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A Crowdsourcing Mode of Tourism Customization Based on Sharing Economy

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ABSTRACT

China's latest innovations of Internet Economy are partly reflected in video living broadcast, shared bicycles etc. In recent years, tourism industry in China obtains rapid development by utilizing Internet. However, it is still difficult to meet the growing tourist demands. In order to solve this problem, in this paper, we put forward a Tourism Crowdsourcing Model (TCM), which utilizes the public creativity to meet the increasing demands for personalized tourism. Firstly, the main problems of the tourism industry are analyzed. Secondly, the pattern of TCM is elaborated, and a matching algorithm between the tourist requirements and the workers' abilities is well designed to find the qualified service providers efficiently and accurately. Finally, an example is given to verify the feasibility and effectiveness of the TCM based on shared economy. The results shows that TCM has some significant advantages to satisfy the tourism personalized needs by motivating the public to participate in the tourism industry initiatively.

Keywords: Sharing Economy, Crowdsourcing, Tourism Customization, Best-Matched.

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INTRODUCTION

Tourism, as a typical service industry, has been a significant component for economy development in various countries and regions. With the growth of China's economy and national income, the tourism demand is growing rapidly. According to the data of China Nation Tourism Administration (CNTA), the tourism market continues to rise in the first half of 2016. Tourism revenue reached 2.25 trillion yuan (RMB), an increase of more than 30%, and the number of tourists' total person-times reached 23.63 trillion, an increase of 200 million.

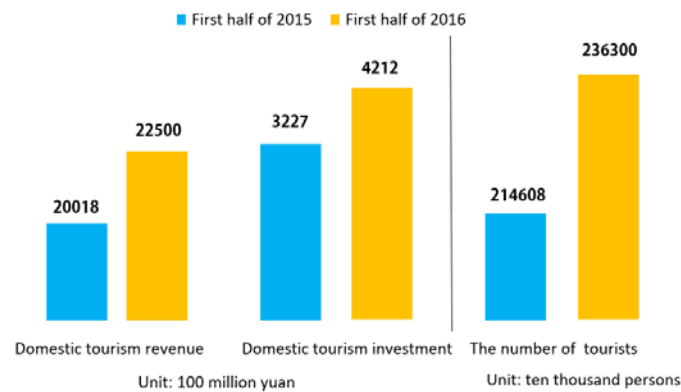


Figure 1: Tourism Data of The First Half of 2016 in China (From Penguin Intelligence (2016))

In 2016, nearly half of the tourism industry focused on the field of personalized tourism, and more than half of the tourism investment is concentrated in this area. Due to lack of differentiation, some start-up companies which hyped new concepts was merged or closed. Online travel shows a healthy momentum in 2016. The data show only 22.9% of tourists chose to travel with the group, and the number of self-help tourists accounted for 66.2%. Most of them are post-90s. But the pain caused by self-help travel is still widespread. For example, when a visitor wants to go to a strange place, how does he plan the traffic and accommodation? When he arrives a new tourist point, how can he plan the visit line.

The main contribution of this paper is that we propose a two-way matching model that supports both tourists and crowdsourcing workers, which allows to establish point-to-point service connections and to meet more personalized service needs.

The rest of this paper is organized as follows. The related work is discussed in Section II. Section III analyzes the tourists' needs. The tourism crowdsourcing mode and an example called *U-travel* are proposed in Section IV and Section V respectively. Finally, Section VI concludes the paper.

RELATED WORK

Crowdsourcing, which was proposed in 2006 by Howe, J. (2006), has been a significant way to solve some problems that computers have trouble with, such as image labeling/classification, natural language processing, or document writing. Individuals can play two different roles within Crowdsourcing: task requester or task worker. There exist an increasing number of researchers studying reviews and ratings behavior in tourism markets based on crowdsourcing. Wu and Wei (2010) propose a system called Opinion Seer, which enables an interactive visualization by analyzing large volumes data of hotel reviews. Cresci and D'Errico (2015) present a review model which can analyze tourists' opinions and provide a map-based visualization of sentiments expressed, thus, enables tourists to identify areas of interest. Leal and González-Vélez (2017) present a model, which extracts meaningful information from textual reviews based on Semantic Similarity to identify relevant recommendations. And then a data mining method is employed to automatically discover an interesting destination for the tourists. Borrás and Moreno (2014) and Gavalas and Kasapakis (2013) present an intelligent tourism recommender survey about the tourism resources. A questionnaire/form-based approach was employed by Tiwari and Kaushik (2015) to collect crowd-sourced information, in which, the method specifically relies on updated information to enrich the list of recommendations. Gabr and Abdennadher (2015) propose a game to provide useful information to tourists, which motivates locals to share their historical sceneries with the tourists. When the participators play the game, the information and data about the visited places is collected. Leal and Dias (2016) propose a tourist-centered off-line and on-line analysis system by utilizing positive and negative ratings and reviews, which discovers relevant trends of tourists. At the same time, Multiple Linear Regression is employed to identify the most significant factors that influence tourists' behaviors. Tiwari and Kaushik (2014) explore a recommender prototype system to predict interesting locations by using crowdsourcing approach. The information in the system include right time to visit, weather conditions, traffic condition, right mode of transport, crowdedness, security alerts, etc.

These related works mainly focus on the recommendation method by analyzing the reviews and ratings collected by crowd individuals. However, these studies do not take full account of the tourists' activities. In order to find tourists' trends and patterns more precisely, we, in this paper, combine both the tourists' requirements and the workers' abilities, and enable the tourists and the workers to achieve the best match.

ANALYSIS OF TOURISTS' NEEDS

Although the output value of China's internet tourism industry has gradually improved in recent years, there still exists a lot of deficiencies such as asymmetric information, market disorder without standard, market no-equilibrium, and loss of culture etc. We analyze the problems as follows.

Poor Tourists' Experience

Market disorder (e.g., high commission rebate and virulent price war), and market non-equilibrium lead to many problems. Prawns with high price in Qingdao sparked a bitter public debate on social media. The root cause is lack of government supervision and high-quality tourism products. Moreover, team tour must strictly control the time and range of activities.

Other applications, which are based on knowledge payment such as Zhihu and Fenda, are becoming more and more popular. The confusion of information influences the tourists' demands and behaviors. Professionals, who have a great mastery on specific skill, are badly needed to help people in need.

Finally, it is travel enthusiast that need to pay attention the problem *How to play influence of travel experience*. We share our travel experiences through photos and travel notes at present. Diversified travel experience sharing path promote the user's next travel decision and enhance travel experience. If we can gain profits through past travel experience, it can be beneficial to develop the tourism industry.

TuNiu (2015) released *The 2017 online travel market trends forecast report*, which pointed out that the domestic tourist attractions will deepen the thematic trends, including honeymoon tours, family tours, study tours and so on. With the 2022 Winter Olympics approaching, Snow tour is becoming the trend during the Spring Festival of 2017. Wang Qingsheng said tourism enterprises should pay attention to the participation, innovation and challenge of the project, and provided high quality and innovative service for tourists.

Insufficient Business Response

At present, most national A-class scenic spots rely on ticket receipts, and they are lack of shocking entertain project. It is unable to meet the demand of visitor, and it can't get a part of value-added profits. The following table is a survey about the independent travel, the samples come from a college student tourism club.

TABLE 1: RESULTS OF A SURVEY ON THE INDEPENDENT TRAVEL

Reasons for independent travel		Question for independent travel	
Free choice route	42%	Safety risk	50%
Time free adjustment	38%	Unable to resolve product order issues	18%
Avoid transactional disputes	16%	Difficult planning	28%
Convenient travel with friend	4%	No travel companion	4%

The enterprise makes little innovation in the E-travel business model. Relying on pattern innovation can improve tourist experience and promote industry reformation more or less, and the innovation will break the traditional profit model and introduce a diversified development mechanism. On the other hand, different industrial standard and the lack of professionals are also the reasons that the customized tourism industry cannot develop rapidly. Generally speaking, there is still a great prospect for this industry.

A report from YiGuan (2016) called “*Topic analysis of China's online Independent travel trends 2017*” shows that high demand service begins from customized travel such as travel agency service, intelligent tools, customization by travel master, and planner + route tour etc.

Strong Needs of Tourism Personalization

The travel purpose has changed from fixed travel lines and scenic spots to customization pattern. As a result, numerous customized travel applications appeared to help users complete the travel. Especially, the year of 2016 was called "the first year of customized travel". However, customized tourism in the perspective, some experts point out that there are still problems such as asymmetric information, fuzzy personality and high cost. Among them, the weight of customized function of Ctrip is still low. But in sharing economy, customized services enable tourists to reduce cost and obtain better experience, the pattern is accepted by more and more people.

Tourism Socialization Trends

Over the past few years, the UGC (User Generated Content) community has been fully developed, such as China's “*Ma feng wo*” and “*Baidu tourism*”. Self-media channel is the first pipe-line for most people to share photos and experiences. Take micro-blog as an example, topic “*Traveling with micro-blog*” has reached over 60 million of the reading amount. Thus, the development of Online Community has gradually influenced the idea of consumers.

TOURISM CROWDSOURCING MODE ANALYSIS

Model Design of Tourism Crowdsourcing

Crowdsourcing, the concept originally proposed by the American Jeff Howe, is an activity that distributes tasks to non-experts, and in the past these tasks were done by internal staff. Tourism Crowdsourcing Model is a route planning service based on Internet Crowdsourcing. It fully mobilizes the Master who has the ability to plan a trip to help complete the route planning for user. There are two reasons for the development of custom crowdsourcing mode. First, the age of content paying arrived. *Logic Show*, a network program directed by Luo Zhenyu, has benefitted from content paying model. Meanwhile, its success is counterproductive to the development of the content paying industry. Second, the sharing economy is growing rapidly, it makes each Internet users involved in sharing line.

The sharing economy was proposed by Marcus Felson and Joe L.Spaeth in 1978. Robin Chase points out “everyone shares the best ability to integrate individuals and businesses, and the essence is the efficient use of each resource and each stakeholder. "Organization" can bring advantages to the industry (Need a larger scale and a lot of resources), and "individual" can bring individual advantages (localization, specialization and customization)” in the *Peers Inc.: How People and Platforms Are Inventing*.

Unlike intelligent route planning, Tourism Custom Crowdsourcing Model will make enterprises to help users maximize the experience of urban folk cultures in minimized costs (reduce the cost of data accumulation). Zhang Ping, the founder of the World State, said that the key to reducing the cost of customized tourism is the sharing economy "Big Data+ Master Crowdsourcing".

Given the characteristics of youngsters who pursue freedom, seek challenges and make friends extensively, it becomes a reason why users choose the custom platform in the future to expand social relationships through customized travel platforms. And custom crowdsourcing mode, mutual travel, and local guides have provided young people a channel to communicate with each other. We have reasons to believe that models are bound to be welcomed by the crowd.

Optimizing the Evaluation Mechanism

Since the model requires an objective evaluation of human ability, it is crucial that we optimize the existing evaluation system. For the same type of product exist drawbacks, "U-travel" will get comprehensive evaluation with a combination of factors (include service levels, platform interviews, and district capabilities). Then, based on the Analytic Hierarchy Process (AHP proposed by T.L. Saaty of University of Pittsburgh, is a multi-objective decision-making analysis method of combination of qualitative and quantitative analysis), the final score is determined. Hence the platform has been evaluated in a comprehensive and relatively objective way. The final score is a function which takes $T_{AHPcoefficient}$ and S_{Base} as variables. A variety of correspondence rules can be considered, we present a simplest method here.

$$S_{total} = f(T_{AHPcoefficient}, S_{Base}) = T_{AHPcoefficient} \times S_{Base} \quad (1)$$

$$\text{Where: } T_{\text{AHPcoefficient}} = \frac{\sum_{i=1}^n (S_{S_Speed} \times k_{S_Speed} + S_{S_attitude} \times k_{S_attitude} + S_{S_quality} \times k_{S_quality})}{5n} \quad (2)$$

$$k_{S_speed} + k_{S_attitude} + k_{S_quality} = 1 \quad (3)$$

$T_{\text{AHPcoefficient}}$ - represent the overall level of service, k_{All} - represent the weight of the index and assign by the rule of AHP, S - give a mark by user (S ranges from 0~5, hereinafter the same), n - the number of users participating, $T_{\text{AHPcoefficient}}$ and k_{All} will be normalized, ranges from 0~1.

Where:

$$S_{\text{Base}} = S_{\text{Activity}} \times k_{\text{Activity}} + S_{\text{System}} \times k_{\text{System}} + S_{\text{Regional}} \times k_{\text{Regional}} \quad (4)$$

$$k_{\text{activity}} + k_{\text{System}} + k_{\text{Regional}} = 1 \quad (5)$$

S_{Base} - represent the basic indicator of ability, k_{All} - the same as above, S_{Activity} , S_{System} and S_{Regional} - represent the base score for each part: Self-media Activity is evaluated by the system according to the ranking ratio (factors include the number of fans, visitors and like), system score reference video interviews and online test scores (video interviews tested people's practical ability and service attitude, online testing focuses on the basic capabilities of some people's route planning), regional scores are determined by factors such as residence and local travel days divided into 1-5 grades and given grades. We assign values based on the T.L. Saaty's 1~9 scaling. As the matrix shows, service quality is more important than service speed etc.

TABLE 2. JUDGMENT MATRIX

	S_{Speed}	S_{Attitude}	S_{Quality}		S_{Activity}	S_{System}	S_{Regional}
S_{Speed}	1.0000	0.3333	0.1429	S_{Activity}	1.0000	0.1429	0.2000
S_{Attitude}	3.0000	1.0000	0.2000	S_{System}	7.0000	1.0000	3.0000
S_{Quality}	7.0000	5.0000	1.0000	S_{Regional}	5.0000	0.3333	1.0000

Then, according to the matrix calculation method, the corresponding weight values are as follow.

TABLE 3. RESULT OF WEIGHT VALUE

k_{S_speed}	0.0810	k_{Activity}	0.0719
$k_{S_attitude}$	0.1884	k_{System}	0.6491
$k_{S_quality}$	0.7306	k_{Regional}	0.2790

EXAMPLE—U-TRAVEL

We design a tourism application to reflect the final conclusion of the paper.

"U-travel" is a mobile Internet product which helps tourists enjoy personalized travel in low cost by sharing-economy model. The Service of Customization by travel master is the core function of U-travel, and the local tour guide and mutual travel patterns is the direction of subsequent versions. On the other hand, we will promote user's actual communication between users and travel masters through the self-media platform, and reduce travel costs by integrating internet shared-product.

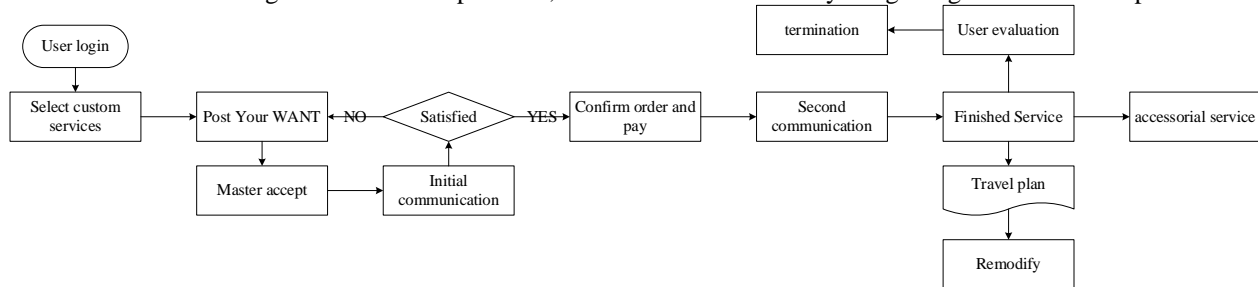


FIGURE 2: User Operating Flowchart

The matching process is as follows,

- (1) Fill in travel places, dates, and select the rank of Travel Master,
- (2) Match the Master through the system (Travel Master's information has been previously recorded in the database),
- (3) Screen out qualified Master (factor: class and region),

(4) Complete the customized services.

Project Core

Personalized Travel

According to the foregoing analysis, we have come up with this view: "U-travel" is a requirement-oriented product, instead of product-orientation. Through excavations of tourist demand, we adjust the route planning as the core. The platform assigns the customized task to the travel masters, and they will complete the customization task, as well as guide users to purchase the traveling products and to use comprehensive sharing-service. In the profit model, the platform gains a commission on the service charge.

In addition, local guides and mutual travel are personalized tours model based on the F2F (Face-to-Face) way. The model of locals guides, which led by a tour guide, go deep into the local lanes and experiences different urban cultures. Mutual travel pays more attention to the social intercourse, and how to facilitate the willingness of both sides to travel is the practical problem for the platform.

Sharing Platform

Nowadays, a lot of sharing platforms, such as live platform and content sharing platform, gradually accumulated paid users for the core service. "U-travel" is an operation pattern of information sharing. Masters earn money by sharing information. For users, core service means low-cost customization trips. And it will try to integrate a variety of sharing platforms, such as housing sharing and car sharing. Users can enjoy the entire sharing service on a single platform. "U-travel" also includes sharing life skills, for example, local people cooked the featured local food for tourists. A long-term project is skill paid courses, such as the ZhiHu's paid column.

Tourism Social Contact

The self-media platform is a way for masters to show themselves, it will help Masters to improve their influence. Fan economy attracts users to attempt the function and enhance user stickiness. Users can publish their own travel tips, travel raiders, anti-cheat guidelines, and establish relationships with other travel enthusiasts. Social networks between users and users, users and Masters will meet their basic social needs.

Data Preparing and Experiment

We simulated a case which based on a custom trip to Xiamen: A user submitted custom requirements of Xiamen, and there are five Masters involved in the matching activity. For example, we chose Master A to calculate the final score. The all K value in the case is derived from the preceding part of the paper. We analyzed the data from 10 users, and the results are as following (all data are simulated):

TABLE 4: THE CASE ABOUT THE SERVICE COEFFICIENT

Master A	Speed Score	Attitude score	Quality score	Score
	$k_{S_speed} = 0.0810$	$k_{S_attitude} = 0.1884$	$k_{S_quality} = 0.7306$	
User No.1	4	4	5	4.731
User No.2	3	3	4	3.731
User No.3	4	4	4	4.000
User No.4	4	4	3	3.269
User No.5	3	4	4	3.919
User No.6	4	3	4	3.812
User No.7	2	3	5	4.380
User No.8	4	4	5	4.731
User No.9	4	5	3	3.458
User No.10	3	4	5	4.650
Final score				4.068
standardization				0.814

The same approach applies to other masters, and we calculate the final score according to the model.

TABLE 5: THE CASE ABOUT THE FINAL SCORE

Master	Service coefficient	$k_{Activity} = 0.0719$		$k_{System} = 0.6491$		$k_{Regional} = 0.2790$	Final score	
		Fans	Visitors	Like	Video Interviews			Online Testing
		0.7306	0.0810	0.1884	0.8750			0.1250
A	0.814	4	4	5	4	5	5	3.56

B	0.760	4	5	4	4	5	4	3.11
C	0.822	3	5	3	3	4	3	2.54
D	0.741	2	2	4	2	3	2	1.56
E	0.682	2	3	2	3	4	1	1.68

Finally, we got the final score about the five Master. If we define the intermediate Master with standard score ranging from 3-4, the Master A and B will be intermediate Master. However, according to the experimental situation, there are many deficiencies. The coefficient has a substantial effect on the base score, so that the deviation is too large to ignore. In the worst case, all results are not up to the standard of Senior Master. Maybe, some additional parameters should be included to build a better evaluation model in the future.

SUMMARY

In this paper, we propose a best matched model between tourists' requirements and workers' abilities based on crowdsourcing mechanism. On one hand, the model collects the workers' historical records such as location, specialty, and historical reviews etc. On the other hand, the model enables a tourist to distribute his tourism demands. In this paper, a two-way interactive system is constructed, which finds out the most suitable tourism worker for the tourism requestor, and then gives the best information or advice such as right time to visit, weather conditions, traffic condition, right mode of transport, crowdedness, security alerts, etc. The experiment results demonstrate that our model can work efficiently. In the future, the integration of multi-dimensional data will be introduced, thus, the recommendations can be achieved more accurately. At the same time, incentives and privacy protection mechanism also need to be seriously considered in the following researches.

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