Analysis of Tourism Marketing Platform Based on Social Network Perspective

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Abstract: The online travel market has many categories and fierce competition. In order to compete for customer resources, major platforms continue to take various measures, and have combined their own characteristics to design their own marketing programs. However, the online travel market is still full of smoke, and there is still no online platform with absolute advantage. For exploring the products needed by consumers and the most effective marketing strategies, this article uses Qunar.com as an example to analyze the user network of the travel platform and summarize the characteristics of the travel platform's community. On this basis, a new set of tourism APP marketing strategy was proposed.

1. Introduction

In traditional marketing strategies, only media channels can be used to expand the breadth of communication and the length of exposure, which is neither controllable nor difficult to measure for consumption conversion. In the era of community communication, mining community value and thinking about the community will help companies achieve innovative marketing in the era of scenes, and achieve qualitative changes in marketing information and marketing effects[1].Compared with the original individual consumption model, the social consumer group has a greater impact on consumers' psychology and behavior. The unique culture, sense of ceremony and sense of participation of the brand community have helped consumers deepen their brand awareness and acceptance. This article selects Qunar.com as the research object, analyzing whose user interaction behavior by using the captured online data. Through the construction of a travel virtual community network, revealing the network characteristics, behavior characteristics and relationship characteristics of the participating members using the travel virtual community for information dissemination and communication interaction. Through mining the social structure data of the actor's behavior, deeply analyzing the potential social network structure and network power characteristics formed by the participating members, and providing support for tourism platform marketing innovation.

2. Social network analysis model

Social network analysis, a discipline developed on the basis of integration of multiple disciplines such as statistics and graph theory, has gradually been practiced and applied in many fields such as sociology, economics, and management due to the universal applicability of research methods and tools [2]. The main research object of social relationship network is "relationship", which is valuable for marketing application research [3]. This article will conduct a more comprehensive research on the social network of software applications from two perspectives of self-centered network analysis and overall network analysis.

2.1 Network density of the overall network

If the directional of the network is not considered, assuming that there are n actors in the network, the theoretical maximum number of relations possessed by the overall network is $n\times(n-1)/2$, while the actual relationship number in the network is m, then the network density of the overall network = actual relationship number/theoretical maximum relationship number = $2m/[n(n-1)]$. If we consider the directional nature of the relationship network, there are still n actors in the network. In theory, $n\times(n-1)$

is the maximum number of relationships owned by the entire network. At this time, the network density of the overall network = $m/[n(n$-$1)]$. If the overall network density is high, it would have more influence on the actors in the network, and the connections between the actors in the network would be closer. While providing various resources and conveniences for actors located in the network, this close connection will also become an important constraint restricting individual development [4].

2.2 Structural analysis of "core edge"

"Central periphery" structures generally exist in the social economic system, such as the "core periphery" structure of international trade, and the "center periphery" theory of regional economy. Its essence is to analyze the structure of the overall (economic) network.

2.3 Centrality analysis

In the network, the "power" of a certain actor relative to other actors in the same network is expressed by the absolute centrality or relative centrality, that is, the strength of its centrality [5]. Consider an extreme situation. in a complete network, when the "power" of all actors is equal, centrality is difficult to measure the "centrality" of the entire network. The "centrality" of the network is an indicator to measure the overall centrality of the network. The calculation idea of this indicator is as follows:

$$c = \frac{\sum_{i=1}^{n}(c_{max}-c_i)}{\max[\sum_{i=1}^{n}(c_{max}-c_i)]} \tag{1}$$

Among them, c_{max} is the maximum centrality in the network, and c_i is the centrality value of other actors.

In the specific calculation process, the absolute centrality of the actor (c_{ADi}) and the absolute centrality of the maximum actor (c_{ADmax}) can be recorded, then:

$$c = \frac{\sum_{i=1}^{n}(c_{ADmax}-c_{ADi})}{\max[\sum_{i=1}^{n}(c_{ADmax}-c_{ADi})]} \tag{2}$$

Middle centrality. If an actor is on multiple network connection lines in a network, it can be said that the actor has the ability to control the connection between other actors. The actor has the centrality of the actor[6].

Assuming that in the network, the number of shortest paths between actors j and k, g_{jk}, the ability of the third actor i to control these two actors is $b_{jk}(i)$, define $b_{jk}(i) = g_{jk}(i)/g_{jk}$, That is, the probability that the actor i is located on the shortcut between the actors j and k. Remember the absolute centrality of c_{ABi} actor i, then:

$$c_{ABi} = \sum_{j}^{n}\sum_{k}^{n} b_{jk}(i), j \neq k \neq i, j{<}k$$

3. Social network analysis of travel platform

3.1 Research object

This article limits the research in time and space. Spatially, it is the object that posts published or replied to the "Shanghai Bund Hotel" commentary question and answer community are studied. There are 1790 comments and 149 questions and answers in its comment community, which guarantees the basic scale of the tourism virtual community. In terms of time dimension, the behavior of posting and replying in the tourism virtual community from February 2016 to February 2019 was selected to avoid the impact of the epidemic and ensure that the research has a sufficient time span.

3.2 Data collection and sorting

The crawler program used in this research is written in JAVA language, based on the etree module, Re module and Xpath crawling technology under the lxml library in the python 3.0 language. A total of 15 fields are collected. The data was collected from February 2016 to February 2019. After deleting duplicate comments, a total of 832 participating members and 1123 valid comments posted by them

were obtained. In order to prevent the unrecognizable characters and special characters in the user ID from being unrecognized by the system, the collected 832 users were coded from 1 to 832.

3.3 Network construction

Because the interaction between actors is directional, the edges generated in the tourism virtual community network are directional [7]. Participating members will be marked as "1" if they have contacted each other through replies. Otherwise, they will be marked as "0". Furthermore, a symmetric matrix is constructed for the interaction between members to form the tourism virtual community network data, as shown in Table 1.

Table 1 Interactive matrix of tourism virtual communities (partial)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
11	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

3.4 Analysis of the overall characteristics of the network

After excluding automatic replies from isolated nodes and hotel official accounts, there are 792 actual participating members and 1905 valid comments. The Gephi 0.9.2 software is used to draw the interactive network map of the members of the travel virtual community, as shown in Figure 1. It can be found that the overall network in the community is relatively sparse. There are a small number of core participating members represented by nodes "310", "356", "398", "216", "658", "706", etc. in the network, which connect actors at marginal positions and release them. At the same time, the information can be received by most of the participating members in the network and cause a large number of other members to follow. It can be preliminarily determined that participating members with high attention and authority such as "310", "356", "398", "216", "658", and "706" have strong influence and information dissemination capabilities. There are obvious small groups formed by active molecular central nodes in the overall relationship network.
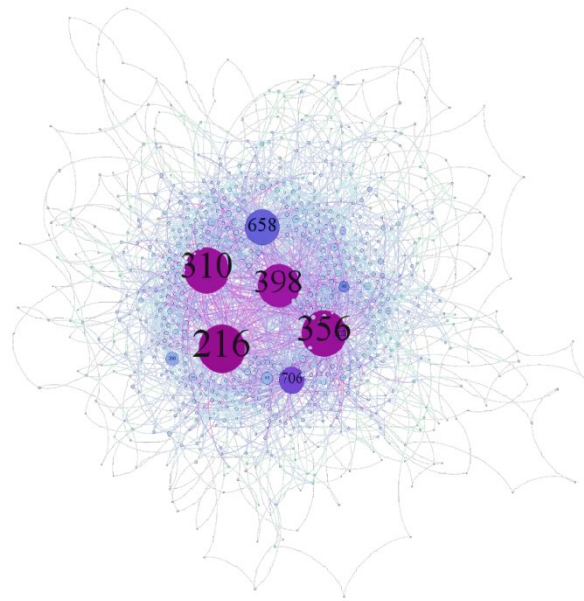
Figure 1. Interactive diagram of tourism virtual community

Ucinet 6.0 software is used to measure the density of the interactive relationship network matrix data of the tourism virtual community. It is measured that there are a total of 792 participating member nodes and 1905 interactions in the network. That is, there are 1905 pairs of participating members that have an interactive relationship. On average, each participating member has an interactive relationship with 1.3 other members. The maximum possible total number of node pairs in the network is 624890.So the overall density of the network is 0.003, that is, the actual interaction volume only accounts for 0.3% of the theoretical interaction volume. Compared with network density of 0.5 that calculating by the random selection model of MAYHEWBH, the tourism virtual community network is a typical low-density network, indicating that the interaction between members in the tourism virtual community network is relatively low, and all members have fewer connections between nodes, the lines connecting nodes and nodes are sparse, and there are a large number of weak links in the network[8].

Table 2 Core-edge model analysis results (partial)

Core/Periphery Class Memberships	Density
1 2 4 5 6 7 8 12 16 17 28 38 40 43 44 47 50 89 90 95 114 118 126 151 175 198 204 208 216 240 271 276 292 309 310 318 324 332 333 334 356 369 370 372 375 384 398 406 407 409 433 442 462 478 515 517 534 542 555 585 600 645 656 657 658 663 670 699 706 719 732 735 739 755 768 775 777 779 780 782 784 792	0.032
3 9 10 11 13 14 15 18 19 20 21 22 23 24 25 26 27 29 30 31 32 33 34 35 36 37 39 41 42 45 46 48 49 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 91 92 93 94 96 97 98 99 100 101 102 103 104 105 106 107 108……726 727 728 729 730 731 733 734 736 737 738 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 756 757 758 759 760 761 762 763 764 765 766 767 769 770 771 772 773 774 776 778 781 783 785 786 787 788 789 790 791	0.005

The results of the core-edge model further validate the core-edge structure of the tourism virtual community network (Table 2). There are 82 and 710 participating members in the core area and the fringe area, respectively. The network density of the core area including the members of activists "310", "356", "398", "216", and "658" is 0.032; The edge area network density including members "3", "9", "10", "11", and "13" is 0.005. The overall network density is low, but the network density in the core area is much higher than that in the edge area. It shows that the internal connection in the core area is

close, and the internal connection in the marginal area is loose. Participating members of the core area play the functions of information diffusion, agglomeration, and transit in the network, and have a control effect on the edge nodes. This is related to the high frequency of interaction between the participating members of the core area and the wider range of interaction areas. In general, the tourism virtual community network presents an obvious "core-periphery" structural feature.

3.5 Centrality

Ucinet 6.0 software is used to calculate the degree centrality of the tourism virtual community network. The top 10 nodes are shown in Table 3. According to the statistical data in the table, in terms of outward degree centrality, the member with the largest number of nodes replying to other nodes is "398", followed by members "310", "356", "216", "706", " 208", "658", 200", "543" and "719" etc. In terms of the centrality of introversion, the member "216" received the most replies, followed by members "356", "310", "208", "398", "658", "706", "375 ", "462", "724". Among them, the member "216" has the highest click-in degree of 44 and click-out degree of 38, which means that the member has direct information exchanges with the other 82 participating members in the travel virtual community. The high point of view proves his dominance in the network, having many followers and supporters, which is a highly popular member of the travel virtual community [9].

Table 3 Calculation results of degree centrality (top ten)

	Node	OutDegree		Node	InDegree
1	398	44.000	1	216	44.000
2	310	42.000	2	356	37.000
3	356	42.000	3	310	36.000
4	216	38.000	4	208	36.000
5	706	34.000	5	398	31.000
6	208	32.000	6	658	20.000
7	658	25.000	7	706	18.000
8	200	21.000	8	375	4.000
9	543	11.000	9	462	4.000
10	719	9.000	10	724	4.000

From the statistics in Table 4, it can be seen that the standardized intermediate centrality of participating members "216" is the highest at 25.294, the intermediary position in the entire tourism virtual community network is the most prominent, the number of connection points is the largest, and the relationship adhesion is the strongest. The other members in the top 10 are members "398", "310", "356", "706, "658", "208", "90", "12" and "89" in order. Through the collection, processing and transmission of information, these core nodes play an extremely important "information bridge" role in the tourism virtual community network. Other participating members rely on them to a high degree, and many information flows are disseminated through them. Through powerful force to mobilize and control the flow of information resources, increase the connectivity of the network, and occupy a monopoly position in the network, thus having greater network power (figure 2).

Table 4 Calculation results of intermediate centrality (top ten)

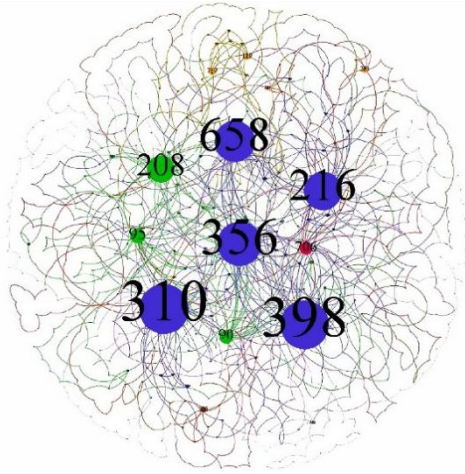|	Node	nBetweenness
1	216	0.253
2	398	0.220
3	310	0.212
4	356	0.211
5	706	0.142
6	658	0.141
7	208	0.137
8	90	0.046
9	12	0.044
10	89	0.039

Figure 2. Network community diagram of travel virtual community

4. Marketing Strategy

Based on the social network perspective, it is not difficult to find that the virtual community formed by the travel software platform is a low-density network, the cohesion of participating members is weak, and the efficiency of information dissemination is low. However, based on various communication opportunities, communication occasions, and communication efficiency, some relatively close small groups have emerged in the network. In addition, the network has a "core-edge" structural feature, presenting an unbalanced development trend, and the overall network is restricted by a few core nodes. In view of the social network characteristics of the current travel platform and the difficulties faced by marketing, the author believes that looking for consumers can "circle" target consumers through the construction or docking of brand communities. Through scenario construction and big data calculation, the platform provides consumers with suitable scenario services and information recommendations. The platform creates community barriers and increase the influence of the community through the construction of community culture and the precipitation of unique IP content. The three are connected in multiple dimensions to improve consumers' favorability towards the community and brand and the sales conversion rate (See figure 3). It can create an innovative marketing strategy under the new marketing ecosystem. Brand community (community), through valuable content (content) services, using social networks for interpersonal communication to achieve brand marketing.

Figure 3. New marketing strategy

The first step in corporate marketing is to find the target consumers of the brand and communicate with them. Grasping the user's connection form, gathering target audiences with common interests and hobbies together to form a "community", which naturally promotes the platform's products and services.

Secondly, user-centered construction of scenes is the core point to gain users' attention. Scene service is to provide users with appropriate information and services based on the time, space and needs of the user at the moment.Refine each product scenario, provide the ultimate scenario service, and realize the transition from "what to buy" to "where to buy", making the profit model a matter of course.

Finally, establish an emotional connection with consumers based on the content. Advertising with a "push" approach must get users' attention from the very beginning, and a "pull" approach for advertising requires gathering users. Using the search function of the platform, sharing and disseminating in the community, including these needed content into its own database for the audience to find and browse, will excavate a group of loyal fans and audiences, and maintain a good social relationship.

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