTKNN. This is a hybrid method integrating two methods of data mining, the Decision Tree with K-nearest neighbor approaches. Previous studies only mentioned that the behavior of gift-giving contains specific and different goals, but they failed to provide a solution to connect gifts with the goals of gift-giving. Gift recommendation thus cannot be precise. With the concept of “affection aroused”, we can express the idea of goals for gift-giving clearly and specifically. With the decision tree method, we can classify gifts with other scenario variables and match them to different affections aroused. Then using the K-nearest neighbor method, the ten most closely matched gifts can be filtered out from a data set for the specified affection aroused.

The DTKNN method overcomes the deficiency of connecting decision making to the goal of gift-giving. Also, the hybrid decision model combines the advantages of the decision tree and KNN methods. Using the decision tree method, the system can classify data quickly, and using KNN, the system can match data precisely. The recommendation system using this method can thus be quick and precise.

In practice, based on the GINI values, five variables are found which have the greatest influence on the affection aroused. Using these variables, three affections were specified for gift-giving, surprise, functionality, and warmth. The FLASH technology is successfully used to implement the DTKNN method to produce a website for gift-giving decisions. The users can obtain a list of recommended gifts with 81% precision. This study believes this would be most attractive to youths.

Many purchasing behaviors also have the character of two goals for buying decisions. The DTKNN method could also be applied to other kind of applications for making buying decisions, such as buying houses, cars, clothes, and so on. Future studies can adjust the DTKNN and try to utilize it for more applications.

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