Abstract

There are two main research results in this project. First, we consider the viral marketing and online advertising issues of discovering/identifying influential nodes in online social media (e.g. blog, social networking site etc.) via social network analysis (SNA) and artificial intelligence (AI). In this part of research, the three dimension factor such are network-based, content-based, and activeness-based factors are applied for SNA then combined with mining and AI techniques such as pointwise mutual information (PMI) and artificial neural network (ANN) for discovering/identifying influential node. Our work can effectively and accurately point out which node to be selected to become the virus for supporting marketers or advertisers in promoting their products or services.

Second, the technology acceptance model (TAM) has applied to analysis the relationship between design aesthetics of mobile website design and customer trust in m-commerce. In this study, design aesthetics was enhanced to include a website characteristics component as important to trust development on the mobile Internet. Our research found that design aesthetics did significantly impact website characteristics component, especially customization, perceived usefulness and ease of use, all of which were ultimately shown to have significant explanatory power in affecting customer trust.

Keywords: influential model; viral marketing; social networks; social media; mobile commerce; design aesthetics; technology acceptance model

摘要

在這份研究報告裡有兩個主要成果。首先，我們利用社群網路分析（social network analysis, SNA）以及人工智慧（artificial intelligence, AI）在病毒式行銷與線上廣告相關議題中進行如何在線上社群媒體（例如：網誌和社交網站等）中定義出對人群具有影響力的使用者。於此，我們從網路、內容與互動三個面向切入進行SNA，而後結合相關的資料探勘和人工智慧技術來發掘具有影響力的使用者。本研究可有效且正確的指出有助於行銷人員進行行銷的線上使用者。其次，我們將科技接受模型（TAM）用於分析在行動商務中，網站設計美學和用戶信任之間的關係。在這研究內，設計美學包括了在行動商務網站的特性而這也是在發展用戶信任感時的重要元件。我們研究發現設計美學確實影響著行動商務網站的設計與用戶的信任感，特別是個人化，便於理解用途和容易使用。

Keywords: 影響力模型、病毒式行銷、社群網路、社群媒體、信任度、行動商務、設計美學、科技接受模型

1. Introduction

Under the current global economic structure, firms face extreme competition from competitors around the globe. Prior study reveals that, under the whole cost structure of firms, only the marketing costs have significantly increased over the last 50 years [23]. The advancement of technology drives down the manufacturing and managerial costs but, at the same time, raises the marketing cost rapidly [31].

With lower costs, higher speed, and externality effects, marketing on the Internet has advantages over traditional media. However, its effectiveness is still uncertain. To resolve this problem, the development of recommendation mechanisms based on the information of the products, purchase history and personal preference, and data-mining techniques [5, 34] would be helpful for sending information to the customers who are most possibly interested in them. Nevertheless, customers' purchase decisions would be largely influenced by the product comments provided by someone we trust, rather than the firms' advertisements [14]. Identifying the potential influencers could help enterprises improve effectiveness of their online marketing strategies through word-of-mouth information propagation.

For e-vendors, the concept of building trust in electronic commerce (e-commerce) to ensure customer confidence and long-term relationships has been recognized, practiced and researched [10, 12, 21]. Over time, as more and more customers use their mobile device to conduct business activities, building trust for vendors in mobile commerce (m-commerce) is equally important. However, gaining trust for m-vendors is seriously challenged by the interface design (e.g., small screen) [18] and its network capabilities (e.g., connection speed) [24]. Customers are constrained by these factors when making business transactions. As such, this puts mobile vendors (m-vendors) in a disadvantageous position. For m-vendors, the process of building trust is complex and transitional, but it can be done.

In this project, we study both technical (identifying influential nodes) and economical (increasing trust in m-commerce through design aesthetics) dimensions of social media. In the technical part, we propose influential models for different social media such as blogosphere and social networking site, in which the marketers or promoters could be supported to allocate their resource to promote products or services through the identified influential nodes. In the economical part, we investigate the relationship between design aesthetics of mobile website design and customer trust in m-commerce for the mobile vendors to gain more trust from customers for creating more business opportunities.

2. Research Goals

First, we propose several recommender system architectures that could successfully applied to different social media such are blogosphere, online forum, and

social networking site. According to the proposed system architectures, successfully and efficiently identifying influential nodes (e.g. super-reviewers, experts, and influencers etc.) or recommending items (e.g. online reviews, social network applications, and discussion threads etc.) from a large scale online social network could be expected. Second, a reliable and valid empirical study is provided. In our constructed empirical analysis model involves 200 subjects using structural equation modeling techniques which offers a unique contribution to the mobile commerce for increasing online trust by providing empirical evidence of users' perception of service quality. An experimental simulation analysis and empirical investigation will be conducted to evaluate the technical and operational effectiveness and robustness of the proposed system architectures.

Comparing to extensive literature on the research of the development of online recommender systems and increasing online trust in mobile commerce for supporting firms or e-vendors, the study of these two parts of research domains is still insufficient. This research area is fertile and a lot of topics are worthy to be explored. To better understand the domain of online social network, we conduct both the technological examination to suggest a better design for online recommendation system and quality improvement through empirical investigation to propose appropriate analysis for efficiently supporting e-vendors could increase their online trust in m-commerce.

In this research, we will link the disciplines of computer science and empirical investigation to discover more managerial insights to advance the development of information management in business activities.

3. Literature Review

There are numerous studies on social recommender system. Sinha et al. [25] have shown that, given a choice between recommendations from friends and those from recommendation systems, friends' recommendations are preferred. Friends are seen as more qualified to make good and useful recommendations compared to traditional recommendation systems [4]. Kritikopoulos et al. [17] ranks blogs according to their similarity in social behaviors by graph-based link analysis, which demonstrates an excellent paradigm of link analysis. The works by Agarwal et al. [2], Java et al. [13] and Subramani and Rajagopalan [26] applied various network-based parameters and dimensions to examine the influence of commentary information in online social networks.

The degree centrality, closeness centrality, and betweenness are the three most widely used social network centrality measures within the social network analysis [11]. Recently, some research has applied social network analysis (SNA) to identify the experts [6, 28]. They claim the majority of individual knowledge transfer does not

follow formal hierarchies or processes but is instead driven by personal and informal communications.

Celebrity endorsers are people who enjoy specific public recognition by certain groups of people [20]. Using celebrity endorsers for products promotion is a common practice in marketing, and it has been extended to the online context [29]. Product endorsement could be an effective way for SNS advertising based on unique SNS characteristics [32]. Past researches imply that celebrity endorsers add value through the process of meaning transfer [3, 20].

In the issue of increasing trust in mobile commerce, there exist hidden action problems. Luarn and Lin [19] extended TAM with other variables (i.e., credibility, self-efficiency and financial cost) and examined consumer's behavioral intention to use mobile banking. Consistent with Wang et al. [30], they found credibility having a significant relationship with behavioral intention to use. According to Siau and Shen [24], trust in m-commerce (m-trust) can be divided into two categories: trust in mobile technology and trust in mobile vendors. Design aesthetics is an important tool to develop trust as effective website design attracts customers and gain their attentions [1, 8]. Following Cyr et al. [7], design aesthetics in m-commerce was defined as the balance, emotional appeal, or aesthetic of a website and it may be expressed through the elements of colors, shapes, language, music or animation.

4. System Structures

4.1 Identifying Influential Reviewers

The proposed model analyzes the content of after-use reviews provided by online users and the reviewing activities of these authors to identify the potentially influential reviewers. Figure 1 displays the main components and procedures included in the system architecture.
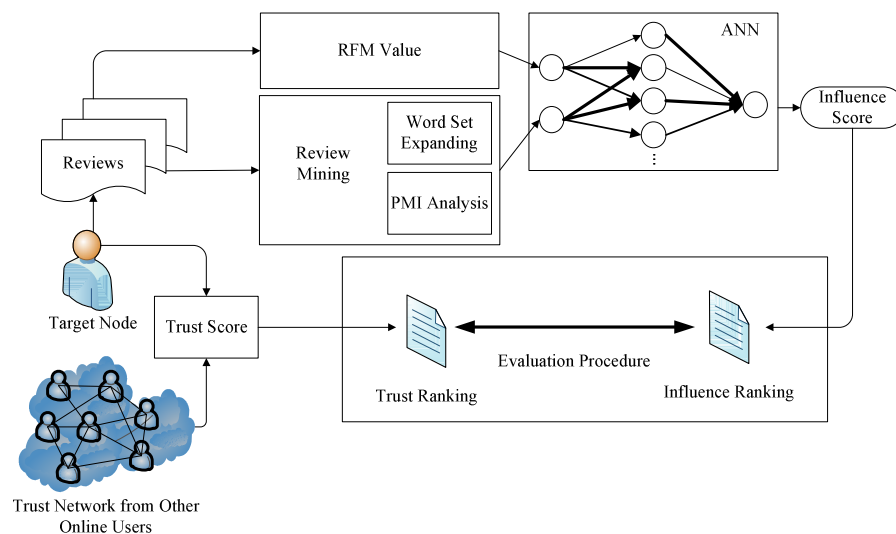

Figure 1. System concept and architecture

In the framework, the comments written by each reviewer are first analyzed by text-mining techniques and quantified by a modified PMI (Pointwise Mutual Information) measure based on an established subjective work set. In the meantime, the reviewing recency and frequency of the authors are quantified to measure the RFM scores of the reviewers. Then, the PMI- and RFM-based scores are combined to determine whether a reviewer has the infective ability and is valuable in word-of-mouth marketing. To aggregate these two scores better, an ANN (artificial neural network) technique is used to implement the weighting mechanism. The well trained ANN model further outputs a list of ranked influential reviewers. Finally, we utilize a well-developed trust mechanism to evaluate the effectiveness of our proposed influential reviewers discovering mechanism.

4.2 Identifying Influencers in Blogosphere

In this section, we propose a marketing influence evaluation model to identify a set of potential bloggers with high market influence. By identifying a set of possible influential bloggers/blog-sites, the marketers could take them as the marketing nodes implied in market and launch available marketing strategies on them to enhance the effectiveness and availability of blog marketing. Added to which, the role of the influential bloggers is mainly to create awareness and signal benefits to others within their blog social network; they can be particularly influential in encouraging trial and adoption of novel products and services [26]. In this model, we divide the marketing influence value into three main categories, which are network-based, content-based, and activeness-based values, as shown in Figure 2. The blogosphere incorporates several important factors and properties in examining whether a blogger indeed has sufficient potential to elaborate the influence of viral marketing.
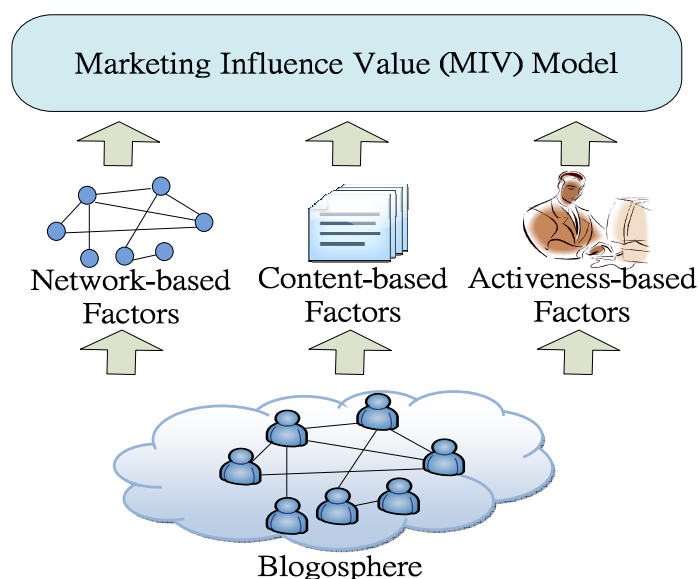

Figure 2. Social influence and MIV factors in the blogosphere

4.2.1 Network Influence Analysis

The network-based factors can be subdivided into social connection factors and social interaction factors. The *in-links and out-links* aggregate by PageRank algorithm ($PR(b)$) and *Network externalities* estimated by the number visitors of blog site (α) are included in social connection part. The *Blogroll relationships* evaluated by the reputation (γ), *comments and citations are estimated by* the number of comments (c), and the number of citations (η) respectively are included in social interaction part.

Network-based value ($NV(b)$) of blog site b is affected by the above factors that are taken into the equation to prepare a ground for developing the MIV model. The network-based value of blog site b is formulated as

$$NV(b) = \alpha_b PR(b) + \gamma_b \left(c_b + \eta_b \right).$$

The first term in the measurement represents the value from social connection factors, and the second term stands for the value from social interaction factors.

4.2.2 Content Influence Analysis

To measure the content-based marketing influence value of a blog site, we combine the above content-based factors such as subjectiveness (s) which used to estimate the subjectiveness of bloggers' expressions, the length of a blog post (λ) which means longer posts attract more people's attention, and living time in network (τ) which used to estimate the quality of information that generated by blogger together into the MIV model. The content-based value of a blog site b is formulated as
$$CV(b) = \tau_b (s_b + \lambda_b).$$

4.2.3 Activeness Influence Analysis

An influential node should have fascination and activeness in his/her network community. Intuitively, a more active blogger would show more willingness to make social conversation with other users. A blog site with regular content post (*cp*) can attract users to revisit the blog site or subscribe to the blog posts. A blogger replies to comments representing that the blogger has interest in making social conversation with other users. In this research, the number of comment replies (*cr*) is used to reflect the level of users' willingness to share or to answer other users' questions.

We calculate the activeness-based value of a blogger by the counts of its activity records during a period of time in the blogosphere. We define $act(b) = cr + cp$ as the number of activities of blogger b during a time period T. The formula of activeness-based value (*AV*) is defined as below:

$$AV(b) = \frac{act(b)}{T}.$$

4.2.4 Marketing Influence Value Calculation

Combining *NV*, *CV* and *AV* of a blog site, we could quantify the marketing

influence value (MIV) of a blog site. The MIV model is developed by aggregating the weighted above 3 dimension values. The formulation of MIV model as

$$MIV(b) = \omega_n NV(b) + \omega_c CV(b) + \omega_a AV(b) ,$$

where $MIV(b)$ is the marketing influence value of blog site b, and ω_n, ω_c and ω_a are the weights that can be used to adjust the contribution of above 3 dimension values. Because of the complexity of human behaviors in the blog social network, in this research, a three-layer back-propagation neural network (BPNN) is employed to deal with the uncertain weighting problem between NV, CV and AV such as ω_n, ω_c and ω_a for forecasting the final MIV value.

4.3 Social Recommender in Knowledge Sharing

We propose a social recommender system which employs semantic analysis, expertise analysis, and relation analysis modules, as well as a modified Markov chain model based on social networks to construct a more comprehensive and personalized framework for relevant discussion thread recommendation and expert-finding in the knowledge forum. Figure 3 depicts the architecture of the proposed recommendation mechanism. There are four analysis modules developed to analyze the information from the constructed form network. The objectives of the analysis modules included in the system are described as follows.

(1) The semantic analysis module establishes the term vectors for each discussion thread and user profiles to compute the semantic similarity (SS) score between a query and a thread (SSt) or between a query and a user's profession and interest (SSp).

(2) The expertise analysis module combines the interests and professions extracted from user profiles with the articles they posted or answered to analyze whether an expert has enough ability and aspiration to answer the requested questions. The expertise analysis module outputs the profession and reliability (PR) score.

(3) The relation analysis module analyzes the social similarity degree between users and the popularity degree of a user by examining their social activities and generates the social intimacy and popularity (SIP) score.

(4) The social network-based Markov Chain (SNMC) analysis module computes the transition probability (TP) that a directly or indirectly linked expert will answer a user's questions by evaluating the possibility of question referral activities in the forum social network.

For each question/query asked by the users in the forum, the system outputs a list of recommended threads and a list of recommended experts. The recommendation of threads is determined based on the semantic similarity (SSt) score between a thread and the query and social intimacy and popularity (SIP) score between the post's author and the requester. The expert recommendation is evaluated based on the

profession and reliability (PR) score of an expert, combined with the (SIP) score and the transition probability (TP) of an expert to the requester. The whole processes of the recommendation mechanism are detailed in the following subsections.
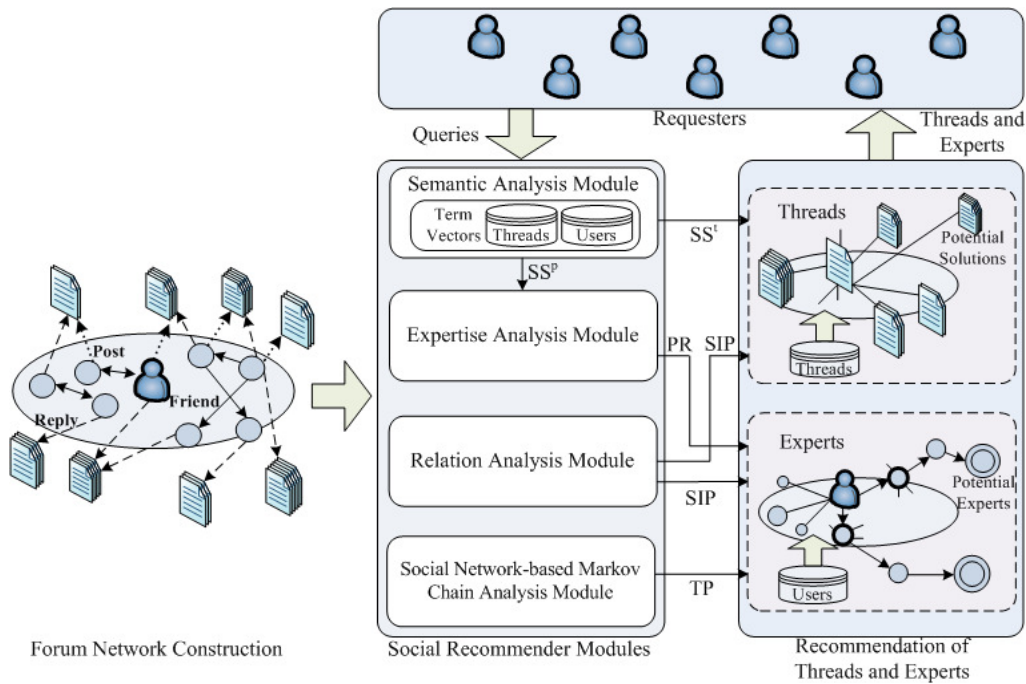

Figure 3. The architecture of the social recommender system

4.4 Social Filtering Mechanisms within Social Network Applications

To design a recommendation system for social network based services, a social application and its user's social relationships are two essential components that require comprehension and analysis. A social application's attributes would influence users' using interests to different degrees. For instance, some users are subject-oriented, in that they pay more attention to what fits their preference; while some users may be more likely to use popular social applications. However, some users are more social-related, in that they would consider whether to use, based on their friends' usage situations or opinions. That is, users would probably make decisions according to how many friends are using or who is using. It is noted that this kind of person would think highly of a friend's interest in a product than in an application's traits, since the essence of a social application lies in its users' interactions. Hence, it is necessary for a recommendation system to take into consideration users' social relationships. A user's tendency towards a certain social application is hard to predict; it might be a mixture of several factors with distinct weights. It is possible for a person to be both subject-oriented and socially oriented (to varying degrees) or for a person to simultaneously care about subject, popularity, reputation, social usage situations, and so on. Therefore, the vision of this paper aims to propose an innovative social network based application recommendation system by

considering both an application's objective aspects and a user's subjective viewpoint. The whole recommendation system architecture is demonstrated in Figure 4.
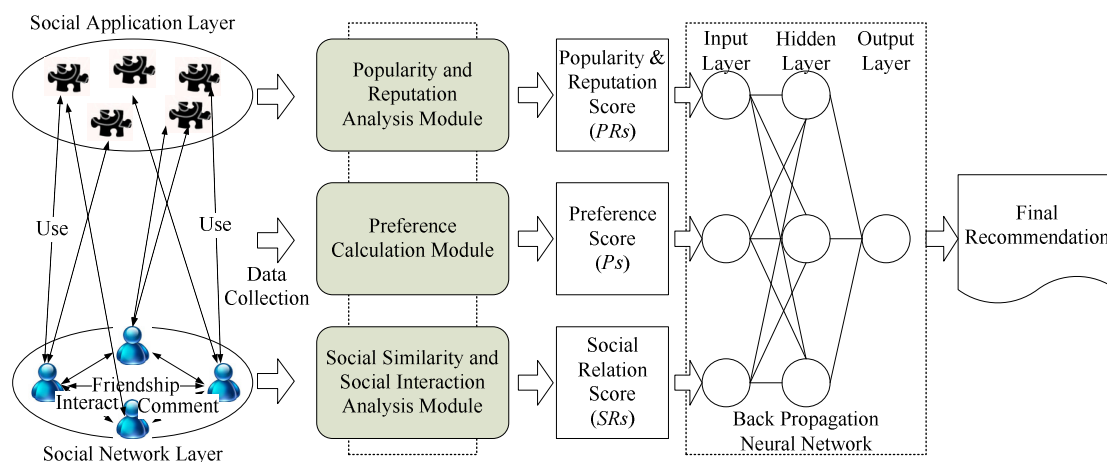

Figure 4. Architecture of social application recommendation mechanism

The system model includes three analytical modules; the "Popularity and Reputation Analysis Module", "Preference Analysis Module", and "Social Similarity and Social Interaction Analysis Module". In the Popularity and Reputation Analysis Module, an empirical statistical survey is undertaken on a number of users in order to collect the application's public information that actually influences users' decisions. After the empirical investigation on the concerns of the general users, the application's population and reputation information could later be used to infer the application's performance, based on users' perceptions. In the Preference Analysis Module, the target user's entire usage profiles are collected in order to discover the user's category taste. The social similarity and social interaction analysis module is developed to evaluate an application's social attraction power and the social invitation capability generated by the friends who have used this application. The target user's social relationships and interactions among friends are then extracted. These three modules would produce the corresponding scores (PRs, Ps, and SRs), representing the degree of dimension, respectively. In order to combine optimally the scores that best represent users' points of view, an artificial neural network model is applied.

4.5 Endorser Discovering Mechanism for Social Advertising

In this part, our proposed system architecture includes two main components - an endorser discovering mechanism and a user feedback mechanism.

4.5.1 Endorser Discovering Mechanism

The main components of the endorser discovering mechanism include an influence analysis module, a preference analysis module, and an intelligent discovering module. The influence analysis module includes three indicators of influential measure: degree centrality, betweenness centrality, closeness centrality and tie strength. The centrality measures belong to the methodologies of social network

analysis. In the preference analysis module, we use a category tree structure to clarify the preference distribution of users and the category definition of ads. The possibility that a user may be interested in an advertisement can be evaluated in this module. In the second stage, the Influence Score (IS) and Preference Score (PS) which are calculated in the first stage, and Rating-feedback score (RS) which is collected from user evaluation are used as inputs to the neural network (ANN) and thus, we can generate the final Endorser Rating Score (ERS) of the users from the output. The advertisement is delivered to the top-N users. Figure 5 shows the detail system framework of our proposed endorser discovering mechanism.
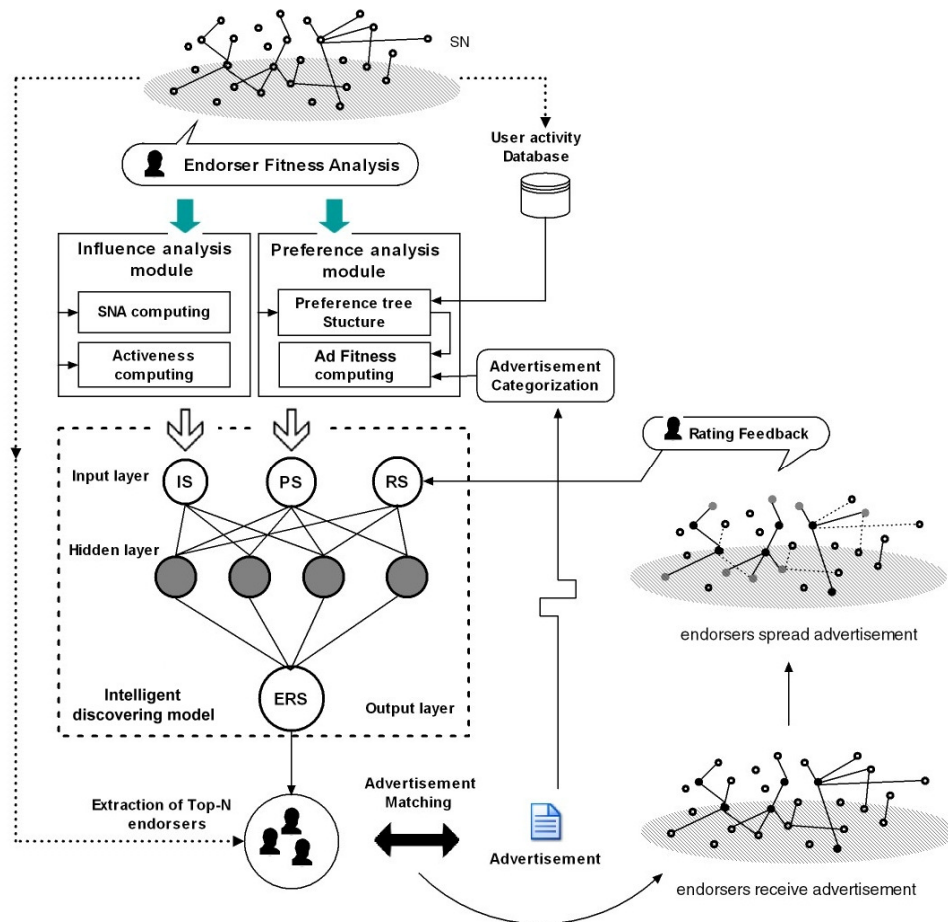

Figure 5. The system framework of SEAD

4.5.2 User feedback mechanism

The benefits of increasing the positive influence and decreasing the negative effect are what we emphasize in our proposed social advertising mechanism. It results from the principle that generally users would not send irrelevant or boring messages to their friends. In order to avoid misplacing the prerequisite and to ensure the social filtering process by users, we design a user feedback mechanism to let the user reflect the feeling of receiving ads. The mechanism helps us to evaluate the user satisfaction of the sender and product information. By using Likert Scale, the options of the rating

levels range from 1 to 5 (Offensive: 1, Irrelevant: 2, Moderate: 3, Interesting: 4, Joyful: 5). Once a user rates an advertising message, the rating score and matching information (sending endorser, category of advertisement) will be stored.

4.6 Increasing Trust in Mobile Commerce

For e-vendors, the concept of building trust in electronic commerce (e-commerce) to ensure customer confidence and long-term relationships has been recognized, practiced and researched. The high level of trust not only smoothes the transaction but also eliminates the uncertainty as well as perceived risks. As a result, a website with a greater level of trust is often associated with a higher degree of purchase intentions and higher customer retention rate. Gaining trust from mobile customers relies on well-designed websites. Recent research examined a variety of topics, including impact of interface design on trust development in m-commerce, factors affecting the adoption of m-commerce and extended business applications for mobility. Of this relevance to this study, Koufaris and Hampton-Sosa [16] found that a customer perception about the website is a key determinant of gaining initial trust, followed by a development of buyer-seller relationship. On the other hand, website's design aesthetics or visual aesthetics were found to be important for gaining trust from customers [15]. Elements of design aesthetics include color, photographs, font style and layout. Studies showed that design aesthetics affect perceived usefulness and ease of use of a website [21]. Hence, we believed that a thorough examination of the factors mentioned above that promote trust in mobility context is critical and may have implications on the trust development for m-vendors.

Design aesthetics is an important tool to develop trust as we mentioned in literature review section. There are studies referring design aesthetics to various website design issues [27, 33]. Zettl [33] argued that visual aesthetics need to interact with website design to produce the final message. Zettl [33] further stated that it is important to correctly apply visual aesthetics. They should be aimed to support the messages that are intended to deliver to the customers. Misuse of design aesthetics can result in an ineffective communication and thus become a disadvantage. Related to this, Tractinsky and Lavie [27] stated that design aesthetics should work with website design elements (e.g., usability, customization and interactivity) as a whole to produce an aesthetic experience rather than being viewed as isolated elements. Finally, such an experience will be greatly influenced by design aesthetics [33].

We predicted that design aesthetics along with three website characteristics of usefulness, ease of use and customization would result in m-trust. Figure 6 showed the model. Usefulness and ease-of-use are the two vital elements in technology acceptance model (TAM) [9]. In TAM, behavioral intention to use is jointly influenced by attitude and usefulness, where the latter affects the former directly.

Moreover, ease-of-use directly influences usefulness and attitude. In general, TAM functions to explain and predict the technology adoption. The hypotheses are listed below:

H1. Higher level of design aesthetics of a mobile website will result in higher m-trust.

H2. Higher level of design aesthetics of a mobile website will result in higher perceived usefulness of the mobile website.

H3. Higher level of design aesthetics of a mobile website will result in higher perceived ease of use of the mobile website.

H4. Higher level of design aesthetics of a mobile website will have a higher impact on the customization of the mobile website.

H5. Higher perceived usefulness of a mobile website will result in higher level of m-trust.

H6. Higher perceived ease of use of a mobile website will result in higher level of m-trust.

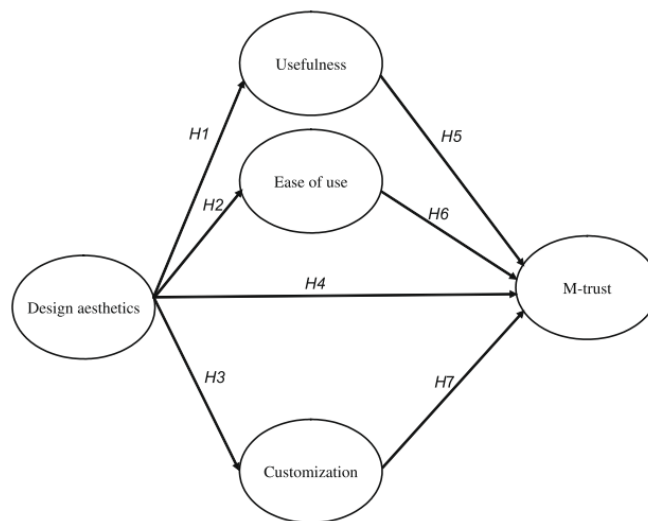**H7.** Higher customization of a mobile website will result in higher level of m-trust.

Figure 6. A model for m-trust development

5. Conclusion

This research mainly aims to support enterprises carry out a successful online word-of-mouth marketing within the online social media which can save a lot of resources in finding customers and earn more business opportunities. Word-of-mouth marketing is a new and effective marketing method that is based on the power of ''word of mouth" for saving many resources and avoiding possible trouble in mass marketing. Blogging, online knowledge sharing (e.g. product review comment, experience sharing, and problem solution etc.) are some of huge word-of-mouth engines and the blogosphere, online forum have also become excellent platforms for

advertisers to promote their product or service and for customers to locate product comments and purchasing suggestions. Finding potential nodes (e.g. bloggers, reviewers, and experts etc.) who are powerful to others and willing to share/spread product impressions efficiently is the key to word-of-mouth marketing.

This study provides some feasible yet powerful social recommender systems to generate a ranked list of bloggers, super-reviewers, and experts according to their social network factors, expertise, social interaction analysis, and social relation analyses in improving the effectiveness of marketing activities. Also, according to semantic similarity, subjective analysis, pointwise mutual information (PMI), and preference analysis etc. for discovering the most valued and appropriated discussion threads, social network applications and endorsers for knowledge sharing and online advertising. Our experimental results show that these proposed models could significantly reduce marketing cost and uncertainty, and the proposed model could give better results than other approaches.

The effect design aesthetics on the dimensions of website characteristics was significant. From the coefficients value in table 1, we could easily observe that all of the hypotheses were supported. All together, design aesthetics, perceived usefulness, perceived ease of use and customization accounted for 37% of the variance in m-trust, with customization exerting a stronger effect on m-trust than design aesthetics and perceived usefulness and ease of use.

Table 1 Results of hypotheses testing.

Hypothesis	Causal path	Path coefficient	t-Values	Supported
H1	Design aesthetics → PU	0.39	4.74[***]	Yes
H2	Design aesthetics → PEOU	0.24	2.78[*]	Yes
H3	Design aesthetics → Customization	0.47	5.92[***]	Yes
H4	Design aesthetics → m-trust	0.25	2.80[*]	Yes
H5	PU → m-trust	0.20	2.76[*]	Yes
H6	PEOU → m-trust	0.19	2.62[*]	Yes
H7	Customization → m-trust	0.25	3.19[*]	Yes

[*]$p<0.01$
[***]$p<0.001$

While the proposed model contributed to the theory and extended the generalizability of mobile services, the major contribution of this research is the integrations of design aesthetics with other selected constructs into a coherent and parsimonious model that predicts m-trust. From a theoretical perspective, the work developed the m-trust framework and validated this framework. Based on a solid theoretical foundation, the m-trust framework combined constructs of design

aesthetics and website characteristics such as perceived usefulness, ease-of-use, and customization in a new context of mobile services and provided a new way to understand the unrevealed effect created by these m-trust determinants. From a practitioner perspective, the objective of this work was to demonstrate practical insights of how to establish m-trust among customers of mobile services. Our study highlighted the significant role played by design aesthetics.

Reference

[1] Agarwal R. and V. Venkatesh, "Assessing a firm's web presence: A heuristic evaluation procedure for measurement of usability," Information Management Research, 13(2), 121-168, 2002.

[2] Agarwal N., H. Liu, L. Tang and P.S. Yu, "Identifying the influential bloggers in a community," Proc. Int. Conf. on Web Search and Web Data Mining, Palo Alto, California, USA, 2008, pp. 207-218.

[3] Amos C., G. Holmes and D. Strutton, "Exploring the relationship between celebrity endorser effects and advertising effectiveness," International Journal of Advertising 27 (2), 209-234, 2008.

[4] Bedi P., H. Kaur and S. Marwaha, "Trust based recommender system for semantic web," In Proc. of the Int. Joint Conf. on Artificial Intelligence, 2677-2682, 2007.

[5] Cho Y.H. and J.K. Kim, "Application of Web usage mining and product taxonomy to collaborative recommendations in e-commerce," Expert Systems with Applications 26 (2), 233-246, 2004.

[6] Cooke, R.M., ElSaadany, S. and Huang, X., "On the Performance of Social Network and Likelihood-based Expert Weighting Schemes," Reliability Engineering and System Safety 93 (5), 745-746, 2008.

[7] Cyr D., C. Bonanni, J. Bowes and J. Ilsever, "Beyond trust: Website design preferences across cultures," Journal of Global Information Management, 13(4), 24-52, 2005.

[8] Cyr D., G.S. Kindra and S. Dash, "Web site design, trust, satisfaction and eloyalty: The Indian experience," Online Information Review, 32(6), 773-790, 2008.

[9] Davis F.D., "Perceived usefulness, perceived ease of use and user acceptance of information technologies," MIS Quarterly, 13(3), 319-340, 1989.

[10] Doney P.M. and J.P. Cannon, "An examination of the nature of trust in buyer-seller relationships," Journal of Marketing 61, 35-51, 1997.

[11] Freeman L. C., "Centrality in social networks conceptual clarification," Social networks 1(3), 215-239, 1979.

[12] Jarvenppa S., N. Tractinsky and M. Vitale, "Consumer trust in an Internet store,"

Information Technology and Management 1(1-2), 45-71, 2000.

[13] Java A., P. Kolari, T. Finin and T. Oates, "Modeling the spread of influence on the blogosphere," Proc. 15th Int. World Wide Web Conf., Edinburgh, UK, 2006.

[14] Jurvetson S., "What exactly is viral marketing?," 2008. Available from: http://www.currypuffandtea.files.wordpress.com/2008/03/viral-marketing.pdf.

[15] Karvonen K., "The beauty of simplicity," In ACM Proc. on the Conf. on Universal Usability, 85-90, 2000.

[16] Koufaris M., "Applying the technology acceptance model and flow theory to online consumer behavior," Information Systems Research, 13, 205-223, 2002.

[17] Kritikopoulos A., M. Sideri and I. Varlamis, "BlogRank: ranking weblogs based on connectivity and similarity features," In Proc. 2nd Int. Workshop on Advanced Architectures and Algorithms for Internet Delivery and Applications, Pisa, Italy, 2006.

[18] Lee Y.E. and Benbasat I., "Interface design for mobile commerce," Communications of the ACM 46 (12), 49-52, 2003.

[19] Luarn P. and H.H. Lin, "Toward an understanding of the behavioral intention to use mobile banking," Computers in Human Behavior, 21, 873-891, 2005.

[20] McCracken G., "Who is the celebrity endorser? Cultural foundations of the endorsement process," Journal of Consumer research, 16 (3), 310-321, 1989.

[21] Schultz L., "Effects of graphical elements on perceived usefulness of a library," Available from: http://www.tarleton.edu/~schultz/finalprojectinternetsvcs.htm.

[22] Selnes F., "Antecedents and consequences of trust and satisfaction in buyer - seller relationships," European Journal of Marketing 32 (3/4), 305-322, 1998.

[23] Sheth J.N. and R.S. Sisodia, "Feeling the heat: marketing is under fire to account for what it spends," Marketing Management (4), 8-23, 1995.

[24] Siau K. and Z. Shen, "Building customer trust in mobile commerce," Communications of the ACM, 46(4), 91-94, 2003.

[25] Sinha R. and K. Swearingen, "Comparing recommendations made by online systems and friends," In Proc. of DELOS Workshop: Personalization and Recommender Systems in Digital Libraries, 2001.

[26] Subramani M.R. and B. Rajagopalan, "Knowledge-sharing and influence in online social networks via viral marketing," Communications of the ACM 46 (12) 300-307, 2003.

[27] Tractinsky N. and T. Lavie, "Assessing dimensions of perceived visual aesthetics of websites," Ben Gurion University of the Negev. Available from: http://burdacenter.bgu.ac.il/publications/finalReports1999-2000/TractinskyLavie.pdf.

[28] Wang J.C., M.J. Chiang, J.C. Ho, W.T. Hsieh and I.K. Huang, "Knowing Who to

Know in Knowledge Sharing Communities: A Social Network Analysis Approach," In Proc. of the 7th Int. Conf. on Electronic Business, Taipei, Taiwan, 345-351, 2007.

[29] Wang A., "The effects of expert and consumer endorsements on audience response," Journal of Advertising Research, 45 (04), 402-412, 2005.

[30] Wang Y.S., Y.M. Wang, H.H. Lin and T.I. Tang, "Determinants of user acceptance of internet banking: An empirical study," International Journal of Service Industry Management, 14 (5), 501-519, 2003.

[31] Weber J.A., "Managing the marketing budget in a cost-constrained environment," Industrial Marketing Management 31 (8), 705-717, 2002.

[32] Wen C., B.C.Y. Tan and K.T.T. Chang, "Advertising Effectiveness on Social Network Sites: An Investigation of Tie Strength, Endorser Expertise and Product Type on Consumer Purchase Intention," ICIS 151-171, 2009.

[33] Zettl H., "Sight, sound, motion: Applied media aesthetics," USA: Wadsworth Publishing Company, 1999.

[34] Zhang Y. Y. and J.X. Jiao, "An associative classification-based recommendation system for personalization in B2C e-commerce applications," Expert Systems with Applications, 33 (2), 357-367, 2007.

計畫成果自評

本計畫工作已順利完成，其主要核心為網際網路線上推薦系統以及行動商務中的客戶信任因素模型之建構與分析。本專題計畫正式完成項目與計畫初預期項目之情形如下：

1 廣泛文獻探討與推薦方法研究

如附錄所示，我們已發表（或審查中）了 6 篇研討會論文和 6 篇期刊論文，其中分別在「研究背景」與「相關文獻」都有這些內容之記載。領域涵蓋「社群網路分析」、「推薦系統」、「線上廣告推行」、「知識分享」、「影響力分析」等。而開發方法則包括人工智慧的「類神經網路」與統計理論中的「科技接受模型」。基於這些工作，我們得以分析並研究如何利用社群網路分析法結合人工智慧建構線上推薦系統，藉以協助廠商在網際網路中推行線上病毒式行銷。另外，也藉由統計理論中的科技接受模型深入分析在行動商務中增進使用者信任度的原因分析，以作為未來進一步分析與探討的基石。

2 線上推薦系統的面向

附錄中的研討會論文以及期刊論文皆已有針對這部份的研究結果公開發表與應用。我們廣泛的搜集在網路社群媒體中，使用者和使用者之間不同面向可能的分析因子進行推薦系統的建置與分析。在研究中發現，如欲建立一完整有效的網路推薦系統，至少應同時考慮社群、內容和互動三個不同面向之因子。附錄中的研究成果已陸續成功的建構出產品評論家推薦系統、部落客推薦系統、廣告代言人推薦系統、社群網路應用程式推薦系統以及網路論壇專家推薦系統。

3 行動商務中信任機制的建立

附錄論文中的會議論文 5 和期刊論文 2，即針對目前行動網路中的電子商務（或稱行動商務）使用者的信任因素進行研究。行動商務至今仍受限於行動裝置的大小和效能（諸如螢幕大小、解析度、像素、行動運算速度等）。本研究中利用統計理論中著名的科技接受模型建立起可能因素（諸如網站畫面的設計感、網站效能、容易使用以及客製化）與行動商務信任感之間的關係模型，經由詳細深入的分析後可針對行動商務服務提供者提出建議，培養提供者與使用者之間信任感進而提昇獲利。如何能提昇使用者和行動商務服務提供者之間的信任度，為本專題的主要項目之一。相關的研究結論與發現皆已刊載於附錄論文與本專題報告內容之中。

目前本專題研究成員將整理研究成果，並將最後成果投稿國際期刊。本研究團隊在線上推薦系統和統計分析上的傑出部份是我們認為能夠大幅超越過去資訊管理領域在網路服務品質研究上的優勢，同時也是本研究室核心，並且是全球資訊管理學界頂尖學府如MIT、CMU目前專注的領域。因此，如受到獎勵資助的研究時程能得以延伸，我們相信能夠做出更創新、突破的研究。

附錄

1. 已發表會議論文

[1] **Li, Y.-M.**, C.-Y, Lai, C.-W. Chen, "Identifying Bloggers with Marketing Influence in the Blogoshpere", 11th International Conference on Electronic Commerce (ICEC 2009), pp. 335-340, Taipei, Taiwan, August, 2009.

[2] **Li, Y.-M.**, H.-W. Hsiao, "Recommender Service for Social Network based Applications", 11th International Conference on Electronic Commerce (ICEC 2009), pp. 378-381, Taipei, Taiwan, August, 2009.

[3] **Li, Y.-M.**, N.-J. Lien, "An Endorser Discovering Mechanism for Social Advertising", 11th International Conference on Electronic Commerce (ICEC 2009), pp. 125-132, Taipei, Taiwan, August, 2009.

[4] **Li, Y.-M.**, T.-F. Liao, "A Novel Recommendation Mechanism for Knowledge Sharing in Online Forum Communities", Proc. 13th Pacific Asia Conference on Information Systems (PACIS 2009), Hyderabad, India, July, 2009.

[5] **Li, Y.-M.**, Y.-S Yeh., "Service Quality's Impact on Mobile Satisfaction and Intention to Use 3G", Proc. 42th Hawaii International Conference on System Science (HICSS-42), pp 1-10, Manoa, Hawaii, USA, January, 2009.

[6] **Li, Y.-M.**, C.-Y, Lai, C.-H. Lin, "Discovering Influential Nodes for Viral Marketing", Proc. 42th Hawaii International Conference on System Science (HICSS-42), pp 1-10, Manoa, Hawaii, USA, January, 2009.

2. 已發表或修改中期刊論文

[1] **Li, Y.-M.**, C.-H. Lin, C.-Y. Lai, "Identifying Inferential Reviewers for Word-of-Mouth Marketing," Electronic Commerce Research and Application, 2010, forthcoming (SSCI).

[2] **Li, Y.-M.**, Y.-S. Yeh," Increasing Trust in Mobile Commerce through Design Aesthetics," *Computers and Human Behavior*, 2010, forthcoming (SSCI)

[3] **Li, Y.-M.**, N.-J. Lien, "Online Social Advertising via Influential Endorsers," (Submitted to *International Journal of Electronic Commerce*). In revision.

[4] **Li, Y.-M.**, T.-F. Liao, "A Social Recommender Mechanism for Improving Knowledge Sharing in Online Forums" (Submitted to *Information Processing & Management*). In revision.

[5] **Li, Y.-M.**, H.-W. Hsiao, "Recommending Social Network Applications via Social Filtering Mechanism," (Submitted to *Decision Support Systems*) In revision.

[6] **Li, Y.-M.**, C.-Y, Lai, C.-W. Chen, "Identifying Influential Bloggers with Marketing Value in the Blogoshpere" (submitted to *Information Sciences*). In revision.