SOCIAL EVENT MARKETING MECHANISM FOR LOCATION-BASED SERVICES

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Abstract - O2O business model synergize the efficiency improved from online retailing and value created from physical customer experience. Nowadays, while many O2O apps and services have been proposed, the study of the accuracy of customer targeting and the effectiveness of advertising in a dynamic environment are big challenges currently faced by O2O e-commerce. In this paper, we proposed a novel social recommendation mechanism for enhancing O2O e-commerce, by incorporating the techniques of context-awareness and social referral. The proposed mechanism could identify the most suitable ads for targeted users in a changing environment, and could significantly improve the effectiveness of advertising by taking the influence of friends into consideration.

Keywords - Location-based Service; O2O; Social referral; Social Recommender systems.

I. INTRODUCTION

With the exponential growth of mobile device and social community in the last decades, social media and mobile device not only change the way people communicate with friends, but also change the way providers communicate with consumers. With the ubiquity of people getting connected dramatically changes the landscape of post electronic commerce, the linkage between online and physical commerce are becoming stronger. An integrated sales experience melds the advantages of physical stores with the information-rich experience of online shopping [1]. In this case, there emerges a business model called O2O which can refer to online-to-offline. O2O commerce effectively connects online and offline services, thus providing services to consumers with great convenience.

Online-to-offline commerce is an important trend and can be exemplified by services such as Groupon, Yelp and Dianping in the restaurant business, TripAdvisor and Hipmunk in the travel business, and Uber in the transportation business [2]. This kind of business mode usually provides information, services, booking discount, advertising and pushing the messages on the Internet and allows customers to seek products online through the website or mobile terminals first and then consume them in physical stores. With online information and mobile device, customers can get more information anytime and anywhere [3], it is more easy and convenient for customers' transaction. By this way, online commerce can increase physical retails..

Although there is this rising trend, the application of mobile media to create value effectively for O2O e-commerce is still a big issue faced by enterprises. Annoyance is a negative feeling a customer has regarding various forms of stimulation [4]. Lee et al. [5] suggests annoyance as having a negative impact on purchase intent, with the degree of the impact increasing distinctively if a buyer suffers inconveniences or harbors ill feelings. Excessive product advertisement and unsuitable promotion that may be present in O2O e-commerce can incite annoyance compared to helpful information, and in turn, cause a negative attitude or intention towards the purchase of a product or service. One of current solutions to reduce the negative attitude or intention is by exploiting location-based advertising mechanism to send promotion information to meet the requirement of users. However, most existing LBA approaches, which mainly exploit only current location information, still cannot provide highly effective ads [6]. Event–aware decision support systems have to cope with a high volume of events continuously generated by sensors. Conventional software architectures do not explicitly target the efficient processing of continuous event streams, event-driven architectures have been proposed as a new paradigm for event-based applications. Our project is to apply the concept of event-driven architectures to marketing, and also redefine the meaning of "event" as the actual activities in our daily life. For example: concert, ball game…etc. Because of the multi-sensor smartphone and the social network platform that we used every day, it's much easier to keep trace what's going on with the people we care. But there have been little research focusing on monitoring the event that is happening around us and make it as much influential as possible, so we try to build a recommendation system around the "event" that happens in our real life. After gathering all the possible participants of the events, we then start to analyze each participant's characteristic by deploying some preference analysis, and moving trajectory analysis method, we divide the crowd into subgroups base on their characteristics (targets users group for specific store). By doing so, the participants can gather purchasing power by bargaining as a group of customers. On the other hand, venders can push the right goods according to the characteristics of the event and the customers and improve the economic

benefit of an event. With social network platform such as Facebook, it's a lot easier to know what social event is happening with our friend and family that we may interesting in around us, and make the most out of it. We try to build an event-driven marketing mechanism based on the mobile device that can maximum the value out of the crowd instantly. For the user side, they can get a better deal in the merchandise that user wants from the aggregation of crowd. For the vender side, they can make more money out of the crowd by draw more customers into their physical store. This project aims at developing a novel recommendation mechanism for social event-driven commerce through social event marketing

With social network platform such as Facebook, it's a lot easier to know what is happening with our friend and family, but there are very few research focusing on monitoring the event that we may interesting in around us, and make the most out of it. So we try to design a mechanism that can monitor and detect the event that is happing around us, and recommend the event that we might want to participate. With the help of the smart mobile device's advanced features and rich data available in online social network, we aim at developing a social event activity recommendation mechanism to achieve more accurate ads targeting. With more accurate ads targeting, customers would not receive junk ads and the product or event information is the users most want just at that moment. To achieve the goal of higher ads accuracy, social influence and mobility influence will be taken into consideration in our mechanism. Many studies have proved that one's emotions, opinions, or behaviors are affected by others. Finally, the users' feedback should be considered to improve the accuracy of this system. The main goal of this research is to be able to provide the users "the most willing to attend" event activity in a more intellective way. This project aims at developing a novel recommendation mechanism for social event-driven commerce through social event discovery. We extract the check-in posts to identify the event theme users discuss, and analyze the activity type of the event around the valid service scope of a social event. By analyzing the fitness considering the criteria factors of preference similarity, social influence, and mobility influence, the proposed system could effectively recommend the most suitable activities to users. With a fast growing number of mobile users and venues/POIs within such services, it is important to adopt efficient techniques so as to provide precise venues/POIs recommendations. That is to say, we should focus on how to improve the accuracy of targeted advertising with social event activity recommendation mechanism by using mobile and social event data, which can also raise the revenue of advertisers. To deal with the problem of low accuracy of social event activity recommendation is the main goal of this mechanism.

In this study, we design a new social event recommendation mechanism that includes utilizing contextual fitness analysis, social referral analysis, and contextual ad recommendation. The proposed social event activity recommendation mechanism is evaluated by conducting experiments on users' Android cellphones. Our experimental results will show that compared with other benchmark recommendation methods, the proposed social recommendation mechanism could significantly improve the accuracy of the targeting of users, and increase the effectiveness of recommendations.

The remaining sections are organized as follows. The relevant concepts and the literature related to our work are presented in Section 2. Section 3 describes the details of the proposed mechanism. In Section 4, the experiments and results that were conducted on the proposed mechanism are described. experiments. Finally, Section 5 concludes this study and presents directions for future research.

II. RELATED WORK

A. Location-based Service (LBS)

Location-based services (LBS) is an important enabler for physical stores to improve profitability via deploying online-to-offline (O2O) commerce. LBS has appealed huge attention due to their potential to transform mobile communications and the possibility for a variety of highly personalized and context-aware services [13]. With LBS, these platforms can provide mobile ads which are highly relevant to the user's location. The advertisers can provide the store's information, advertise in the assigned locations and realize online to offline O2O commerce [14]. For example, T.G.I. Friday's restaurant, through LBS positioning advertising mechanism of Vpon, consumers can enjoy joyful advertising videos, which can immediately display the nearest store and allow consumers to share information to location-based social network. Consumers can go to the nearest restaurant via mobile map navigation. In company with mobile advertising, social context, coupon, brand, and the product attracts consumers into the practical stream of LBS commerce. In this project, through social intelligence and mobility intelligence of location-based social network, we will examine the accuracy of customer targeting and the effectively of advertising to enhancing social event LBS commerce.

B. Social Influence and Mobility Influence

The rising popularity of social media such as Twitter and Facebook has been useful for marketers promoting their products and for consumers sharing their opinions. People often navigate social media sites to seek the reviews of others when making a purchase or decision, and therefore, social influence is a vital factor in the decision-making process. Sinha and Swearingen found that consumers tend to consider recommendations from people they trust and know,

such as friends and family members [24]. Numerous researchers thus take social influence as a factor in decision-making systems. In general, customers are willing to use the service whose location is close and convenient to reach. Transportation convenience is one of the important factors affecting the customers' visit or purchase intention. Due to location-dependent service is only serviced at specific location. Hence, even the smart phones users have received a very attractive ad for LBS, if the distance is far away from the smart phone users to LBS, the smart phone users can't drive to the LBS destination and use this service. If the transportation convenience is greater, more people will be attracted to use the LBS. In this sense, the moving trajectories of users should be analysed to explore the user's mobility influence for LBS. In this project, we study the impact of social and mobility influence in the suggestions of an activity, endorser, and store more accurate.

C. Endorser Marketing Strategy

Marketing with endorsers is a common and useful strategy. An endorsement means the advertising message that can affects the behaviors of customers. The person who can appear this influence on individual or group is called the endorser [16]. The endorsement marketing can be categorized into celebrity endorsement and non-celebrity endorsement. A celebrity endorser is a person who enjoys public recognition and uses this recognition on behalf of a consumer good by appearing with it in an advertisement. In other words, the celebrity endorser has a special influence to affect people on behaviors. Past studies show that celebrity endorsement brings lots of advantages on image polishing, brand introducing, brand repositioning, attention increasing, producing positive attitude towards advertising, and increasing the purchase intentions [17]. The advertising researchers noted that the positive emotional attitude is important on the goal of advertising and can be viewed as an indicator on advertising effectiveness [18]. This suggests that the endorsement strategy, especially the celebrity endorser approach, is helpful to conduct advertising and can be expected with better effectiveness.

Since the endorsers can influence the behaviors of customers, the endorsement mechanism would be very helpful on advertising. Besides the social influence power, the endorsers are often being trusted by the people that they can affect. In this project, we adopt the concept of endorser marketing to develop a social event marketing mechanism for LBSs to enhance the value of the social event ads received. This suggests that through the endorsement mechanism will enhance the advertising acceptance of customer and decrease the advertising avoidance.

D. Multi-criteria decision-making (MCDM)

Regardless of the daily lives or professional domains, several representative conflicting criteria exists and need to be assessed in the process of decision-making. Multiple-criteria decision-making (MCDM) is a sub-discipline of operations research that explicitly considers multiple criteria in decision-making environments [25]. One of the MCDM methods is Analytic Process Hierarchy (AHP), proposed by Thomas Saaty, which is designed to solve complex problems involving multiple criteria [26]. The applicable situation of AHP is when criteria are arranged in a hierarchic structure [27]. Furthermore, AHP is an appropriate solution when involves the principles of decomposition, pair-wise comparisons and priority vector generation and synthesis [27]. The AHP has been further applied in many profession domains, such as social network analysis [28], recommendation mechanism [29] and facility location selection [30]. In this project, in order to deal with the issue of activity, endorser and store priority ranking and the selection of the most fitting endorser based on multiple evaluation criteria that are interrelated with each other, AHP is utilized in our proposed mechanism.

E. Event Driven Marketing

Event marketing is a very popular marketing tool in recent years. For example, if a company sells sporting products, they can market at a sporting event. If a business is able to explore and position their target audiences, then they can find ways to attract them. Users attend an event implies that they are interested in the services provided by this event. Hence, if we can identify the service type this event provides then we can understand the interests of the users who are attending the event. When it comes to a nearby store recommendation, it's relatively important to identify what kind of event users are attending, which could significantly affect their buying behavior. By identifying the event that users are attending, we will have a better understanding of why the users are there, and be able to recommend a more event-relevant store to them.

The phenomenon of "impulse purchasing" or "impulse shopping" is an unplanned decision to buy or to shop based on the context (e.g. emotion, feelings, event etc.) at that time. For example, when people have just finished watching a ball game, they are more likely to purchase game-related products in that time than they would in a normal situation. By incorporating the insights derived from event discovery into the recommendation system, the phenomenon of "impulse purchasing" or "impulse shopping" will be appropriately covered and work as a foundational component in our proposed mechanism.

In this project, we apply the technique of social event discovery to activity, endorser, and store recommendation by analyzing the online check-in data [15]. Specifically, we use geographical context and user-generated check-in posts to anticipate the

"event" that the user is participating in. After identifying the characteristic of the event that is happening around the users, we make activity, endorser, and store recommendation according to users' characteristics, moving trajectories, store characteristics and their social relationships.

III. THE SYSTEM FRAMEWORK

A successful with social event will attract a large of crowds to participate and bring a great business opportunity for the nearby stores and event related product sales. In the social event marketing mechanism, we try to build a social event driven marketing system. To develop a novel social endorsing mechanism for social event targets advertising to enhance effectiveness and coverage of social event marketing. By monitoring the check-in posted in popular social network platforms (e.g. Facebook), we can observe or predict the phenomenon of the gathering of the crowd.

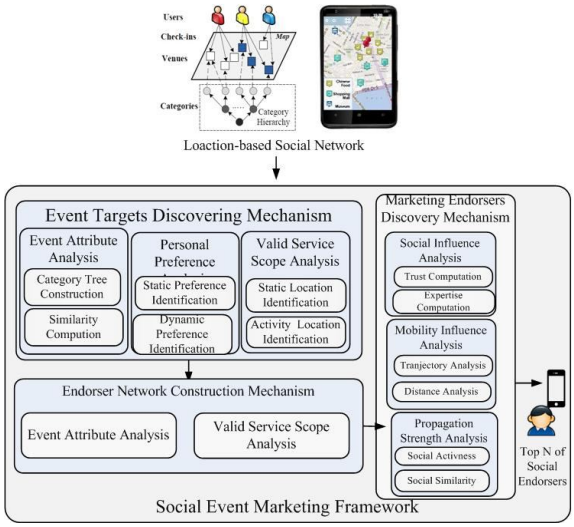


Figure 1. Social event marketing mechanism system framework

The proposed event discovery functionality enables the users to be fully aware of what's happening around them. After discovering the event, we can further analyze the right target users of the event. We try to apply some text mining techniques that can identify the key words from the user's check-in post to analyze the preferences of users and the categories of event advertisements. In order to develop a novel social endorsing mechanism for social event targets advertising to enhance effectiveness and coverage of social event marketing. After finding the event target users, we construct the endorser network to find the candidate endorsers for event information dissemination. Finally, we can incorporate social Influence analysis, mobility analysis and propagation strength analysis into marketing endorsers discovery mechanism to find the top-N suitable endorsers. With the concept that we proposed, we can enhance the business value of the event marketing. To carry out this mechanism, three major modules are required. They are: Event targets discovering analysis, Endorser network construction analysis, Marketing endorsers discovery characteristic analysis and Activity fitness analysis. Figure 1 depicts the system framework of the proposed system.

A. Event Targets Discovering Mechanism

The targets discovering mechanism will discover the target users group by the categories of them and the event advertisement. The event target discovering mechanism will analyze the preferences of users and the categories of event advertisements. In addition, because the service is location dependent, only those customers close to the valid service scope can be the finally target users. Event target users will be discovered by measuring the similarity between the categories of their preferences and the category of event advertisement with the valid service scope constraint.

B. Event Endorser Network Construction Mechanism

After discovering the social event target users, an endorser candidate network can be constructed within the valid service scope of LBS of social event. Endorser candidate refers to people or organization with sufficient capability to serve as advertising seeds for these target users, with fitness the social event LBS service type and within the valid service scope of LBS. The system will construct the endorser candidate network by including the users with interest in the event advertisement, expanding from the target users. The members of this network will be the candidates of endorsers.

C. Event Endorsers Discovery Mechanism

Finally, the event endorsers identifying mechanism will find out the set of appropriate endorsers by analyzing the social influence, mobility influence and the propagation strength of the members.

CONCLUSION

An social event-driven marketing mechanism will be proposed. This system can be used to enhance the number of the participants of the event as well as the value these people created. Event and location based commerce support features will be developed to benefit both the customers and the local stores. The contributions of the research are described as follows. First, from the system development perspective, we have designed in this work an effective CSR mobile advertising application to allow advertisers to distribute location-based ads. The experimental results confirm that our proposed system can significantly improve the accuracy of user targeting and also the willingness to purchase at the recommended store. Second, from the methodological perspective, this social influence or social context factor, which has a

great influence or reference value for users' choice in a mobile environment, should have been noticed and carefully considered by advertisers. In this work, as well as the online social networks, we consider the social network formed by mobile contacts, which has barely been used in the mobile advertising field. Third, from the practical perspective, the existing location-based review sites, such as Google Local, ipeen.com and Yelp.com, have clearly not recognized the importance of context-aware recommendations. The approach of using stores' contextual rating data to characterize the stores themselves, and then using this to indicate users' possible needs, is innovative. This work may inspire the review sites and other advertisers. Lastly, from the empirical perspective, the results of the experiments demonstrate that context awareness can effectively improve the accuracy of predicting users' dynamic needs, and the social referral feature can alleviate the feelings of antipathy towards ad recommendations.

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