ORIGINAL RESEARCH

A Policy Category Analysis Model for Tourism Promotion in China During the COVID-19 Pandemic Based on Data Mining and Binary Regression

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Background and Aim: At the end of 2019, the outbreak of COVID-19 had a significant impact on China's tourism industry, which was almost at a standstill in the short-term. After reaching the preliminarily stable state, the government and the scenic area management department implemented a series of incentive policies in order to speed up the recovery of the tourism industry. Therefore, analyzing all sorts of social effects after policy implementation is of guiding significance for the government and the scenic areas.

Methods: Targeted as the social effect with the implementation of tourism promotion policy during the COVID-19 pandemic, this paper briefly analyzes the impact of COVID-19 on the national cultural and tourism industry and selects several representative types of tourism policies, crawls the comment data of Weibo users, analyzes users' perception and emotional preference to the policy, and thus mines the social effect of various policies. Subsequently, by identifying the social effects of various policies as dependent variables, a binary logistic regression model is constructed to obtain the best combination of tourism promotion policies and promote the rapid revitalization of the cultural and tourism industry.

Results: The results show that from the single policy, the social effect of the "safety" policy is the best. From the perspective of combination policies, the simultaneous release of "safety" policies and "economy" policies have the greatest social impact, which can dramatically accelerate the recovery of the cultural and tourism industry. Finally, this paper proposes suggestions for policy formulation to improve the ability of the cultural tourism industry to cope with crisis events.

Conclusion: These results explain the perceived effects of the public on the government policies and can be used to judge whether the policies have been released in place. Based on the above results, corresponding suggestions are proposed as follows: 1) the combination of economic policies and security policies can achieve better results; and 2) the role of "opinion leaders" can be played to improve the perceived effect of policies.

Keywords: online comments, social effects, combination optimization, data mining, binary logistic regression, COVID-19

Introduction

With the progress of science and technology, as well as the improvement of people's living conditions and material level, China's tourism industry has entered a new take-off stage after more than 20 years of development. However, the outbreak of COVID-19 in late 2019 greatly impacted on China's tourism industry,

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wiping out more than 450 million tourist revenues. About 2 months after the enforcement of prevention and control, on February 25, the national culture and tourism office issued the guidance to lead the national scenic spots to implement the epidemic prevention and control to make recovery steadily. Meanwhile, local governments and scenic spots have issued a series of promoting policies, such as travel coupons, current limiting, 2.5-days off, which aims to stimulate recovery of the tourism industry while preventing COVID-19. However, the policies have received mixed reviews from netizens, who have focused on the safety issues brought about by the opening of scenic spots. For the government and scenic spots, the most concerning question is which kind of policies have the most obvious stimulating effect on the tourism economy. In order to answer these questions, it is necessary to conduct an emotional analysis of a series of policies issued by the government and scenic spots, measure the effect of policy implementation according to online netizens' comments, and summarize the policy combination with the best implementation effect, so as to help the government and scenic spots maximize the validity to promote recovery.

At present, domestic and foreign scholars have carried out some researches on the implementation effect of tourism policies, mainly including drawing on multidisciplinary research methods such as consumer behavior, public management, and journalism and communication, designing research scales and measurement processes, and conducting research on the impact of tourism policies based on tourism consumption behavior intention. However, few scholars directly use online comment data of tourism public opinion for research, but whether to travel is easily affected by public opinion. Therefore, it is of great significance to carry out text mining on tourists' online comment data on tourism policy, so as to analyze the social effect of policy implementation.

Based on this, this paper evaluates the effects of a series of policies issued by the government and scenic spots against the background of COVID-19. In particular, this paper analyzes the present situation and the existing supporting policy to select the representative tourism policies released by government, then reviews Weibo comments data to understand users' intention and emotion preference, as well as the social effect of all kinds of policy implementation. Besides, this article builds a binary logistic regression model, making social effects influenced by various policies as the dependent variable,

and making other factors (Weibo comments, comments time, like quantity) as independent variables. In turn, it combines the results of the single policy and mixed policy with the most promoting effect for tourism, providing suggestions for the government and the scenic spot to accelerate the revitalization of the culture and tourism industry.

The structure is as follows: Literature Review analyzes the literature of tourism policy; Analysis on Supporting Policies of Cultural Tourism Industry During COVID-19 discusses the tourism support policies; Data Mining Based on Online Comments of Travel Policies During COVID-19 conducts data mining on the online comments on tourism policies; The Social Effect Analysis of Tourism Policies Based on Binary Logistic Regression Model constructs a binary logistic regression model to measure the social effects of tourism revitalization policies and seek for the optimal combination of policies; Conclusions and Suggestions summarizes the whole paper and provides policy suggestions.

Literature Review

At present, there are text mining, emotion analysis, and combinatorial optimization methods for policy implementation effect analysis in both domestic and international research. These methods are still practiced in the study of tourism policy implementation effect. Therefore, this paper draws on the methods of evaluating the implementation effect of other policies to analyze the research status of a tourism policy implementation effect.

Tourism policies mainly refer to policies that promote tourism activities in various aspects. In order to understand the impact of these policies on the actual tourism industry, scholars have conducted in-depth studies with policy measurement tools, and the representative results are as follows: David et al[1] introduces the research method of system theory into the political field, and puts forward the "political system theory" for the first time. It holds that the interaction between policy system and environment is realized through "input, transformation and output" in politics through "requirements and support" existing in the environment. Rossouw and Saayman[2] demonstrated the relevance and necessity of using the tourism satellite account (TSAs) as a tool for South African decision-makers (especially tourism decision-makers) to improve and expand the application of the general equilibrium (AGE) model. The reasons for the need for economic models for policy analysis and other

purposes were expounded, and the new and old methods for tourism policy modeling were summarized. Steve[3] extended and applied a non-parametric method to estimate the effect of heterogeneous treatment, and examined how the policy effect changed over time. The study showed that this method had potential value in evaluating the impact of a series of environmental policies and environmental impacts. Dong and Liu[4] used a threshold model and quantile regression model to explore the threshold effect of policy power on policy implementation effect and the transformation of policy implementation effect in different development stages. The results showed that the effect of industrial policy varied greatly in different development stages, and policy power had a significant threshold effect on its operation intensity. Matousek et al[5] studied how the uncertainty of economic policy affected the capital shortage of financial companies in the new crisis of the event. The study found that if the response of policy-makers and politicians was not timely and decisive during the severe market downturn, then there would be a price for the delay. Joseph[6] used the classical stability theory to model the complex social and political system, and the causes of social collapse were studied. Chen et al[7,8] analyzed the polarization of public opinion in group behavior based on the SIR model, and at the same time considered the influence of external information and individual internal characteristics on the polarization of public opinion. Alexander and Yusaku[9] took Japan as an example, and carried out a survey experiment to let citizens understand the policy information of the US, which varied according to the source, policy content, and problem prominence. The results showed that when the source signal (Trump attribution) led to negative views in the US, policy content (cooperative than uncooperative) had a greater impact on shaping the opinions of American citizens. Ho[10] analyzed the success factors of a convalescent tourism policy, and discussed the priority and importance of success factors of the recuperation tourism policy by using an AHP analysis method. Yin[11] redefined the theory of the political system based on the agenda setting theory in communication science, and constructed a "network public opinion decision hypothesis model" to analyze how and to what extent network public opinion affects government decision-making. In addition, as there are many types of policies, some scholars have classified the policy tools, among which Rothwell and Zegvelk[12] were the most representative ones. When studying industrial innovation and public policy, they divided the policy tools into three types:

Environmental policy tools, Supply-oriented policy tools, and Demand-oriented policy tools.

In spite of various studies on tourism policy, even though some scholars explore the effects of tourism policy implementation, few scholars study the optimal combination of tourism policy, namely through the data mining of online reviews, research released by any combination of tourism policy content can bring about a better social effect. In addition, as far as the social effects of tourism policies are concerned, there is still a lack of objective analysis based on network text data, so the research methods need to be innovated. In view of this, this paper takes the Weibo comments as the data source to find out the optimal combination that can make tourism promotion policies exert the greatest social effect, so as to provide suggestions on the content form of policies issued by government departments.

In order to understand the actual effect of policy implementation, scholars have conducted relevant studies on the evaluation methods of the policy implementation effect. Kim et al[13] studied the "free public transport" policy and the "citizen participation alternative day no driving" system implemented by Seoul government in order to reduce dust. They adopted a regression analysis method to analyze the impact of traffic on fine dust, and used text mining technology to analyze the response of two traffic policies and citizens' petition, and proposed policy improvement direction according to the research results. Lee et al[14] used text mining technology and emotional text analysis technology to test the online evaluation of Japanese tourism websites after the 2011 Japanese tsunami, and studied the impact of the tsunami on Japan's tourism industry. The results show that the low exchange rate and the positive sentiment of online reviews from tourism websites have a positive impact on the number of tourists to Japan. Chen et al[15,16] used text mining and emotion analysis methods to implement the effect of online education under the epidemic situation. Also, the experience effect was studied from the perspective of user and platform. Bucek[17] used text mining technology to investigate the twitter accounts of US President Barack Obama from March 2012 to January 2016, so as to study whether politicians' behavior on social networks would affect actual economic policy. Qi et al[18] analyzed the innovative fiscal policy texts of provinces and cities in China based on python, so as to understand the regulation and control of tax policies. The results declared that fiscal policy and regional innovation capability showed obvious spatial heterogeneity, and R&D

investment and industrial structure were the main sources of improving innovation capability. Sun[19] proposed an evaluation scheme to optimize the policy process by using sorting and clustering strategies, and proposed a combination algorithm combining the algorithm with policy priority evaluation. Finally, satisfactory policies and rules were selected to improve the matching speed. The experimental results showed that the method reduced the matching operation and improved the evaluation efficiency. Pellesova[20] discussed the technology of using an econometric method to optimize economic policy, mainly studied the target variable method, and explored the advantages and disadvantages of the selected method and its possible application in the formulation of optimal economic policy. Dash and Kajiji[21] proposed a mixed integer nonlinear objective program (MINLGP), which aimed to solve the model of multi-objective portfolio optimization decision-makers facing binary hedging decision-making between Portfolio Rebalancing periods. It was found that when percentile risk measurement was used, the expected catastrophic loss of the best diversified portfolio of hedging was obviously less than that of non hedging products. Yang et al[22] evaluated the impact of the recently implemented policy of improving gasoline quality on reducing the concentration of fine particulate matter (PM). The study illustrated that it was difficult to completely solve the particulate pollution problem in China by a single policy, and a series of policy system designs were needed to alleviate this problem. Geng and Kamal[23] analyzed the optimal policy options for two main types of price regulation in China, and found that the domestic optimal external reference pricing (ERP) policy reduced domestic prices while maintaining export incentives for enterprises. Maansi and Nomesh[24] measured the efficiency of Indian high courts using Data Envelopment Analysis (DEA). Secondly, they studied the impact of including pending cases on judicial efficiency. Kelly et al[25] proposed a composite index to assess home-heating energy-poverty risk across 18,641 small area clusters in Ireland. The index offered the capacity to analyze changes in energy-poverty risk associated with specific policy intervention proposals, including major contemporary environmental policy transitions. Elke and Andreas[26] examined the acceptance of burden sharing rules by using multivariate binary and ordered Probit models. The rule involved the costs of the German energy transition, which was one of the most challenging and disputed national climate and energy policy measures. The results declared that polluter-pays rule

had by far the highest support. Carlotta et al[27] used Random Forest and Gradient Boosted Regression Trees algorithms to predict the response of freshwater ecosystems to multiple anthropogenic pressures, with the goal of informing the definition of water policy targets and management measures to recover and protect aquatic biodiversity. Ekaterina et al[28] confirmed a positive impact of the zone merger on the gas trading market's spatial equilibrium and indicated the causes of remaining market inefficiencies used by an extended parity bounds model, which provided a tool for evaluating the efficiency of policy decision-making. Dong and Liu[29] analyzed the optimal functioning power of policies and determined the direction of future policy implementation. This paper utilized the COPA framework to analyze policy evolution in respect of the new-energy vehicle industry (NEVI). Smith and Hasan[30] discussed the methods and practices involved in quantitative evaluations of implementation research studies, and analyzed available measurement methods for common quantitative implementation outcomes involved in such an evaluation-adoption, fidelity, implementation cost, reach, and sustainment, and the sources of such data for these metrics using established taxonomies and frameworks.

According to the above literature, many scholars have studied public policies and built many models. However, due to the epidemic, the formulation of tourism policies should also take the characteristics of emergencies, health, and safety into account. At present, there are few studies on this aspect in the literature. Therefore, this paper takes the implementation of the promotion policy as the background, classifies policy, analyzes online reviews, uses the binary regression model to evaluate the implementation effect under a different combination of policies, and finally selects policy combination ways with better effect, which provide a decision basis and support for the release of the government's policy.

Analysis on Supporting Policies of the Cultural Tourism Industry During COVID-19

The status of the cultural and tourism industry during COVID-19 needs to be analyzed before analyzing the implementation effect of the tourism revitalization policy issued by the government. In light of the update of the epidemic, when should the government issue policies? What policies have been issued? What topics have been

discussed on Weibo? Which media does report the policy heavily? What kind of publicity effect did it have? Based on this, the current situation of tourism is elaborated below, and the current implementation of decentralized tourism revitalization policies are summarized. More topics related to tourism policies discussed by the public are selected through the Microblog platform, and the online comment data of the public are retrieved, so as to prepare for the subsequent in-depth analysis of the social effects brought by the implementation of policies.

A Brief Analysis of the Current Situation of the Cultural Tourism Industry in China

The outbreak of COVID-19 at the end of 2019 spread rapidly across the country and seriously affected China's economic and social development and people's livelihood. In particular, the impact of the epidemic on the tourism industry includes both direct losses of many tourism enterprises and related employees and indirect losses of related industries in the tourism industry. Just consider the Spring Festival, the direct economic loss caused by the shutdown of China's tourism industry is as high as 400 to 500 billion Yuan, resulting in the annual expectation to change from a "year-on-year growth of about 10% to a negative growth of 14% to about 18%. On January 24, the General Office of the Ministry of Culture and Tourism of China issued an Urgent Notice on COVID-19 prevention and control to suspend the business activities of tourism enterprises, requiring travel agencies and the online tourism industry of China to suspend the operation of group tourism and "air ticket + hotel" tourism products. As of February 1, 450 million people had canceled or postponed their Spring Festival trips.

Statistics show that during the Spring Festival in 2018, the country received 386 million tourists, rising 12.1% year on year. Tourism revenue reached 475 billion Yuan, rising 12.6% year on year. During the Spring Festival in 2019, 415 million tourists traveled across the country, rising 7.6% year-on-year. Tourism revenue reached 513.9 billion Yuan, up 8.2% year on year. By 2020, more than 450 million tourism revenues have been lost. At the same time, online travel agency (OTA) platforms such as Ctrip and Tuniu have invested more than hundreds of millions of Yuan in cancellation fees, and more than 260,000 travel agencies are struggling. According to STR, the hotel occupancy rate on the Chinese mainland peaked at 70% in early January 2020,

and began to plummet a day later, plummeting to 17% on January 26.

As can be seen from the above brief description of the current situation, with the sudden outbreak of COVID-19, the Chinese government responded quickly and took various measures to block the transmission channels of COVID-19. As it turned out, China suddenly went into a "dormant" state. However, the economic development, especially the development of the tertiary industry, has encountered regression this year. The cultural and tourism industries, which are characterized by crowd gathering, bear the brunt of the contraction. How much impact will this "disaster" have on economic development? Can the cultural tourism industry survive? Is tourism a fragile industry? Experts, scholars, and ordinary people are concerned about these issues.

Supporting Policies of the Cultural and Tourism Industry During COVID-19

The cultural and tourism industry is a modern service industry with human service targeted with human services. Its basic feature is the movement of people, and the pursuit of security is the primary condition for people's needs. By May 2020, the epidemic prevention and control situation in China has been stable, laying the foundation and creating the basic conditions for people to travel safely during the May 1 holiday. Since the outbreak, the industry has acquired high attention from international organizations to the central ministries and commissions, and from local government, industry association to the tourism enterprises, and tourism-related aspects. Taking positive action and dealing with unprecedented pressure that the tourism industries are facing should manage well in two aspects: the first is to provide epidemic prevention and control, the second is to introduce all kinds of policy for supporting all kinds of damaged industries and enterprises. As for the various policies issued by the government, through the Internet reports of major media, the public can express their own opinions and cognitive emotions on the public events they care about, thus forming mixed opinions on the revitalization of tourism policy.

Based on the comprehensive analysis of Weibo content and online comment related to the policy of "revitalizing tourism", this paper summarizes the policies that netizens have paid close attention to and discussed enthusiastically, striving to cover and describe the public's response to the government's policies in the cyberspace to the greatest

extent. Firstly, this paper summarizes government policy as five major series and regards them as the first-level subject category, collects the network comment, and chooses the topic with most comments on each category acknowledged by the CCTV news, the blue whale financial journalist work platform, Sina News, People's Daily, and the Paper. Further, it uses the octopus Weibo topic review as a selected collection to distinguish between policy and Weibo topics. In order to distinguish policies and the post in Weibo, "#" is used to annotate. The categories of policies and online discussion topics for revitalizing tourism are shown in Table 1. (The number of the comments in Table 1 are all from Weibo. The limitation search of Weibo is as follows: first, it may produce a lot of meaningless information; second, the search of Weibo still adopts the traditional way, and the information content cannot be reprocessed.)

Data Mining Based on Online Comments of Travel Policies During COVID-19

The Internet represents an important channel for people to express their interests and emotions. Since the COVID-19 outbreak, people have become more vocal on the Internet due to restrictions on travel, and there has been a lot of discussion about the travel-related topic. As a reflection of public sentiment, the influence of online public opinion is not only manifested in its influence on major developments, but also penetrates the political level, becoming an important channel for the government to listen to the voices of the people and understand public opinion. In order to explore the public's attitudes towards various official tourism policies during COVID-19, this section conducts data mining on the comments on the Weibo topic mentioned above. Firstly, the data of netizen comments were selected and cleaned, then the pre-processed netizen comments were analyzed from the perspective of policy perception, and the categories of policies were divided. Finally, the visualization analysis and emotional analysis of netizen comments were conducted based on different policy categories.

The Selection and Cleanout of Comments

According to the second-level microblog topics, comments on Weibo topics at different times were selected as the research objects. In the first category, under the government policy "online tourism," the topic #Travel around China online# and the netizens' comments from April 25 to May 5, 2020 were selected. In the second category, under the government policy of #Many provinces define 2.5 days off#, the netizens' comments on five topics on January 14, 2020, from March 19 to April 1, from April 26 to July 24 were selected. In the third category, under the government policy #Measures in scenic spots (free tickets or restricted access or real-name purchasing system)#, eight hot topics were selected and the discussions were divided into two categories: because Huangshan Mountain scenic spot was congested, the government introduced a series of policies for the situation rapidly to adjust scenic spot, which arouses heat discussion in the Internet. The comments with regard to #Huangshan Scenic Spot starts emergency plan# from April 5 to April 6 were collected. After the introduction of policies for national scenic spots, the comments were collected from February 19 to March 18, and from April 13 to April 15. In the fourth category, under the government policy #The tourism industry in many places across the country resumes business#, the netizens' comments from February 21 to April 29, 2020 and from July 14, 2020 to July 15 were collected. In the fifth category, under the government policy #Travel coupons issued in many places across the country#, the netizens' comments from March 26, 2020 to July 1, 2020 were selected.

Through octopus crawling to get the corresponding Weibo topic comments, as the original data contains some trivial comments, these trivial comments will interfere with the subsequent analysis results, so the trivial data needs to be processed. In view of the requirement of emotion analysis, the data needs to be processed. First, the symbols, emoticons, punctuation, and some useless marks in the comments should be removed. The second is to clean out comments irrelevant to the policy, such as advertising, the word count comments, etc. The software Python is mainly used to remove Chinese and English symbols, emoticons, invalid texts (such as "ah", "en", and other modal words, comments that are not related to the tourism topic of this article, and irrelevant advertisements), and some key codes to realize this function are as follows: import re; the line = line. decode ("utf8"); String = re.sub (" [\s +\!\/_ $% ^ * (+\"\"] + | [+ -.??, ~ @ # $% and * () "+". decode ("utf8"), "". decode ("utf8"),line). The data after cleanout is shown in Table 2.

Table 1 Policies on Revitalizing Tourism and Classification of Online Discussion Topics

The Primary Category (Government Policy)	The Secondary Category (Weibo Discussion Topic)	The Number of Comments Collected on Weibo Topics
Travel coupons issued in many places across the country	#National version of the consumer coupons will be launched tomorrow# Here comes the strategy	5439
	#Hangzhou will issue 1.68 billion Yuan consumption coupons#	
	#Wuhan will issue 500 million Yuan consumption coupons#	
	#Zhejiang Jiaxing issues 200 million Yuan consumption voucher#	
Many provinces define 2.5 days off	#Zhejiang encourages 2.5 days off a week#	17,731
	#2.5 days of weekend vacation system will be implemented in three places#	
	#Jiangxi tries out 2.5-day flexible work and rest on weekends#	
	#2.5-day flexible vacation system implemented in Yichang, Hubei Province#	
	#It is suggested that one of three flexible weekend vacation systems can be implemented#	
Measures in scenic spots (free tickets or restricted access or real-name purchasing system)	#Notice on stopping receiving tourists in Huangshan Scenic Area#	30,961
	#112 scenic spots in Sichuan are free of admission to all tourists in April#	
	#Huangshan scenic spot is congested#	
	#Huangshan Scenic Spot starts emergency plan#	
	#The Ministry of culture and tourism requires that the opening of scenic spots should strictly control the flow#	
	#Real-name purchasing system is required for Sichuan scenic spots to reopen#	
	#Visitors are required to be 1 meter apart in the opening of the scenic area#	
	#During the epidemic period, only outdoor areas are opened#	
Online travel (live travel or live commerce)	#Travel around China online#	38,216
The tourism industry in many places across the country resumes business	#The West Lake in Hangzhou will open up orderly from today#	5306
	#Ministry of culture and tourism issues notice to resume inter-provincial team Tourism#	
	#Yunnan tourism industry resumed business#	

Table 2 Selected Data After Cleanout

Classification of Policy Perspectives	Economy	Safety			Idle	Feasible	
Specific policies	Consumption coupon	Scenic spot policy	Huangshan crowded	Travel around China online	2.5 days off a week	Resuming tourism industry	Resuming inter-provincial travel
Number of comments	4,473	8,286	20,802	26,808	17,156	3,251	1,710
Percentage of comments	5.42%	67.76%			20.80%	6.01%	

Analysis of Netizens' Perception of the Policy

The Classification of Comments

Netizen perception refers to whether the netizen's understanding of the policy is consistent with policy-makers' desired goals. From the perspective of policy, this paper divides the above five policy categories into four categories, namely, economy, safety, idle, and feasible category. The economy category refers to the policy-makers' expectation to achieve the purpose of promoting the economy through the policy, such as "consumption coupon". The safety category refers to the policies formulated by policy-makers to avoid crowd gathering and virus cross-infection in scenic spots from the perspective of safety, such as "Scenic spot policy", "Huangshan crowded", and "Travel around China online". The idle category refers to the policy made by the policymaker from the perspective of whether tourists have free time to travel, such as "2.5 days off a week". The feasible category refers to whether the scenic spot is open, such as "Resuming tourism industry", "Resuming inter-provincial travel".

Although policymakers formulate from the above four perspectives, different netizens have different understanding of policy. Taking coupon for example, some netizens consider it from an economy perspective, and point out that "in order to stimulate consumption, various places think about the different ways". From a safety perspective, some netizens think "it will lead to offline congestion, which is not safe". Therefore, in order to understand netizens' perception of the four types of policies, we divided netizen comments into five types according to their comment content and designated tag numbers for subsequent data processing. The specific division criteria are shown in Table 3.

According to the above criteria, all the comments made by netizens should be classified. Since the total number of comments on all policies is as huge as 82,486, TextCNN convolutional neural network is adopted in this paper to

Table 3 Policy Division Criteria from the Perspective of Netizens

Classification of Netizens' Perspective	Tag Number	Meaning	Comment Examples
Economy	0	When it comes to money, the economy, etc	"Just back to work, no money"
Safety	1	When it comes to epidemic situation, safety, etc	"Is it safe? The epidemic is not over"
Idle	2	When it comes to holidays, whether you have time to travel, etc	"Oh, where did you get your vacation when you just went to work?" "school is not allowed to go out"
Feasible	3	From the perspective of whether the scenic spot is open or not, we can see whether the tour is feasible	"Many scenic spots are not open. How can I get there?"
Others	4	Other netizens' comments except for the above four categories	"Like" "support"

automatically classify the comments. TextCNN is a deep learning algorithm. By inputting a training set and a verification set with classification tags, the computer can automatically learn the classification method, so as to classify and predict other data. The algorithm includes five parts: word list construction, word vector construction, convolution, maximum pooling, and K classification. The specific steps for classifying netizen comments are as follows:

1) Data cleaning: emoji, spaces, blank lines, and other contents should be cleaned up to make the message content more concise. Remove invalid messages, such as duplicate 1, 11, etc.

2) Training data selection: 20,000 pieces of data were randomly selected from more than 80,000 comments for model training, accounting for about 25% of the total data. A better model training effect will be achieved. The policies of each category were selected in proportion, and finally 1,240 economic categories, 12,600 security categories, 4,780 free categories, and 1,380 feasible categories were selected.

3) Manual labeling of the selected training data: the selected netizen comment data of a total of 20,000 pieces were manually classified according to the classification labels of five types of netizens, and each data was labeled (label number is 0–4).

4) Training neural network model: 20,000 pieces of data were randomly divided into a training set, validation set, and test set according to a proportion of 80%, 10%, and 10%, and put into the model for training. The test set was used to test the classification accuracy of the final trained model, and the results showed that the accuracy of the training set reached 88.6%, indicating that the model training effect was good and could be used for classification prediction.

5) Prediction by model: The model trained in the previous step is used to automatically classify the remaining more than 60,000 pieces of data.

The Analysis of Results

All comments were classified by the above steps, and the classification results are shown in Table 4.

As can be seen from Table 4, netizens' comments are mixed with many contents irrelevant to the policy perspective, that is, comments of other categories take up a large proportion. In addition to these unrelated perspectives, netizens have different perceptions of various policies.

Overall, the perception of policies is ranked as economy > idle > feasible > safety.

In terms of economy, "consumption coupon" policies were the most popular, with 54.8% of netizens expressing their views from an economic perspective, which may be related to the timing and characteristics of the coupon policy. Consumption coupon aims to stimulate the social economy after the epidemic turned around, when the epidemic was not serious and people were less worried about safety. At the same time, the policy also has low requirements for travel. People can use coupon for offline dining and shopping without worrying about no free time.

In terms of safety, the netizens' perception of the three policies was relatively low, with 6.7%, 18.5%, and 0.3% of the netizens respectively expressing their opinions from the perspective of safety. Under the "scenic spot policy", most people think about the travel problem. Under the topic #Huangshan crowded#, people have considered both economy and safety issues. Some people mentioned the economic help of the free ticket policy, but people are still concerned about the virus infection caused by cluster behaviors during COVID-19. Under the topic of #Travel around

Table 4 Classification Results of Netizens' Comments

Classification of Policy Perspectives	Specific Policies	Classification of Netizens' Perspective				
		Economy	Safety	Idle	Feasible	Others
Economy	Consumption coupon	54.80%	0.30%	0.10%	0.40%	44.30%
Safety	Scenic spot policy	13.40%	6.70%	0.50%	17.20%	61.90%
	Huangshan crowded	18.90%	18.50%	0.20%	2.20%	60.00%
	Travel around China online	0.80%	0.30%	3.80%	0.10%	94.70%
Idle	2.5 days off a week	11.70%	0.60%	36.80%	0.30%	50.40%
Feasible	Resuming tourism industry	7.10%	2.70%	0.40%	15.90%	73.80%
	Resuming inter-provincial travel	9.00%	8.70%	0.10%	22.20%	59.80%

China online#, people expressed their opinions from a more free perspective, such as "Travel around China online every weekend at 9:30 am". This policy allows people to enjoy the beautiful scenery of different places without leaving home, which disperses the risk of crowd gathering brought by offline travel, and there is no time limit.

In terms of idle, netizens with the #Many provinces define 2.5 days off# policy perceived better, with 36.8% of netizens expressing their opinions from the perspective of idle. Some netizens were skeptical of the policy, saying "we don't even have a two-day weekend anyway." Some netizens understood the purpose of the proposal, saying that "tourism is an important pillar of future development, so we can take a few more days off."

In terms of feasibility, netizens' perception of the two policies was general, 15.9% and 22.2% of netizens, respectively, expressed their opinions from the perspective of feasibility. In early February, netizens commented on the restoration of the scenic spot, questioning whether it should be open to the public. In April, when the epidemic was greatly controlled in China, most netizens expressed their support for the opening of the Yellow Crane Tower scenic spot, saying that it was getting better and better after a long time.

Visual Analysis Based on Different Policy Categories

The online comments of the public on the policies during the epidemic period were obtained from the websites. As they were relatively redundant and dispersed, the software ROST CM5.8.0 was used to classify the emotional tendency of user comments, and analyze the policies that aroused better public perception and the emotional tendency of the public on such policies. Then, according to the visual analysis technology of the semantic network, the hot public concern about the travel during the epidemic period is mined, which can be used as the basis for the follow-up test of whether the public perceives the policy.

Sentiment Analysis

ROST CM[31] software is a digital research platform for humanities and social sciences based on content mining. It is a group of digital academic research platforms with close functional connections, which can collaborate intelligently with each other, and finally conduct an intelligent analysis of humanities and social sciences according to a certain paradigm. ROST CM software is capable of semantic network and emotion analysis. In this paper, ROST CM5.8 is used for emotion analysis, and the analysis results are used to integrate the proportion of positive, neutral, and negative comments brought by the implementation of four kinds of policies during COVID-19, as shown in Table 5.

According to the proportion of positive, neutral, and negative comments in Table 5, 37.90% hold a positive attitude, 54.68% hold a neutral attitude, and only 7.42% hold a negative attitude towards the online tourism policy issued by the government, indicating that most netizens have a favorable impression and support this policy. For

Table 5 Sentiment Analysis of Various Weibo Topics

Classification	Policy Category	Topic	The Proportion of Positive Emotions	The Proportion of Negative Emotions	The Proportion of Neural Emotions
Safety	Online travel	Travel around China online	37.90%	7.42%	54.68%
	Scenic spot measures	Measures for Huangshan Scenic Area	31.53%	37.96%	30.51%
		National scenic spot measures	48.99%	16.21%	34.79%
Idle	Many provinces define 2.5 days off	Many provinces define 2.5 days off	37.49%	23.18%	39.33%
Economy	Coupons issued in many places across the country	Coupons issued in many places across the country	46.78%	15.04%	38.18%
Feasible	National Tourism recovery	Resuming tourism industry throughout the country	49.91%	18.78%	31.31%
		Resuming inter-provincial travel	47.31%	15.60%	37.09%

tourists to gather together after Huangshan scenic spot opened, although the government issued a series of measures to control the flow, 37.96% of the population held a negative mood for this event, which is more than the number of people with positive emotions. It indicates that government departments should prepare for emergency measures and security measures before opening a scenic spot, rather than wait and solve problems when they arise. Measures of the scenic spots in the country mainly include "online booking", "flow restriction", etc. Then, 48.99% of the people show positive emotions, which are far more than negative emotions, indicating that the implementation of scenic spot measures in various places has a significant effect, which can give people enough sense of safety during the trip. The negative comments on the "2.5 days off" policy reached 23.18%, when the positive comments reached 37.49%. Although the government called on every medium enterprise to extend rest time, under COVID-19, employees hope to recover economic loss as soon as possible, so more people heold a neutral attitude. Under the "economy" policy, 46.78% of netizens held a positive attitude, while only 15.06% hold a negative attitude, indicating that most netizens held a positive attitude in support of the policy. It can be seen from the "feasible" policy that the number of people holding positive emotions in this policy is much higher than the number of people holding negative emotions, by more than 30%, indicating that this policy is supported by the masses.

Visual Analysis Based on Semantic Network Under Different Policy Categories

According to ROST CM analysis of the proportion of positive and negative opinions in people's online comments, those posts under the four categories of policies, namely "safety", "idle", "economy", and "feasible", are generally positive. Here, in order to obtain the major concerns of the public under each type of policy, semantic network visual analysis was adopted to analyze the online comment data of the four policies under the background of COVID-19. The semantic network is one of the representations of an artificial intelligence program, which expresses human knowledge construction in the form of a network. It consists of arcs between nodes, where nodes represent concepts (events or things), and arcs represent relationships between them. The semantic network diagram is used to represent the degree of association between words and reflect the most concerned words in

user comments. The main purpose is to find the words that are mentioned most in netizens' comments, so as to judge whether people perceive the content of the policy. By ROST CM5.8.0 analysis, a relevant semantic network diagram can be obtained. Figures 1–7 represent the semantic network diagram of user comment content under each travel topic, and represent the relationship between words in each user comment content.

The Analysis of Safety Policies

The semantic graph of the Internet is obtained by analyzing the comments made by netizens under the topic of #Travel around China Online#.

From Figure 1, netizen focus more on the reporters and anchors of online travel live-streaming. "Travel around China online" is broadcasted at a fixed time every day. Generally speaking, beautiful anchors or journalists attract more audience, especially web celebrity "Weiya". Affected by the COVID-19 epidemic, people can neither travel abroad nor buy travel products. Through online mode, people can be personally involved and promote the consumption of tourism products in remote areas. According to Figures 3 and 4, Xinjiang, Sanya, Shanxi Pingyao, Changbai Mountain, Guilin, and other places have attracted more netizens' attention. Through live streaming of local food and scenic spots, people want to travel in person, which accelerates the sales of tourism products.

In addition, the Internet semantic graph of Figures 2 and 3 is obtained by analyzing the comments made by netizens under the topics #Huangshan Scenic Spot measures# and #National Scenic spot measures# on Weibo.

Since announcing it was open, Huangshan Mountain scenic area has been crowded, indicating that, after stabilizing of the epidemic, the majority of people are chasing for tourism, but congestions cause certain difficulties for epidemic control. Huangshan Mountain scenic area started the emergency plan, stopped serving tourists, preventing a widespread infection epidemic. It can be seen from Figure 2 that Tomb-sweeping Day (the first holiday after the epidemic), has become the relaxation of travel for people all over the country after they have been "confined" for a long time, which also increases the difficulty for the government to prevent and control the epidemic. "Wear Mask" has become important and necessary. In Figure 3, the nodes of "Anhui", "Huangshan", and "local" indicate that most tourists to Huangshan scenic spot are residents of Anhui province. Many tourism enterprises, such as
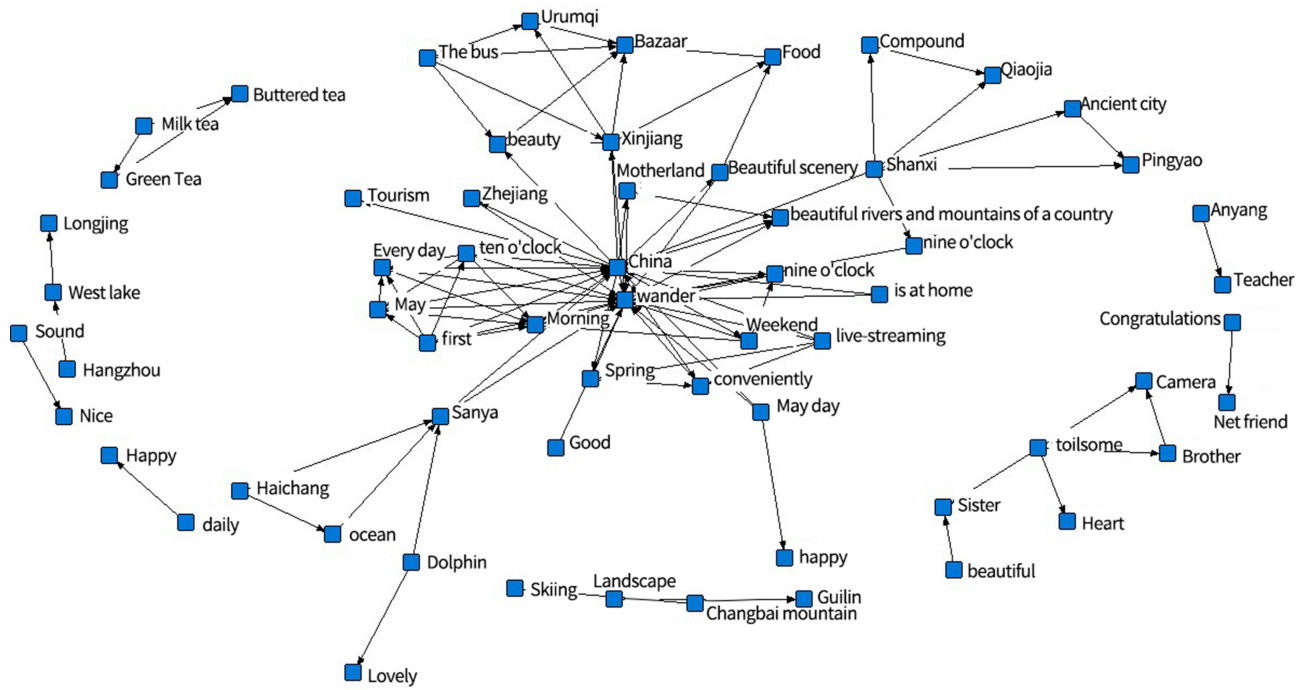
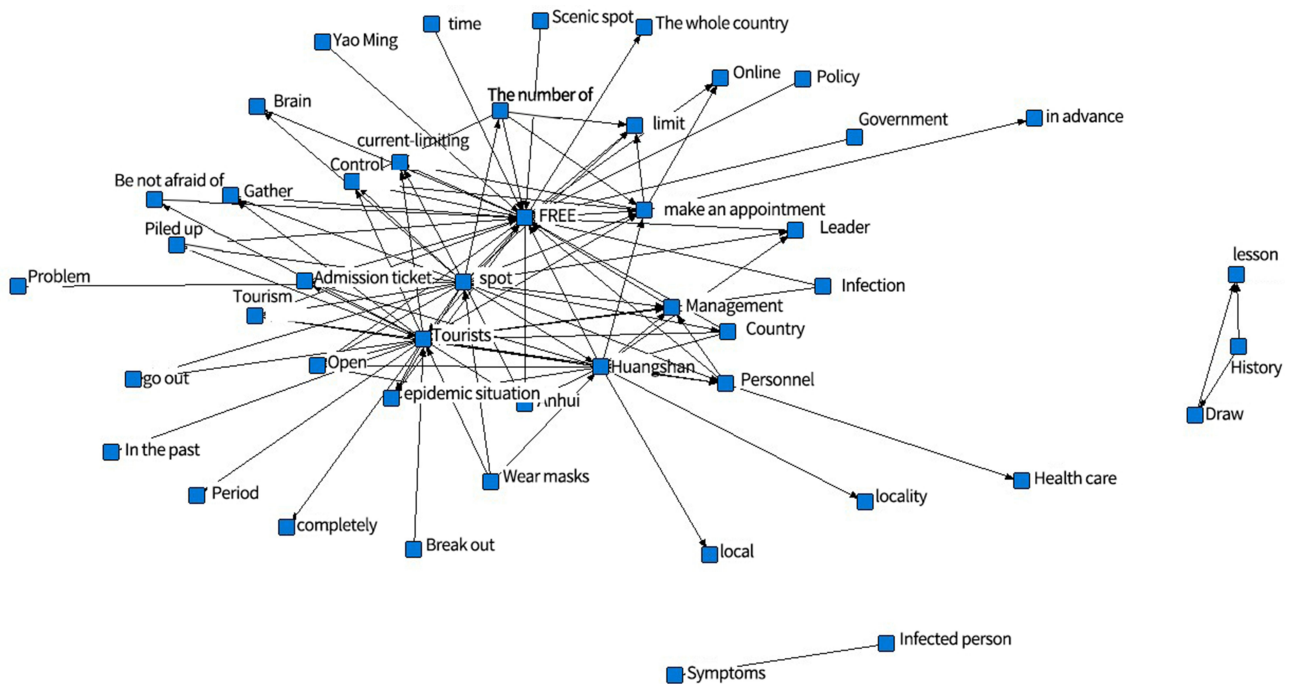**Figure 1** Semantic graph of #Travel around China Online#.

Figure 2 Semantic graph of #Huang shan Scenic Spot measures#.

Ctrip and Feizhu, have launched local and provincial tours to narrow the traveling scope and make the public feel more assured. As can be seen from the "current-limiting", "making an appointment", "free", and "time" nodes, the government has taken measures such as online booking, limiting the visiting number of scenic spots, offering free tickets, and extending the opening hours of scenic spots to provide people with a safe place to travel, and at the same time actively controlling the mass influx of people into scenic spots. Despite a series of measures to control flow,
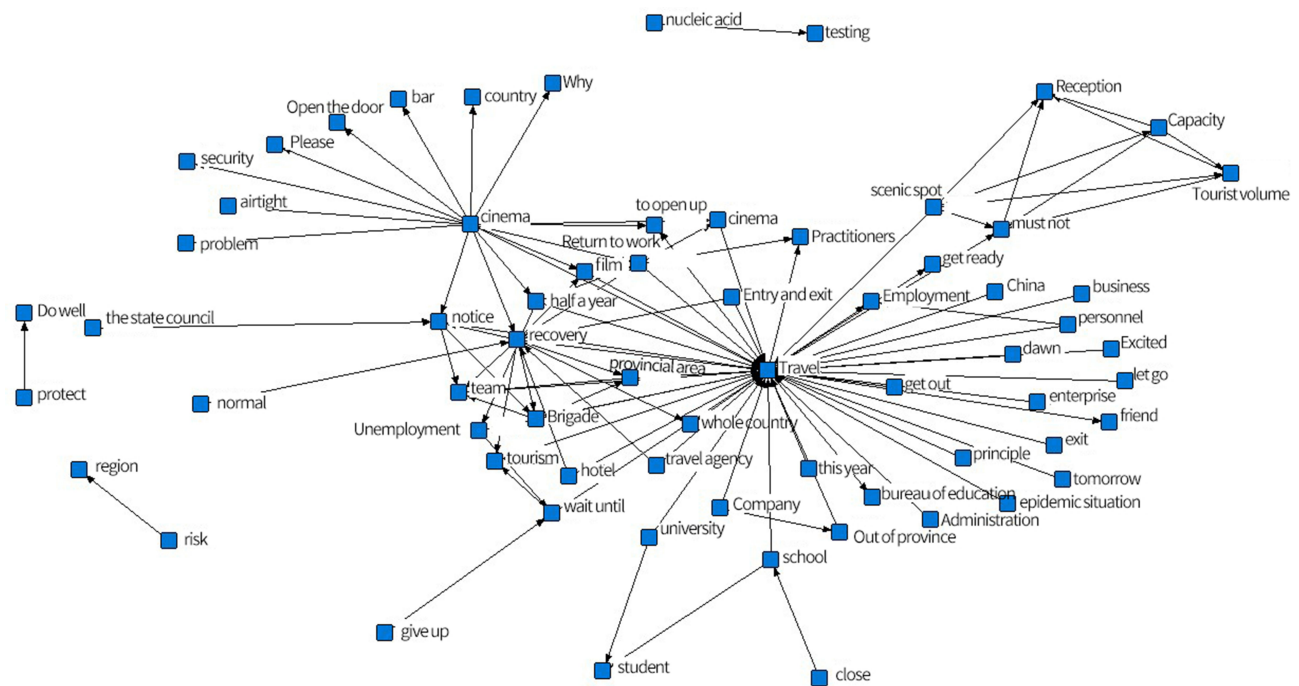
Figure 3 Semantic graph of #National Scenic spot measures#.

Figure 4 Semantic graph of #Many provinces define 2.5 days off#.

for the emergence measures taken by Huangshan, 37.96% of people hold a negative mood for this event, which is more than the number of positive emotions. It indicates while recovering tourism, government should consider unexpected circumstances, optimize emergency measures, and avoid crowding in advance.

Figure 5 Semantic graph of #Coupons issued in many places across the country#.

Figure 6 Semantic graph of #Resuming tourism industry throughout the country#.

The Analysis of Idle Policies

The semantic graph is obtained by analyzing the comments made by netizens under five topics.

In order to stimulate the recovery of the tourism industry, the government proposed the "2.5 days off" policy.

Hubei, Zhejiang, Jiangxi, Hunan, and other provinces responded positively. Figure 4 shows that around the "rest" node, most people mention "implement", "work overtime", "double rest", "civil servants", and "private enterprise". It shows that most of the private personnel

Figure 7 Semantic graph of #Resuming inter-provincial travel#.

hope to implement 2.5 days off as early as possible, and guarantee their overtime pay. For state-owned enterprises, organizations and institutions, employees rarely work overtime compared with people from private sectors, so they do not extravagantly hope for 2.5 days off. It can be seen from the nodes "economy" and "development", this policy is mainly aimed at stimulating people's consumption in holidays and developing the economy. At present, most enterprises have responded positively to this policy by changing the former bonus payment into "complimentary travel products" or "company incentive group travel", which promotes the recovery of the tourism industry. The sentiment analysis results of Table 5 show that negative emotions reached 23.18%, and the number of positive emotion accounts for about 10%. Some people paid hourly or daily encounter huge economic pressure, so they reduce the demand for tourism and extend working hours to afford their family expenses.

The Analysis of Economy Policies

The semantic graph is obtained by analyzing the comments made by netizens under four sub-category topics.

In Figure 5, the above analysis result shows that the national policy of issuing coupons aims to "stimulate economy", "benefit the people", "provide public welfare",

and "stimulate the market". The coupon platforms include "Alipay", "Dianping", and "Mafengwo". As the most common application in the national people's life, "Alipay" has spread to all industries. Hangzhou, the city where Alibaba is located, also responded positively to the government's policies and issued 1.68 billion Yuan of consumption coupons. "Wuhan", as an important node, is the city hit the hardest by the epidemic. For this reason, Wuhan issued 500 million Yuan of consumption coupons to stimulate Wuhan's economy, encouraging small and middle enterprises to resume work and production, and increasing people's welfare. According to the "Consumption" node in Figure 5, the government's purpose of promoting tourism consumption by issuing consumption vouchers can be well accepted by the public. People can buy travel vouchers in advance, which can be used after the epidemic stabilizes, and it is also a kind of advance consumption. At the same time, the government also advocates daily consumption and issues a series of coupons. "Supermarket", "the Mall", and "Market" are all perceptions of the coupon policy. If the government wants to emphasize tourism vouchers, the content of the information should be clear when the policy is issued. The node "Positive" indicates that netizens are optimistic about the epidemic situation in China and are eager to travel after the epidemic stabilizes.

The Analysis of Feasible Policies

The semantic graph of the network is obtained by integrating and analyzing the comments of the netizens under three subcategories of Weibo topics, as shown in Figures 6 and 7.

During April and the Tomb-Sweeping Day, that is, when the COVID-19 was gradually controlled, the tourism industry across the country resumed business one after another. Yunnan, as one of the major winter tourism destinations in China, relies mainly on the cultural tourism industry supported by the floating population economy. Cultural and tourism authorities at all levels are restoring confidence, optimizing the modern tourism governance system, and opening several scenic spots while strengthening of the epidemic prevention and control. In July, when the epidemic was controlled, the ministry of Cultural and Tourism announced the resumption of inter-provincial travel. At the same time, cinemas began operating. From the node "entry and exit", "unemployment", "half a year", and so on, the issued policies for returning to work make the unemployed encouraged, ignite people's inspiration to travel abroad, and solve the problems for employees with the need to leave the country for work or enterprises with foreign business. The node "nucleic acid", "testing", and " protect" show that although the epidemic is in a stable state at present, the country has not taken the prevention and control of the epidemic carelessly.

The Social Effect Analysis of Tourism Policies Based on Binary Logistic Regression Model

The logistic regression model mainly studies the probability P of some phenomena and discusses the factors related to the probability P. In this article, studying whether people perceive the government policy belongs to the 0–1 binary classification variables. Therefore, by constructing a strictly monotone function Logistic (P) to study the model between P and the independent variables, this paper selects the binary logistic regression model.

Variable Selection and Data Definition

From the above analysis, various policies to revitalize tourism during COVID-19 arise people's attention and discussion on the Internet. As the main channel of major government policy, the new media must consider the guiding force of influential people, who are represented by a large quantity of Weibo and fans. Combining the analysis of the emotional distribution and semantic network

nodes after the visual characteristics of tourism revitalization policies under COVID-19, the netizen-related variables are selected from the perspective of netizens, including: total number of Microblogs, the timeliness of comments posted, the division of policy in the view of user, users' emotional score (opinion tendency), thumb up number in netizens comments, the netizen comments, the gender of the netizens, the number of fans, the number of the followers, the degree of activity, and the level of development of COVID-19. These 11 variables obtained by the network data after the expansion of crawl can fully show the impact of netizens personal influence, individual opinion on the effects of the policy implementation. The meanings of 11 variables are shown in Table 6.

The Construction of Binary Logistic Regression Model

The dependent variables set in this paper are binary classification variables (ie, the Boolean variables), therefore, the binary classification logical model (Binary Logistic Regression) is adopted to study the factors affecting netizens' perception to policy, as well as set an optimal combination of policy and explain the influence of factors on perception effect. In the regression model, the independent variable is $X_1 \sim X_{10}$, and the dependent variable Y represents whether the policy content is perceived from the perspective of Internet users. ε is the error term, assuming that it is independent of other variables; β_i is the regression coefficient in logistic regression; $In(\frac{P_i}{1-P_i})$ represents the logarithmic change value of the ratio for the probability of occurrence to non-occurrence when X_i changes a unit. By referring to the definition of logistic model in literature,[32] the influencing factor model of netizens' perceived effects on tourism policies is constructed, as shown in Equation (1).

$$Y = In(\frac{P_i}{1 - P_i}) = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \varepsilon$$

$$(1)$$

The combination of different types of policies cause diverse social effects, leading to different public perception of the degree as well as the influencing factors of netizens' perception. In order to find the best combination of tourism promotion policy, by dividing tourism policy into four categories and combining them, 15 kinds of policy combinations can be acquired (economy, idle, feasible, safety, economy + safety, economy + feasible, economy + idle, idle + safety, idle +

Table 6 Variables and Definitions

Variables	Code	Definitions
Dependent variable (Policy implementation effect): The division of policies from the perspective of netizens	Y	Judge whether the classification of the netizen's perspective and policy perspective is consistent, if it's 1, otherwise it's 0 (If it is consistent, it indicates that this policy is effective and produces better social effect).
The policy concerns the total number of Microblogs	X_1	The number of netizens' comments on Microblog topics under each policy category.
Timeliness of comments posted	X_2	The Microblog topics involved under each policy category, the average difference between netizens' comment time and Weibo release time.
Opinion tendency	X_3	ROST was used to score each netizen's comments emotionally, a number less than zero indicates a negative emotion, A number greater than zero is a positive emotion, equals zero is neutral.
Thumb up number	X_4	The number of thumb ups each netizen comments on the policy from other netizens.
Comment number	X_5	The number of thumb ups each netizen comments on the policy from other netizens.
Netizens gender	X_6	Gender of netizens participating in comments under each policy category, it's 1 for women and 0 for men.
Number of fans	X_7	The number of followers of netizens participating in comments under each policy category.
Number of followers	X_8	Netizens participating in comments under each policy category, the number of followers of other netizens on Weibo.
The degree of active	X_9	The number of original Microblogs posted by netizens participating in comments under each policy category.

(*Continued*)

Table 6 (Continued).

Variables	Code	Definitions
Level of development of COVID-19	X_{10}	According to the level of response to major public health emergencies, The first level response was from January 24 to April 30, the second level response was from April 30 to June 12, the level 3 response was from June 12 to July 30.

feasible, safety + feasible, economy + idle + feasible, economy + idle + feasible + safety). With regard to the policy combinations, the binary logistic regression model is set up. In the binary logistics regression model, how many independent variables are introduced needs to be studied. If fewer independent variables are introduced, the regression equation will not be able to explain the changes of dependent variables in an accurate manner, but it does not mean that more independent variables are absolutely better. Therefore, it is necessary to adopt some strategies to control the independent variables by introducing regression equations. The Stepwise Selection method is adopted here, that is, the introduction threshold of *P*-value is tested according to the significance of the set regression coefficient, independent variables are introduced into the model one by one, then *P*-values of all coefficients in the model are recalculated, and variables are screened according to the set elimination threshold. The Stepwise Selection method includes forward selection method and backward selection method. The forward selection method is relatively simple, but the biggest disadvantage is that if there is multicollinearity, the final model may be mixed with less important independent variables. The backward selection method is more conservative in terms of information. The backward selection method is chosen in this article. Data processing was conducted in SPSS25.0 software, and the significance level of entering the model was set at 0.05, and the significance level of removing or retaining variables was also set at 0.05.

The main steps of regression analysis are as follows: using LR Likelihood Method to select the independent variables with a significant relationship between public perception effect, conduct significance test for the variable regression coefficient and model to get binary logistics regression equation between each variable and dependent

Table 7 Significance Test of Independent Variables Selected by "Economic" Policies

Variable	Model Log Likelihood	Change in-2 Log Likelihood	Degrees of Freedom	Significance of the Change
Step1[a] X_2	−3031.611	437.468	1	0.000
X_3	−2812.878	0.003	1	0.960
X_4	−2813.892	2.031	1	0.154
X_5	−2814.068	2.383	1	0.123
X_6	−2813.835	1.916	1	0.166
X_7	−2813.162	0.571	1	0.450
X_8	−2814.975	4.197	1	0.041
X_9	−2813.964	2.175	1	0.140
X_{10}	−2848.757	71.761	1	0.000

Note: [a]Means backward stepwise selection regression method is adopted in regression analysis.

Table 8 The Variable Coefficients in the "Economic" Policy Equation

	B	Standard Error	Wald	Degrees of Freedom	Significance	Exp(B)	AIC
Step7[a]X_2	0.028	0.002	310.135	1	0.000	1.028	
X_8	0.000	0.000	4.090	1	0.043	1.000	
X_{10}	0.309	0.037	70.078	1	0.000	1.361	
Constant	−0.688	0.086	63.620	1	0.000	0.502	
							519.426
Step1[a]							540.505

Note: [a]Means backward stepwise selection regression method is adopted in regression analysis.

variable, and test the prediction accuracy of the overall model. The following is a detailed introduction to the regression analysis of the public perception effect under the "economy" tourism policy, and the regression analysis process of the remaining 13 tourism policy combinations can be similarly obtained.

The regression model construction process of the public perception effect under the "economy" tourism policy is illustrated as an example. Based on the comment data of "economy" policy obtained above, SPSS was used for binary logistics regression. After eliminating the independent variable X_1 which could not be introduced, the independent variable could be selected and the results were shown in Table 7, the value of regression coefficient of each variable was shown in Table 8, and the model regression statistical results were shown in Tables 9 and 10.

1. Generally speaking, the significance level is to estimate the probability of wrong parameter within a certain interval. When the original hypothesis is true and represented by α, the probability of rejecting the original

hypothesis is usually 0.05. When the decision to accept the original hypothesis is made, the probability of its correctness is 95%. It can be seen from Table 7 that in the selection of independent variables, the significance level Sig.<0.05 is X_2 for the timeliness of comment release, the number of attention is X_8, and the development level of COVID-19 is X_{10}. Therefore, there is a significant relationship between the public perception of "economy" policies and these three variables, so

Table 9 Omnibus Tests of Model Coefficients Under the Policy of "Economic"

	Chi-Square	Degrees of Freedom	Significance
Step 7[a]Step	−2.673	1	0.102
Block	526.017	3	0.000
Model	526.017	3	0.000

Note: [a]Means backward stepwise selection regression method is adopted in regression analysis.

Table 10 The Final Model of "Economic" Policy Predicts Rates

Observed	Predicted		
	Netizens Have a Sense of the Policy	Netizens Did Not Perceive the Policy	Percentage Correct
Step 7[a]Netizen's perception of policy: Y	1341	680	66.4
	759	1693	69.0
Overall percentage			67.8

Note: [a]Means backward stepwise selection regression method is adopted in regression analysis.

independent variables of the binary logistics model under such policies can be screened out.

2. According to the selected independent variable, the coefficient of its independent variable is determined by the value of Exp(B) in Table 4. Exp(B) is also known as the preponderance ratio, which means that the preponderance ratio is twice that of the original Exp(B) when the other independent variables are fixed and unchanged.

3. The regression equation of public perception under the "economy" policy can be obtained as follows:

$$Y = 0.465 + 1.029X_2 + X_8 + 1.38X_{10} \quad (2)$$

Due to the Sig. <0.05 in Table 9, it indicates that model is significant under 95% significance level, so the X_2, X_8, and X_{10} can be used as factors that influence the public perception of policies. According to the model prediction accuracy in Table 10, the probability of the model in formula (2) that can predict the public perception of policy is 67.8%.

Similarly, according to the above policy categories, the basic four kinds of policies are combined. When policy content contains one, two, three, or four kinds of information, 15 class policy combinations can be obtained. The construction of regression model under 15 combinations all meet the test of significance level. The results are shown in Table 11.

Analyzing the Implementation Effect of Tourism Policy

1) After the release of the 15 policy combinations, the binary logistic regression model was established based on public perception of policy. From Table 11, the

conclusions can be made that the release of "safety" policy brings better social effect, whose social policy implementation effect is 93.2%. If the "safety policies + feasible policies" and "economy policies + safety policies" can be released together, people's perceptions are 92.2%, 89.3%, followed by the "economy + safety + feasible policies", which is 88.5%.

As can be seen from Table 5, the main topic of "safety" policy on Weibo is "Travel around China Online". By means of online travel, people lower their travel frequency while keeping their enthusiasm for travel consumption after COVID-19. Moreover, during the epidemic period, the safety of the tourism environment is the most concerned and worried issue. The most fundamental problem for the revitalization of the tourism industry is to control the development of the domestic epidemic. After the security is guaranteed, the "economy" and "feasible" policies will be released at the same time, which can promote the revitalization of the tourism industry. As for the "economy" policy, it is mainly to issue tourism coupon, while the "feasible" policy is to open major tourist attractions or to resume inter-provincial travel. Only when the tourist attractions start to operate normally, can people use tourism coupon to recover the tourism industry through scenic spot consumption.

2) The combinations of "economy + feasible", "economy + idle + feasible", "economy + idle" bring poorer social effect than other policy combinations. This is because if the government does not release the information of epidemic development situation nor the safety measures for travel, people are not interested in traveling. Before safety is guaranteed, the effect of policy is poor. Based on this, it is suggested that the government should report the development of epidemic situation at home and abroad in real time, as well as the relevant safety measures taken in tourist attractions or the process of tourism in the content of the revitalization of tourism policy, so as to ensure more obvious social effects after the release of the policy.

3) From Table 11, the conclusions can be made that the netizens' activeness X_9 greatly impacts on public's perception effect. In the top five optimized policy combinations, the greater the X_9 of Internet users is, the stronger the perception about policy is, the greater the effect of policy implementation brings. The activeness of netizens is the original Weibo released by netizens. Generally speaking, the more active a netizen is on Weibo, the greater his personal influence will be, and the stronger the effect of network public opinion will be caused. For government departments, if they want to expand

Table 11 Results of Binary Logistic Regression Model for 15 Policy Portfolios

Ordinal Number of Policy Portfolios	Ranking of Different Policy Preferences	Different Policy Mix Categories	Binary Logistic Regression Model	Factors Influencing the Social Effect of Policies	Public Perception of the Effects of Policy
1	1	Safety policies	$Y = 4.881 + 0.988X_3 + 0.789X_6 + X_9 + 0.03X_{10}$	Opinion tendency\Netizens gender\The degree of active\Level of development of COVID-19	93.2% AIC=2,869.762
2	2	Safety policies + Feasible policies	$Y = 0.891 + X_1 + 0.996X_2 + 0.983X_3 + 0.857X_6 + 0.399X_{10}$	The policy concerns the total number of Microblogs\Timeliness of comments posted\Opinion tendency\Netizens gender\Level of development of COVID-19	92.2% AIC=1,641.991
3	3	Economy policies + Safety policies	$Y = 1.114 + X_1 + 0.999X_2 + 0.747X_6 + X_9$	The policy concerns the total number of Microblogs\Timeliness of comments posted\Netizens gender\The degree of active	89.3% AIC=4,768.212
4	4	Economy policies + Safety policies + Feasible policies	$Y = 0.992 + 0.995X_3 + 0.78X_6 + X_9 + 0.788X_{10}$	Opinion tendency\Netizens gender\The degree of active\Level of development of COVID-19	88.5% AIC=229.69
5	5	Idle policies + Safety policies	$Y = 2.927 + X_1 + 0.998X_2 + 0.987X_3 + 0.946X_6 + X_8 + 0.059X_9 + 0.187X_{10}$	The policy concerns the total number of Microblogs\Timeliness of comments posted\Opinion tendency\Netizens gender\Number of followers\The degree of active\Level of development of COVID-19	85.5% AIC=2,148.01
6	6	Economy policies + Idle policies + Safety policies	$Y = 2.927 + X_1 + 0.998X_2 + 0.987X_3 + 0.946X_6 + X_8 + X_9 + 0.187X_{10}$		85.5% AIC=218.008
7	6	Safety policies + Idle policies + Feasible policies	$Y = 1.651 + X_1 + 0.996X_2 + 0.985X_3 + X_4 + 0.997X_5 + 0.951X_6 + X_8 + 0.354X_{10}$	The policy concerns the total number of Microblogs\Timeliness of comments posted\Opinion tendency\Thumb up number\Comment number\Netizens gender\Number of followers\Level of development of COVID-19	85.2% AIC=2,746.003
8	7	Economy policies + Safety policies + Feasible policies + Idle policies	$Y = 1.59 + X_1 + 0.999X_2 + 0.991X_3 + 0.892X_6 + X_8 + X_9 + 0.627X_{10}$	The policy concerns the total number of Microblogs\Timeliness of comments posted\Opinion tendency\Netizens gender\Number of followers\The degree of active\Level of development of COVID-19	82.8% AIC=4,731.289
9	8	Feasible policies	$Y = 0.975X_1 + 0.972X_3 + 1.363X_6$	The policy concerns the total number of Microblogs\Opinion tendency\Netizens gender	79.8% AIC=60.456
10	9	Economy policies	$Y = 0.465 + 1.029X_2 + X_8 + 1.38X_{10}$	Timeliness of comments posted\Number of followers\Level of development of COVID-19	67.8% AIC=519.426
11	10	Idle policies + Feasible policies	$Y = 0.214 + X_1 + 0.986X_3 + 1.277X_6 + X_8 + 0.93X_{10}$	The policy concerns the total number of Microblogs\Opinion tendency\Netizens gender\Number of followers\Level of development of COVID-19	66.9% AIC=514.627

(Continued)

Table 11 (Continued).

Ordinal Number of Policy Portfolios	Ranking of Different Policy Preferences	Different Policy Mix Categories	Binary Logistic Regression Model	Factors Influencing the Social Effect of Policies	Public Perception of the Effects of Policy
12	11	Idle policies	$Y = 0.53 + 0.99X_3$ $+ 1.261X_6 + X_8 + X_9$	Opinion tendency\Netizens gender\Number of followers\The degree of active	63.2% AIC=91.277
13	12	Economy policies + Feasible policies	The implementation effect of the three policy combinations is not as good as that of the single policy release (This regression model is meaningless, AIC value is meaningless)		63.4%
14	13	Economy policies + Idle policies + Feasible policies			63.2%
15	14	Economy policies + Idle policies			59.4%

the social effects brought by the policies, they can forward the policies through "opinion leaders" on Weibo to let more people know the contents of the policies, promote tourism consumption, and drive the tourism economy.

4) From Table 11, except for the "idle + feasible", "economy", "economy + safety" policy, opinion tendency degree X_3 impacts on the effect of different policy combination. X_3 regression equation coefficient shows that each type of policy combination regression coefficients is above 0.9, indicating that X_3 had a greater influence on the effect of the policy implementation. This is because after the release of policy, netizens hold positive, negative, or neutral attitudes, which affects the tendency of public opinion. If the policy is released, "opinion leaders" hold negative attitudes, which will not be conducive to policy implementation and cause rejection on the network platform. Therefore, after the release of policy, government should control trend of public opinion, timely stop bad happens so as to play the positive impact of policies.

Conclusions and Suggestions

This paper selects Weibo comments, comments time, gender, the original Weibo number, and other aspects from January 11, 2020 to July 24 on the revitalization of the tourism policy, and divides the revitalization of tourism policy into "economy", "safety", "idle", "feasible" four major categories. From the perspective of users, by constructing binary logistic regression model, the combination of all kinds of policy is analyzed. Based on the above analysis, this paper provides the following suggestions for the government and scenic spots to cope with public health emergencies and improve the perceived effect of policies:

Tourism Policies Under the Epidemic Situation Should Highlight Safety Measures

The epidemic brings great challenge to China's governance system and capacity. For the tourism industry, it is necessary to carry out the corresponding assessment, prevention, and treatment, and handle the tourism crisis properly, which not only requires scientific decision-making and precise measures by the government, but also requires the joint efforts of scenic spot practitioners. According to the analysis of this paper, the public's perception of "safety" policies is the strongest. Only when tourists perceive that it is safe to travel can the cultural and tourism industry gradually resume work and production. Based on this, the government should timely issue a "safety" policy after the initial stability of the epidemic. For example, on February 25, the Ministry of Culture and Tourism issued a "Guide to Prevention and Control Measures for Reopening of Tourist Attractions", which enables tourists to perceive that the government encourages the cultural and tourism industry to resume work and production, and it is relatively safe to travel in the current environment. In addition, the government can issue a series of advocacy policies, such as advocating industry associations to strengthen the safety and supervision of epidemic prevention and control, and guiding scenic spots to actively participate in relevant work; Secondly, the scenic spot should issue a series of effective and feasible prevention and control policies to ensure safety, such as implementing a series of policies in terms of limiting the capacity of tourists, keeping social distance between

tourists, regularly disinfecting all scenic spots, and requiring tourists to wear face masks.

The Combination of Economic Policies and Security Policies Can Achieve Better Results

The most fundamental problem of reviving the tourism industry is to control the development of the epidemic. When safety is guaranteed, "economy" and "safety" policies will be issued at the same time, which will greatly accelerate the recovery of the tourism industry. The reality of the difficulties in view of the current tourism industry development, in addition to the policy of issuing coupons to attract tourists, governments at all levels can introduce more perfect tourism industry revitalization policy, especially the release and enforcement of fiscal policy, tax policy, credit policy, and social security policy for the troubled tourism-related businesses. Providing financial subsidies for tourism services and related enterprises to resume operation and production. For tourism enterprises that have special difficulties and fail to pay tax on time, tax payment shall be reduced or postponed appropriately. Tourist attractions can also release a series of "economy" policies to attract tourists, such as free tickets or appropriate discounts, multi-scenic joint ticket discounts and other marketing policies. In addition, "feasible" policies will be issued at the same time, such as enforcing the paid leave system for employees and 2.5 days off policy.

Play the Role of "Opinion Leaders" to Improve the Perceived Effect of Policies

Through analysis, this paper finds that "opinion leaders" have a significant impact on the perceived effect of the public after the release of policies. The greater the influence of "opinion leaders" is, the stronger the perception of policies will be, and the greater the social effect brought by the implementation of policies will be. Therefore, the government can advocate "opinion leaders" on Weibo to forward and expand the exposure of the policy, so as to improve the perceived effect of the policy, let more people know the content of the policy, boost tourism consumption and drive the tourism economy.

Use Big Data of Tourism to Improve the Effect of Policies

Since the outbreak of the COVID-19, big data of tourism has played an important role. However, in the face of the sudden outbreak, the release of policy information and monitoring of public perception is still lagging behind. In this regard, local governments and scenic spots can use the big data platform to accurately locate the spread path of the epidemic, quickly track the flow of tourists and their movements, and establish a tourist relationship map, so as to provide data protection for "safety" policies and reduce tourists' concerns about safety. In addition, big data can be used to speed up the connectivity of all kinds of policy information and expand the exposure of policies, so as to increase the public's perception of the effect of policies.

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