

Design and Implementation of a WeChat Mini-program Named "Cloud Tour Gangu"

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Abstract: A mobile application called "Cloud Tour Gangu" (Gangu is a county in Gansu province of China, It is the oldest county that has lasted nearly 2,700 years.) is developed by our team as a WeChat applet. The application is built on WeChat because WeChat has an enormous installed base in China, besides, WeChat applet stack has made developing, delivering, and updating WeChat applets very approachable. Tourists are provided with information of tourist attractions in Gangu, as well as its cultural traditions and local history such as famous historical figures of Gangu via the applet. Moreover, the applet supports path planning on behalf of tourists. Tourists can also choose to share their experiences on social media platforms as they arrive at landmark tourist spots, an activity known as "Card Punching" by Chinese netizens. The applet is supposed to serve as a smart "Business Card" of the tourism industry of Gansu. While its main use case is to be used as a Traveler's Guide by tourists, it can also be found useful for non-tourists who want to know about Gangu.

1. Introduction

1.1. Introduction to Gangu County

Gangu County is located at the juncture of the Loess Plateau in central Gansu and the western extension of the Qinling Mountains. Its terrain is characterized by undulating mountains and crisscrossing gullies. The northern mountainous region is an offshoot of the Liupan Mountains, while the southern mountainous region is a continuation of the Qinling Mountains. The Wei River crosses the county, and its tributaries have long eroded into complex areas of bays, plateaus, plains, and wetlands ^[1]. "Gansu Tongzhi" describes Gangu County as follows: "The eastern ridge stands tall, and the western hill is vigorous. Facing the sky in the south, surrounded by the Wei River in the north, mountains and passes abound, and ridges form a dense network." According to research, Gangu County is the oldest and only ancient county in China that has been continuously established for nearly 2,700 years, earning it the reputation of being the first county in China ^[2]. Its geographical location makes it a must-pass place on the ancient Silk Road and Tang-Tubo Ancient

Road, as well as one of the main routes for the transmission of Buddhism to the east ^[3]. Today, Gangu County is under the jurisdiction of Tianshui City in Gansu Province, located in the northwest of Tianshui City, and is renowned as the "hometown of chili peppers, apples, and martial arts" in China ^[4]. According to Wilkinson and other scholars, rural tourism is regarded as a comprehensive rural economic sector that integrates culture, tourism, and sightseeing ^[5]. Currently, cultural tourism has become a new highlight, new format, and new driving force promoting the transformation and development of Gangu County's economy and society^[6]. Since the "14th Five-Year Plan," Gangu County has relied on its rich cultural heritage and abundant cultural tourism resources, and has been committed to creating a new highland for the integrated development of cultural tourism based on the development concept of "one strategy, two major brands, five cultures, five routes, and six plays"^[7].

1.2. The advantages of the "Cloud Tour Gangu" WeChat mini program in promoting tourism resources

Media is the advocate for the excavation, utilization, and protection of cultural resources^[8]. Gangu County has fully utilized various platforms such as news media, WeChat, Weibo, television, and exhibitions for tourism promotion, achieving certain publicity results. However, there are some difficulties for tourists who visit the county: firstly, there are numerous tourism promotion platforms, but not all of them are widely used and familiar to the general public, so tourists need to spend time and effort to become familiar with these platforms; secondly, the introduction of tourism resources on Weibo, micro-videos, WeChat public accounts, Xiaohongshu, and major news apps is often one-sided, making it difficult for tourists to obtain comprehensive information about attractions, culture, and cuisine in one go, requiring a lot of effort to collect complete information; finally, the road transportation network in the county is complex, making it difficult to determine the best route to the destination. These difficulties have raised some concerns for those planning to travel to the county.

The advantages of the "Cloud Tour Gangu" WeChat mini-program lie in its wide user base and users' familiarity with WeChat operations. At the same time, the mini-program does not occupy phone memory, is ready to use, and provides a smooth user experience, making it convenient and appealing for tourists to use. In addition, the "Cloud Tour Gangu" WeChat mini-program not only showcases the natural scenery of Gangu, but also presents its cuisine, specialties, and historical figures, offering functions such as location check-ins for attractions and system notifications. The mini-program allows people to quickly and comprehensively understand Gangu before their trip, stimulating their interest in Gangu, and can also serve as an electronic guide for travelers during their trip.

1.3. Comparison between the locally-developed "Cloud Tour Gangu" WeChat mini program and the official tourism promotion platform

The "Cloud Tour Gangu" mini-program, developed using JavaScript technology and WeChat developer tools, showcases the distinctive landscapes, cultural customs, and historical figures of Gangu County. The vitality of rural tourism lies in the showcasing of local character and cultural uniqueness^[9]. One of the developers of the mini program is a local resident of Gangu County, which gives them the following advantages over the official tourism promotion platform by leveraging modern technological means to showcase their hometown.

① Local residents have a deeper and more intricate understanding of their hometown. They are able to showcase the local customs, cultural heritage, and intricate details of daily life in a way that is closer to reality. This down-to-earth presentation approach is more likely to resonate with viewers

and pique their interest, making the introduction more captivating and persuasive.

② Being an integral part of their hometown, local residents possess firsthand experiences and emotions that are more authentic and vivid. Sharing these genuine experiences provides viewers with a more intuitive and in-depth understanding, enhancing the three-dimensional image and credibility of their hometown.

③ In comparison to the official platform, which is bound by certain regulations and limitations, local residents have the freedom to present the charm of their hometown in a more flexible and diverse manner. This allows for more creative and informal content creation.

1.4. The Sociological Significance of the "Cloud Tour Gangu" WeChat Mini Program

As the process of globalization strengthens economic development and cultural exchange, it also leads to a certain level of cultural homogenization [10]. Regional culture represents a unique combination of history, customs, traditions, and arts that is formed by local people through long-term production and life experiences. It is a valuable heritage rich in historical information [11]. Encouraging local residents, who are the bearers of regional culture, to engage in diverse forms of creation has several positive implications for the preservation and inheritance of regional culture:

① Through various forms of creation, local residents can pass down and protect their cultural heritage, ensuring that it is not forgotten or lost.

② The preservation and creation of regional culture can become important resources for tourism and cultural industries, thereby promoting local economic development.

③ The diverse expression of regional culture contributes to the promotion of cultural exchange and understanding.

2. Design of "Cloud Tour Gangu"

2.1. The functionality of the "Cloud Tour Gangu" mini-program

The functionality of the "Cloud Tour Gangu" mini-program is structured as shown in Figure 1.

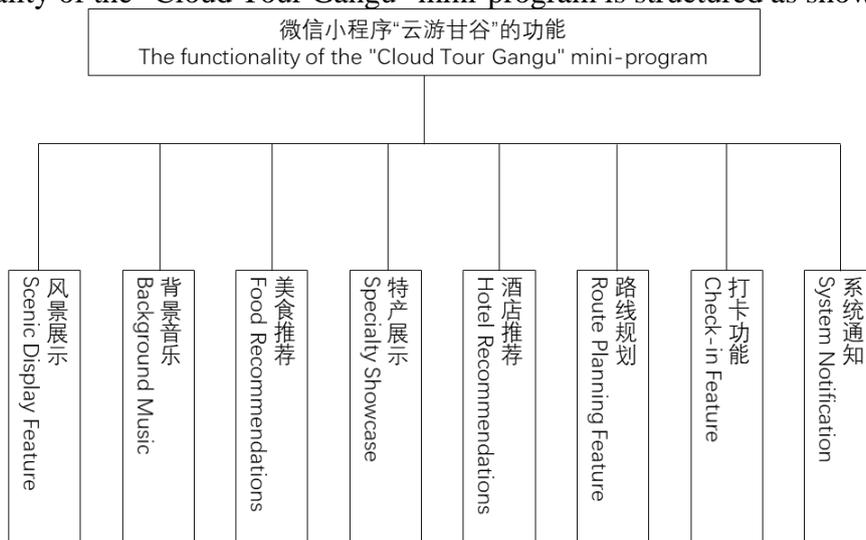


Figure 1: Mini Program Functional Structure Diagram

Scenic Display Feature: Show photographs of the natural landscapes and famous attractions of Gangu County, allowing users to gain a comprehensive understanding of the tourism resources in Gangu.

Route Planning Feature: Based on Tencent's location services, the navigation module provides driving, public transportation, and walking directions to assist visitors in reaching their destinations quickly.

Background Music: Add a music button to the top left corner of the homepage, allowing users to click and play the county anthem of Gangu. Clicking the button again will stop the music. When the music button rotates, it indicates that the music is playing, and when it stops rotating, it signifies that the music has stopped.

Check-in Feature: Users can select and confirm locations on the map page, and the mini program will store the selected locations in the cloud database. Users can view their check-in information and access data from the cloud database to learn about their check-in records during their travel journey.

2.2. "Cloud Tour Gangu " Mini Program Interface Design

The interface of the mini program showcases three tabs, whose names are depicted in Figure 2. The mini program system itself is divided into three modules: "Home," "Columns," and "Profile."



Figure 2: Tab Names in Mini Program



Figure 3: Home Page Interface

The homepage interface, as shown in Figure 3, consists of two sections: "Introduction to Gan

Gu" and "Travel Guide". The introduction section provides a concise overview of Gangu's rich cultural and historical heritage, geographical features, administrative divisions, and weather conditions, encompassing a total of 15 aspects. On the other hand, the travel guide offers a comprehensive summary of the detailed information about several renowned attractions in Gangu, serving as a convenient reference for visitors who wish to explore and experience the local sights. Additionally, the homepage features the inclusion of a melodious Gangu county anthem, which users can click to play and close with a subsequent click.



Figure 4: Column Page Interface



Figure 5: "My Account" Interface

The column showcases elaborate descriptions of the eight magnificent sights of Gangu County: The Majestic Cliffs, The Snow-covered Stone Drum, The Spring Dawn at Tianmen Gate, The Autumn Mist over the Wei River, The Crimson Sunset at Zhuyu, The Towering Lingfeng with Emerald Greens, The Tranquil Waves of Nanling, and The Radiant Sunrise at Tuofeng. It also encompasses delectable local cuisine, distinctive specialties, historical figures, and recommended hotels. Illustrated in Figure 4, the column interface features a captivating slideshow of the Gangu Eight Scenic Spots above, while below, it presents the core features of the mini-program: Gangu Eight Scenic Spots, Exquisite Gastronomy, Local Specialties, Nearby Attractions, Accommodations, and Historical Figures. Utilizing these functions, travelers can be guided to appreciate the scenery and cultural customs of Gangu, enhancing their virtual exploration of this enchanting destination.

The interface depicted in figure 5 showcases the essence of the user's persona. It exhibits a tasteful amalgamation of their avatar, sobriquet, and other quintessential details. Its primary function lies in deftly pinning down the user's current geographical coordinates, facilitating route planning, manifesting their check-in records, receiving salient system notifications, and perusing the version particulars.

3. Development of the "Cloud Tour Gangu" Application

To embark on the development of a WeChat mini-program, the initial step would be to register a mini-program development account on the WeChat Official Platform. Once the registration process is completed, it is essential to simultaneously refine the provided information and commence development. Basic details to be refined for the mini program involve its name, profile picture, introduction, and the scope of services offered. Following the completion of developer binding and configuration of development information, developers gain access to download the developer tool and refer to the development documentation for programming and debugging the mini program. Once the development of the mini-program reaches fruition, the code is submitted for review by the WeChat team, and upon approval, it can be published. During the development process of the "Cloud Tour Gangu," Tencent Cloud services have been engaged to facilitate cloud development for the mini program. Additionally, Tencent Location Services have been utilized.

3.1. Create a navigation bar at the bottom

In the app.json file, we can utilize the tabBar tag to achieve the functionality of a bottom navigation bar. Each tab corresponds to a navigation path, allowing us to freely navigate between pages by simply clicking on the icons. To achieve the effect of color change upon clicking a tab, we need to store different image styles for the three tabs in the bottom bar image folder.

Within the list, we can define the styles for these three small icons. Figure 2 showcases the effect of the bottom navigation bar.

3.2. Implementation of Background Music

Add a melodic button on the homepage, and upload the desired melodies to Tencent Cloud Storage. Then, harness the power of JavaScript to access the cloud data, enabling users to trigger the melodious sounds upon button click, and disable the harmonious notes upon subsequent clicks.

3.3. Implementation of route planning functionality

The route planning feature assists users in reaching their destination from the starting point by providing clear and specific directions with precise positioning. Moreover, it offers users various travel alternatives to help them save time. The effectiveness is depicted in Figure 6.

To utilize the route planning feature, users must first register and activate Tencent Location Services. Developers should create their own application and provide the application name and description. Then they(the developers) need to enable the WeService API, Map SDK, and WeChat Mini Program, and input the authorized WeChat Mini Program APP ID. Upon completion of the setup, developers will obtain the key for Tencent Location Services. They (the developers) should then add the plugin in the app.json file of their mini program, Additionally, in the corresponding JavaScript file, developers need to input the key obtained from Tencent Location Services and the name of the mini program used to call the plugin. This will enable the route planning plugin within the mini program. Once the configuration is complete, the developers should bind a click event in the JavaScript file to trigger the route planning function when users click on it.

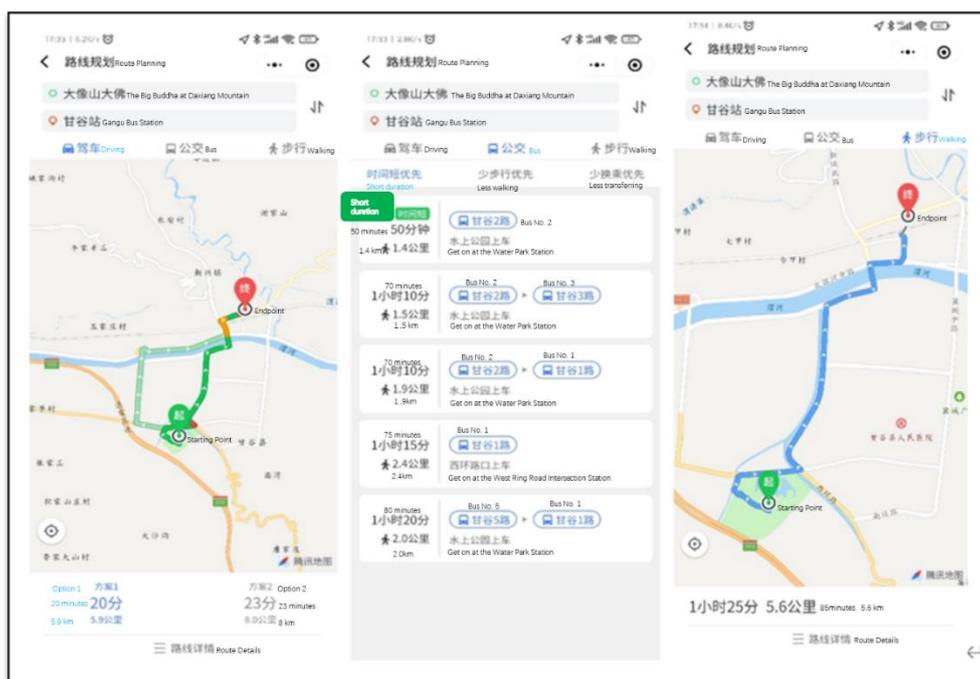


Figure 6: Route Planning Display

3.4. Implementing a check-in feature

To enable location selection functionality, you need to use the "chooseLocation" plugin for WeChat mini program. The version used here is the latest 1.0.6. The invocation method is as follows.

```
"plugins": {
  "chooseLocation": {
    "version": "1.0.6",
    "provider": "wx76a9a06e5b4e693e"
  },
},
```

Furthermore, developers should ensure that the permission for user location information has been enabled in the settings of the mini program.

```
"permission": {
  "scope.userLocation": {
    "desc": "Your location information will be used for the geolocation feature in the app "
  }
},
},
```

The "chooseLocation" plugin in the mini-program also requires the activation and configuration of Tencent Location Services before use. The configuration parameters are shown in Figure 7.

Figure 7: Configuring Tencent Location Services

The location selection feature requires users to enable GPS positioning in order to choose specific nearby locations. By utilizing the mobile phone's location functionality, users can obtain information about nearby places and independently select their preferred locations.

After users have completed selecting their locations, they can click the submit button. Through cloud functions, the selected addresses chosen by the users will be uploaded to the cloud database. To display the users' check-in information, it is necessary to write cloud functions to retrieve data from the cloud database and display it on the check-in information page. The desired effect for the check-in page is shown in Figure 8.

No	Location	Address
序号	打卡点	详细地址
01	Elephant Mountain 大象山	Daxiangshan Town, Gangu County, Tianshui City, Gansu Province
02	Tianmen Mountain 天门山	Daxiangshan Town, Gangu County, Tianshui City, Gansu Province
03	Caijia Temple 蔡家寺	Xixing Town, Gangu County, Tianshui City, Gansu Province
04	Clear Waves of Nanling 南岭清波	Gupo, Gangu County, Tianshui City, Gansu Province
05	Evening Glow on Zhuyu Range 朱围晚霞	Zhuyu, Gangu County, Tianshui City, Gansu Province
06	Jianshan Temple 尖山寺	Wujiaye Township, Gangu County, Tianshui City, Gansu Province

Figure 8: "Check-in" Page

4. Analysis of User Experience Survey Results for the "Cloud Tour Gangu" Mini-program

The survey questionnaire for the "Cloud Tour Gangu" mini-program is divided into five sections: personal information, usage of the mini-program, evaluation of the "Cloud Tour Gangu" mini-program, and suggestions for improvement. The questionnaire was distributed through the QuestionStar app and a total of 139 responses were collected. Among them, 46.76% were female and 53.24% were male. The distribution of respondents across different age groups is shown in Figure 9, with the 18-50 age group accounting for 90.48%. It can be seen that this survey has a good level of randomness.

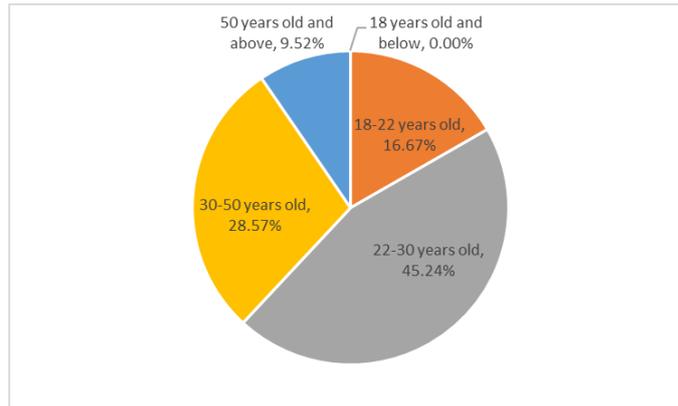


Figure 9: Proportional Distribution of Different Age Groups

4.1. Survey and Analysis of Mini-program Usage

The questionnaire includes a question titled "Frequency of WeChat Mini Program Usage". The frequency is divided into four levels: daily, weekly, monthly, and only when guiding consumption. Table 1 presents the responses from 139 survey questionnaires. It can be observed that the number of people with the highest and lowest frequencies ranks first and second, indicating two situations: ① the user base of mini programs has not yet reached saturation, and there is still development potential; ② shopping, store, and business mini programs are more widely used, while promotional mini programs are less prevalent. The question "Does the WeChat Mini Program you use introduce local specialties" also indicates the lesser promotion of promotional mini programs. Figure 10 illustrates the choices between "Yes" and "No" for this question.

Table 1: Proportional Distribution of User Frequency for WeChat Mini Program

Option	subtotal	Ratio
Daily	73	52.52%
Weekly	23	16.55%
Monthly	14	10.07%
Only used for consumption guidance	29	20.86%
Valid number of respondents for this question	139	100.00%

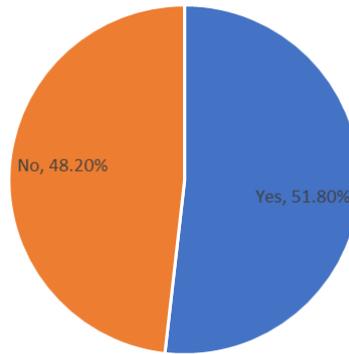


Figure 10: Have you had the opportunity to utilize WeChat Mini Programs that highlight local features?

4.2. Analysis of User Experience Survey for the "Cloud Tour Gangu" Mini-program

Among the 139 questionnaires, 17.27% of the respondents expressed considerable familiarity with Gangu, 30.94% claimed to be familiar, while 51.8% admitted unfamiliarity with the place. Following their experience with the "Cloud Tour Gangu" mini-program, a significant 78.42% of the participants believed it greatly contributed to their understanding of Gangu. This indicates that the "Cloud Tour Gangu" mini-program plays a crucial role in promoting cultural and tourism development, and can be regarded as a remarkable showcase. In the survey, we also inquired about the participants' preferences regarding the information they would like to access through the mini-program. The options and selection results are presented in Table 2.

Table 2: Options for "What kind of information would you like to learn about in a Mini Program?" and the corresponding selection results

Option	subtotal	Ratio
Local cuisine	63	77.78%
Local climate and temperature	58	71.6%
Local terrain characteristics	48	59.26%
Local humanistic history	68	83.95%
Best recommended local tourist routes	57	70.37%
Number of valid responses for this question	81	100.00%

The analysis of the options reveals that the feature design of the "Cloud Tour Gangu" mini-program fundamentally meets the demand for a local tourism resource introduction mini-program. This mini-program is functional, user-friendly, and merits promotion.

4.3. Suggestions for improving the "Cloud Tour Gangu" mini-program

Regarding the suggestions for improvement of the "Cloud Tour Gangu" mini-program, the questionnaire includes five questions as follows:

- ① In which aspects does the mini-program require improvement?
- ② What recommendations can be made regarding the background setting of the "Home" page?
- ③ How should the layout of the "Columns" section be improved?
- ④ What suggestions can be offered for image selection in the "Columns" section?
- ⑤ Do you have any recommendations for the functionality options in the "My" section?

Based on the summary and analysis of the options, here are some suggestions for improvements

to the mini-program:

① Replace the background image on the "Home" page to evoke a fresh and distinctive sense of Gangu.

② Utilize a fluid layout for the "Columns" section, featuring a scrolling carousel of images at the top. These images should not be limited to the "Eight Scenic Spots of Gangu," but also encompass "Landscapes," "Culinary Delights," "Cultural Heritage," and more.

③ Enhance the "My" module by adding two new features: "Daily Weather Updates" and "Recommended Itineraries for the Best Travel Experience."

④ Incorporate a color scheme for the background and use the software's logo as the profile picture.

5. Conclusion

The government has repeatedly emphasized the combination of high-tech information technology and tourism innovation in the construction of digital rural areas, aiming to promote the intelligent and informational development of tourism. The "Digital Rural Development Action Plan (2022-2025)" for 2022 highlights the promotion of smart construction in rural tourism and the creation of online tourism [12]. WeChat mini programs, as a convenient and efficient form of mobile application, greatly enhance the reach and user engagement of rural tourism. The successful development of the "Cloud Tour Gangu" WeChat mini program demonstrates the importance of digitization and intelligence in the development of rural tourism. The mini program integrates Gangu's tourism resources and provides visitors with more accurate and personalized travel experiences through intelligent recommendations and personalized services.

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