1st Assignment Consumer Analysis

Attitudes Towards Navigation APPs: Comparison between Amap and Baidu Map

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Introduction

I. Situations of Mobile Navigation APPs

With the expansion of cities and the increasingly frequent population migration (cross cities, regions and countries), navigation has become more and more essential to people's daily life. What's more, navigation not only prevents people from getting lost, but also acts as the basis of many other LBS functions, therefore, navigation apps are deeply embedded in everyday life. The growing number of cars also add to the increasing uses of navigation apps. Until 06/2017, the active users reached 404 million, increasing by 6.32% compared with the number calculated in 05/2017[1].

According to Smart Mobile Terminal Market Report for 2016[2], the total amount of smart terminal in mainland China reached 1.37 billion, which means that almost everyone in mainland China owns a smart terminal device. This provides chances for the increasing coverage of navigation apps. From 2016-2019, the amount of mainland China mobile phone navigation app users keeps increasing and will reach 0.788 billion in 2019, covering more than half of population[3]. Therefore, mobile navigation app has quite large consumer groups. To understand the users' needs and attitudes can aid the refinement of navigation apps and in turn bring more benefits for users.

II. Introductions to Amap and Baidu Map

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[1] Analysys, (2017). 2017 年第 2 季度中国手机地图市场 大数据和人工智能助力智慧出行 [Data Analysis]. Retrieved from https://www.analysys.cn/analysis/22/detail/1000860/

[2] Talking Data, (2017). 2016 年移动智能终端市场发展报告 [Data Report]. Retrieved from http://mi.talkingdata.com/report-detail.html?id=511

[3] Analysys, (2016). 中国手机地图市场趋势预测 2016-2019 [Data Analysis]. Retrieved from https://www.analysys.cn/analysis/22/detail/1000386/

Amap and Baidu Map take up most of the market share in the segmentation of navigation apps in mainland China, together owning more than 90% of the active users, with the rate of 42.21% and 61.32% respectively till 06/2017[4]. According to Talking Data, Amap ranked No.2 and Baidu Map ranked No.1 in the segmentation[5].

Amap was developed by AutoNavi, the wholly-owned subsidiaries of Alibaba, which is one of Chinese best digital navigation and map providers that acquires the A-level ability of mapping. Amap aims to provide professional positioning and navigating services as well as support LBS functions. Baidu Map was designed by Baidu and navigation-oriented company—Mapbar and it commits to provide integrated resolution for local life rather than merely maps. It is convenient to explore surroundings via Baidu Map.

Although AMap and Baidu Map differ in positioning, their functions and current users are quite similar so that the competition is fierce. Hence, it is necessary to set off from the consumers perspective and understand the factors that influence consumers' choices.

Objectives

This consumer analysis is intended to understand what is important for users when choosing navigation apps, and to figure out users' attitudes toward AMap and Baidu Map respectively. Furthermore, this consumer analysis is designed to explore the relationship between usage scenarios and attitudes. Understanding these can help these companies to examine the marketing strategies and make adjustment accurately.

Methodology and Data Collection

I. Obtaining the Attributes

Method of online interview is adopted to obtain criteria for evaluation of the apps. 20

[4] Analysys, (2017). 2017 年第 2 季度中国手机地图市场 大数据和人工智能助力智慧出行 [Data Analysis]. Retrieved from https://www.analysys.cn/analysis/22/detail/1000860/

[5] Talking Data, (2017). Trend of AMap and Baidu Map [Data Analysis] Retrieved from http://mi.talkingdata.com/app/trend/122.html

navigation app users were interviewed (1:1 proportion of gender), most of them are at the ages of 20-40. All the interviewees are users of AMap or Baidu Map, 60% of them have used both and 35% of them have switched from Baidu Map to AMap. Mainly three questions (except for the demographic variables) were covered in the interview:

1. What do you think is important for navigation apps?
2. What apps have you used for navigation?
3. What do you think about the navigation apps you have used before / you're using now?

Through the interview, 16 attributes were concluded according to the frequency of being mentioned of. There are many factors mentioned by the interviewees, among them, more than 50% (9) of the attributes can be categorized as the subordination of navigation function, like the locating function, map update, etc., the rest 7 attributes were divided into "additional function and other factors. The detailed 16 attributes are listed as below:

Navigation Function	1.	Accurate Locating
	2.	Offline Maps and Navigation
	3.	Map Update
	4.	Remote Location Coverage
	5.	Key Words Association
	6.	Transportation Planning and Route Planning
	7.	Navigation in Complex Situations (e.g. short-distant navigation, indoor navigation, etc.)
	8.	Real-time Navigation (e.g. the update of road and traffic conditions, destination reminder, etc.)
	9.	Humanized Function (e.g. audio guide, speeding warnings, weather updates, etc.)
Additional Function	1.	Life Services (e.g. recommendations of surrounding tourist attractions, restaurant, etc.)
	2.	Compatibility with Other Apps and Platforms (e.g. hiring Uber in the navigation app, etc.)
	3.	Multiple Sources of Audio Guidance (e.g. one can choose the sound of Li Zhiling as the audio sound)
Other Factors	1.	Responding Speed
	2.	Storage Usage
	3.	UI design
	4.	Easiness of Usage

II. Online Questionnaire

After obtaining the attributes, a questionnaire was designed according to the objectives

using the five-point Likert scale as measurements. Below aspects were covered:

1. Attitudes towards the attributes: the respondents were required to grade the attributes according to the importance (1=Very Unimportant ---- > 5=Very Important). This part is aimed to understand how respondents perceived the importance of the attributes.
2. Evaluation of AMap and Baidu Map performance against the attributes: the respondents should judge the performance of AMap and Baidu Map against the attributes according to satisfactory (1=Very Unsatisfied ---- > 5=Very Satisfied). This part is intended to figure out users' evaluation of AMap and Baidu Map relating with certain function or feature.
3. Usage habits: to investigate their frequent-use navigation apps and usage scenarios.
4. Demographic features of the respondents, including gender, age and education.

From 23/09/2017-25/09/2017, 70 questionnaires were collected online. Removing the invalid responses (non-users of navigation apps), 60 questionnaires were valid for further analysis. For the full version of the questionnaire, please see the appendix in the last part.

III. MAAM Analysis

This survey adopted Multi-Attribute Attitude Models approach to measuring the users' attitudes. According to Wilkie and Pessemir, the basic model of MAAM should contain[6]:

1. Attitude: the characteristics of a product that can be identified and measured by investigation, can be concluded as Attribute $_i$.
2. Importance (w_i): the consumer-perceived priorities of the given attributes.
3. Consumers' evaluation (e_i) for the product against the attributes.

Combining the three elements, the consumers' overall attitudes towards products (A')

[6] William L. Wilkie, Edgar A. Pessemier. (1973). Issues in Marketing's Use of Multi-Attribute Attitude Models. *Journal of Marketing Research*, *Vol X,* 428-441.

can be calculated through the formula below[7]:

$$A' = \sum_{i=1}^{n} w_i \, e_i$$

Major Findings

I. Demographic Features of the Sample

Overall, female takes up 63.33% of the sample. 58.33% of them are young people at the age of 18-25, 41-50 and 26-40 age groups come with the percentage of 18.33% and 11.67% respectively. In terms of education, 33.33% of the respondents have received undergraduate education and 30% of them are pursuing higher education, the rest 36.67% of them have completed high school. The majority (62.86%) now lives in the south-eastern part of mainland China and 20% of them live in Hong Kong. The detailed profile is depicted in Table 1.

Table 1

Demographic Variables		Amount	Proportion(%)
GENDER	Male	22	36.67
	Female	38	63.33
Age	Under 18	6	10.00
	18-25	35	58.33
	26-40	7	11.67
	41-50	11	18.33
	51 and Above	1	1.67
Education	High School and Below	22	36.67
	Undergraduate	20	33.33
	Postgraduate and Above	18	30.00
Province	Northern	2	2.86
	South-eastern	44	62.86
	Eastern	7	10.00
	Hong Kong	14	20.00
	Other Countries	3	4.29

II. Overall Comparison of Amap and Baidu Map

Generally, the sampled users of AMap and Baidu Map is similar in amount, with 49 respondents using AMap and 50 of them using Baidu Map, moreover, 39 respondents have used both AMap and Baibu Map. Table 2 below is for overall comparison between AMap and

[7] Ricky Yee-kwong Chan. (1997). Demographic and attitudinal differences between active and inactive credit cardholders-the case of Hong Kong. *International Journal of Bank Marketing*, *15/4*, 117-125

Baidu Map.

1. Comparison of Importance (w_i)

In terms of importance score (w_i), both the sampled users of AMap and Baidu Map care least about the "multiple sources of audio guide" (below 3 points). Navigation is generally important (scoring above 4) for users and the most unimportant attribute in this part is "offline maps and navigation", contrarily, "accurate locating", "transportation and route planning", "map updates" are more concerned about by the users. Other factors like "responding speed" and "Easiness of Usage" are also perceived as important factors by the respondents. Basically, navigation is the most important aspect for both apps, with average scores of 4.35 and 4.24 respectively (Table 3). Scores of w_i of AMap are higher than those of Baidu Map in all attributes.

Table 2 Overall Comparison

Attribute		*wi*		*ei*		*wiei*	
		Amap	Baidu	Amap	Baidu	Amap	Baidu
Navigation	Accurate Locating	4.73	4.60	4.18	3.94	19.77	18.12
	Offline Maps and Navigation	3.86	3.74	3.67	3.80	14.17	14.21
	Map update	4.51	4.36	3.96	3.92	17.86	17.09
	Remote Location Coverage	4.43	4.36	3.8	3.66	16.83	15.96
	Key Words Association	4.10	3.88	3.78	3.86	15.50	14.98
	Transportation Planning and Route Planning	4.67	4.58	4.02	3.74	18.77	17.13
	Navigation in Complex Situations	4.20	4.18	3.49	3.42	14.66	14.30
	Real-time Navigation	4.61	4.48	4	3.60	18.44	16.13
	Humanized Function	4.00	3.94	3.8	3.66	15.20	14.42
Additional Function	Life services	3.69	3.64	3.69	3.82	13.62	13.90
	Compatibility with Other Apps and Platforms	3.39	3.34	3.53	3.84	11.97	12.83
	Multiple Sources of Audio Guide	2.80	2.60	3.53	3.40	9.88	8.84
Other Factors	Responding speed	4.37	4.30	4.04	3.86	17.65	16.60
	Storage Usage	3.71	3.62	3.82	3.62	14.17	13.10
	UI Design	3.73	3.70	3.9	3.68	14.55	13.62
	Easiness of Usage	4.20	4.12	4.02	3.92	16.88	16.15
Overall Attitude (A')						249.93	237.37

Table 3 Average Score of 3 Aspects

Attribute	*wi*		*ei*		*wiei*	
	Amap	Baidu	Amap	Baidu	Amap	Baidu
Navigation	4.35	4.24	3.86	3.73	16.75	15.81
Additional Function	3.29	3.19	3.58	3.69	11.80	11.77
Other Factors	4.00	3.94	3.95	3.77	15.79	14.83

2. Comparison of Importance (e_i)

As for consumers' evaluation of AMap and Baidu, both have strengths and weaknesses. Averagely, AMap outweighs Baidu in navigation and other factors, and Baidu performs better in additional function like "life services". (Table 2 & Table 3) However, in some attributes of navigation, Baidu scores higher than Amap, such as "offline maps and navigation" and "keywords association".

3. Comparison of overall attitudes (*A'*)

Finally, the overall attitude score of AMap is higher than Baidu (249.93 vs 237.37), which is largely supported by higher scores of "accurate locating", "transportation and route planning" and "real-time navigation".

III. Gender Difference

The interview revealed that males seem to be more critical when talking about likes and dislikes when using navigation apps, therefore, the survey tried to analysis if there would be any gender differences.

Generally, the overall attitude score (*A'*) of female is higher than male both for AMap and Baidu Map as is shown in Chart 1. The main reason may lie in that the female users' expectancies of importance (w_i) are higher in general. For both gender, AMap surpasses Baidu in overall attitudes (*A'*) and the difference between female users is more notable.

Chart 1

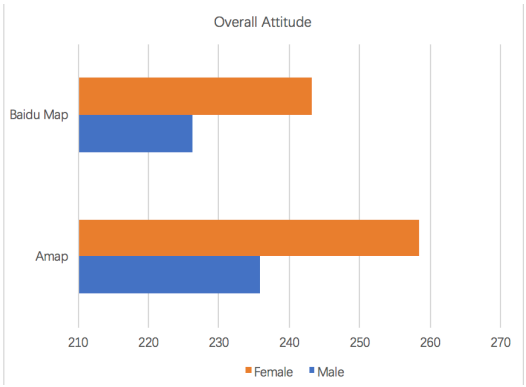


Table 4 Gender Difference

Male

Attribute		*wi*		*ei*		*wiei*	
		Amap	Baidu	Amap	Baidu	Amap	Baidu
Navigation	**Accurate Locating**	4.72	4.33	4.33	3.94	20.44	17.09
	Offline Maps and Navigation	3.44	3.28	3.39	3.78	11.66	12.38
	Map update	4.28	3.94	3.94	3.94	16.86	15.56
	Remote Location Coverage	3.94	3.94	3.72	3.78	14.66	14.90
	Key Words Association	3.67	3.50	3.61	4.06	13.25	14.19
	Transportation Planning and Route Planning	4.33	4.17	4	3.83	17.32	15.97
	Navigation in Complex Situations	3.56	3.56	3.61	3.56	12.85	12.64
	Real-time Navigation	4.39	4.17	4.06	3.83	17.82	15.97
	Humanized Function	3.83	3.78	3.78	3.89	14.48	14.69
Additional Function	**Life services**	3.72	3.44	3.83	3.94	14.25	13.59
	Compatibility with Other Apps and Platforms	3.28	3.11	3.5	3.83	11.48	11.93
	Multiple Sources of Audio Guide	2.72	2.56	3.5	3.39	9.52	8.66
Other Factors	**Responding speed**	4.22	4.11	4.17	4.06	17.60	16.67
	Storage Usage	3.72	3.56	3.61	3.67	13.43	13.04
	UI Design	3.61	3.50	3.89	3.89	14.04	13.61
	Easiness of Usage	4.11	3.89	3.94	3.94	16.19	15.34
Overall Attitude *(A')*						235.85	226.24

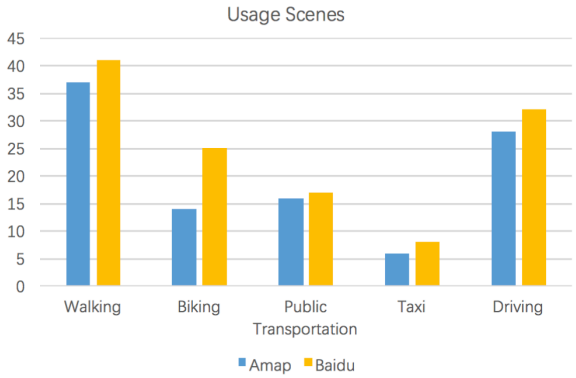
Female

Attribute		*wi*		*ei*		*wiei*	
		Amap	Baidu	Amap	Baidu	Amap	Baidu
Navigation	**Accurate Locating**	4.74	4.75	4.1	3.94	19.43	18.70
	Offline Maps and Navigation	4.10	4.00	3.84	3.81	15.74	15.25
	Map update	4.65	4.59	3.97	3.91	18.46	17.94
	Remote Location Coverage	4.71	4.59	3.84	3.59	18.09	16.51
	Key Words Association	4.35	4.09	3.87	3.75	16.83	15.35
	Transportation Planning and Route Planning	4.87	4.81	4.03	3.69	19.63	17.75
	Navigation in Complex Situations	4.58	4.53	3.42	3.34	15.66	15.15
	Real-time Navigation	4.74	4.66	3.97	3.47	18.82	16.15
	Humanized Function	4.10	4.03	3.81	3.53	15.62	14.24
Additional Function	**Life services**	3.68	3.75	3.61	3.75	13.28	14.06
	Compatibility with Other Apps and Platforms	3.45	3.47	3.55	3.84	12.25	13.33
	Multiple Sources of Audio Guide	2.84	2.63	3.55	3.41	10.08	8.94
Other Factors	**Responding speed**	4.45	4.41	3.97	3.75	17.67	16.52
	Storage Usage	3.71	3.66	3.94	3.59	14.62	13.14
	UI Design	3.81	3.81	3.9	3.56	14.86	13.58
	Easiness of Usage	4.26	4.25	4.06	3.91	17.30	16.60
Overall Attitude *(A')*						258.34	243.23

IV. Differences in Different Usage Scenarios

Most users use navigation apps when walking, driving and biking. AMap scores higher than Baidu Map in all usage scenes in terms of the overall attitudes (*A'*). Notably, for those who drive, AMap exceeds Baidu Map by remarkable 21.6 points. From the overall score of each attribute in the scene of driving, the major factors that contribute to the higher *A'* are "accurate locating", "map updates", "real-time navigation" and "transportation and route planning", all of which are about navigation function. Similarly, in cases of other usage scenes, the main contributors are the factors mentioned above, therefore, there won't be more specific descriptions.

Chart 2 & 3



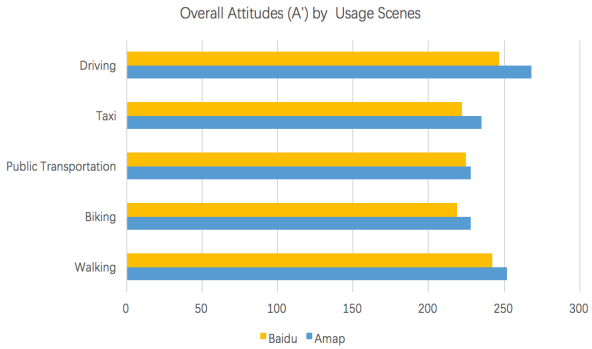


Table 5 Driving Scene

Attribute		*wi*		*ei*		*wiei*	
		Amap	Baidu	Amap	Baidu	Amap	Baidu
Navigation	Accurate Locating	4.82	4.69	4.29	4.06	20.66	19.04
	Offline Maps and Navigation	3.96	3.88	3.71	3.78	14.72	14.65
	Map update	4.68	4.53	4.25	3.94	19.88	17.84
	Remote Location Coverage	4.54	4.50	3.93	3.66	17.82	16.45
	Key Words Association	4.32	4.06	3.96	3.91	17.13	15.87
	Transportation Planning and Route Planning	4.71	4.63	4.07	3.81	19.19	17.63
	Navigation in Complex Situations	4.18	4.16	3.61	3.44	15.07	14.29
	Real-time Navigation	4.71	4.53	4.21	3.66	19.87	16.57
	Humanized Function	4.21	4.13	3.86	3.72	16.26	15.34
Additonal Functions	Life services	3.86	3.66	3.82	3.88	14.74	14.17
	Compatibility with Other Apps and Platforms	3.54	3.38	3.61	3.84	12.75	12.97
	Multiple Sources of Audio Guide	3.00	2.59	3.61	3.41	10.82	8.83
Other Factors	Responding speed	4.54	4.44	4.32	3.91	19.60	17.33
	Storage Usage	3.89	3.72	3.96	3.69	15.43	13.71
	UI Design	3.89	3.94	4.04	3.72	15.71	14.64
	Easiness of Usage	4.39	4.28	4.21	4.00	18.51	17.13
Overall Attitude (A')						268.18	246.48

Discussion

I. Conclusions and Recommendations

In general, AMap has better performance than Baidu Map. When it comes to the influence factors of users' satisfaction, navigation, as the basic function and core value of navigation apps, plays a vital role. It is important for both apps to keep refining the functions of navigation, adding to the accuracy and flexibility of these functions. Specific functions catering for the needs of different user segmentations should also be considered. For instance,

a driver has mentioned that he was satisfied with Baidu for its speeding warnings, which was very considerate.

Baidu Map has a better reputation in its additional function, especially the life services, which means that its positioning of providing local life services is recognized to some degree. However, the scores of this part are relatively lower than those of others. The reasons may lie in that the most users regard navigation apps just as tools for finding roads, which may imply that the market of life services based on navigation is a blue-sea. Except for refining navigation functions, Baidu Map can also try to polish the life service and promote marketing education to convince the users of the importance of it.

II. Limitations

There are several limitations of the survey and analysis. Firstly, the attributes more focus on navigation aspect, even though it is the most important factor for most users, this may lead to inaccuracy. In the further adaptation, some attributes can be combined to reduce the attributes in navigation part. Secondly, the respondents of the questionnaire are not divided evenly in gender group, which may cause bias in the analysis of gender differences. It will be more precise when the number of males increased. Lastly, due to the limited sample amount, the analysis in different usage scenes may be not significant enough, which can be solved by expanding the sample size and covering users at a broader age spectrum.

Reference

Analysys, (2017). 2017 年第 2 季度中国手机地图市场 大数据和人工智能助力智慧出行 [Data Analysis]. Retrieved from https://www.analysys.cn/analysis/22/detail/1000860/

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Ricky Yee-kwong Chan. (1997). Demographic and attitudinal differences between active and inactive credit cardholders-the case of Hong Kong. *International Journal of Bank Marketing*, *15/4*, 117-125

Appendix

The Survey About Consumer Attitudes Towards Navigation APPs

Hello! I am a postgraduate student of The Chinese University of Hong Kong. This survey aims to investigate consumers' attitudes towards navigation apps for further studies over these apps. The data will merely be used for analyzing and your personal information will be protected. Please answer the questions honestly. I appreciate your help! If you have any problems, please contact: xumengrong95@163.com

Have you ever used navigation apps before? [Multiple choice] *

○ yes

○ no (jump to the end of the questionnaire)

What apps have you used before? [Multiple choices] *

□ AMap

□ Baidu Map

□ Google Map

□ Tencent Map

□ Sougou Map

□ Kariland Navigation

□ Others_____

Usually, under what circumstances will you use navigation apps? [Multiple choices] *

□ Walking

□ Riding bikes

□ Public Transportation

□ Taxi

□ Driving

□ Others_____

Importance Likeness

Below are the main attributes of navigation function, please choose the importance level honestly. (1----> 5 = Very

unimportant ---- > Very important) *

	Very unimportant	Unimportant	Neutral	Important	Very Important
Accurate Locating	○	○	○	○	○
Offline Maps and Navigation	○	○	○	○	○
Map update	○	○	○	○	○
Remote Location Coverage	○	○	○	○	○
Key Words Association	○	○	○	○	○
Transportation Planning and Route Planning	○	○	○	○	○
Navigation in Complex Situations	○	○	○	○	○
Real-time Navigation	○	○	○	○	○
Humanized Function	○	○	○	○	○

Below are the main attributes of additional function, please choose the importance level honestly. (1----> 5 = Very unimportant ---- > Very important) *

	Very unimportant	Unimportant	Neutral	Important	Very Important
Life services	○	○	○	○	○
Compatibility with Other Apps and Platforms	○	○	○	○	○
Multiple Sources of Audio Guide	○	○	○	○	○

Below are the main attributes of other factors, please choose the importance level honestly. (1----> 5 = Very unimportant ----> Very important) *

	Very unimportant	Unimportant	Neutral	Important	Very Important
Responding speed	○	○	○	○	○
Storage Usage	○	○	○	○	○
UI Design	○	○	○	○	○
Easiness of Usage	○	○	○	○	○

AMap【If you have never ever used it, please choose "Neutral" for all questions in this part.】

Below are the main attributes of navigation functions for AMap, please choose the importance level honestly. (1----> 5 = Very unimportant ----> Very important) *

	Very unimportant	Unimportant	Neutral	Important	Very Important
Accurate Locating	○	○	○	○	○
Offline Maps and Navigation	○	○	○	○	○
Map update	○	○	○	○	○
Remote Location Coverage	○	○	○	○	○
Key Words Association	○	○	○	○	○
Transportation Planning and Route Planning	○	○	○	○	○
Navigation in Complex Situations	○	○	○	○	○
Real-time Navigation	○	○	○	○	○
Humanized Function	○	○	○	○	○

Below are the main attributes of additional functions for AMap, please choose the importance level honestly. (1----> 5 = Very unimportant ----> Very important) *

	Very unimportant	Unimportant	Neutral	Important	Very Important

Life services	○	○	○	○	○
Compatibility with Other Apps and Platforms	○	○	○	○	○
Multiple Sources of Audio Guide	○	○	○	○	○

Below are the main attributes of other factors for AMap, please choose the importance level honestly. (1----> 5 = Very unimportant ---- > Very important) *

	Very unimportant	Unimportant	Neutral	Important	Very Important
Responding speed	○	○	○	○	○
Storage Usage	○	○	○	○	○
UI Design	○	○	○	○	○
Easiness of Usage	○	○	○	○	○

Baidu Map【If you have never ever used it, please choose "Neutral" for all questions in this part.】

Below are the main attributes of navigation functions for Baidu Map, please choose the importance level honestly. (1----> 5 = Very unimportant ---- > Very important) *

	Very unimportant	Unimportant	Neutral	Important	Very Important
Accurate Locating	○	○	○	○	○
Offline Maps and Navigation	○	○	○	○	○
Map update	○	○	○	○	○
Remote Location Coverage	○	○	○	○	○
Key Words Association	○	○	○	○	○
Transportation Planning and Route Planning	○	○	○	○	○
Navigation in Complex Situations	○	○	○	○	○

Real-time Navigation	○	○	○	○	○
Humanized Function	○	○	○	○	○

Below are the main attributes of additional functions for Baidu Map, please choose the importance level honestly. (1----> 5 = Very unimportant ---- > Very important) *

	Very unimportant	Unimportant	Neutral	Important	Very Important
Life services	○	○	○	○	○
Compatibility with Other Apps and Platforms	○	○	○	○	○
Multiple Sources of Audio Guide	○	○	○	○	○

Below are the main attributes of other factors for Baidu Map, please choose the importance level honestly. (1----> 5 = Very unimportant ---- > Very important) *

	Very unimportant	Unimportant	Neutral	Important	Very Important
Responding speed	○	○	○	○	○
Storage Usage	○	○	○	○	○
UI Design	○	○	○	○	○
Easiness of Usage	○	○	○	○	○

Personal Information

What is your gender? [Multiple choice]*

○ Male

○ Female

How old are you? [Multiple choice]*

○ under 18

○ 18~25

○ 26~40

○ 41~50

○ 51 and above

Your education [Multiple choice] *

○ High shcool and below

○ Undergraduate

○ Postgraduate and above