Mobile Search Development Research

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Abstract. In modern times, the development of the Internet industry is very rapid, especially mobile phone usage increase and the steady development of 4G communication network, and the more advanced technology development and application of mobile search become an indispensable part of People's Daily life, its characteristics of convenience, timeliness, to better meet the needs of the relevant information access.

1. Introduction

With the rapid development of information technology in recent years, Chinese Internet population continues to increase, the Internet business model innovation, scale is gradually expanding global informationization, online services to accelerate the development of the steady growth of Internet users. In 2017, general secretary of 19 large report mentioned the Internet for many times, also means that many aspects, such as the Internet in our social life plays a more and more important role, the Internet has become an indispensable part of people's life, it can be seen in the following picture in nearly a decade development of the Internet's impact on people.

Note: Data from China Internet Network Information Center

Figure 1. Internet users' scale and internet penetration rate.

In ten years, the number of Internet users has a steady growth, the popularity of the network is becoming more and more high, even though growth has slowed in recent years, but the number of
Internet users has increased steadily in an annual increase of 450 million internet users, also reveals the Chinese Internet to promote the informationization of the national capital rapidly⁶.

The development of the Internet drives the development of mobile devices, such as mobile phone. The continuous enrichment of applications of mobile Internet has promoted the development of mobile Internet. The gradual improvement of related techniques and functions make the rapid increase in their users antennal to be in a stable number. The information on the Internet is quick and timely. Mobile phones have become a necessary part of people's life. So getting information from mobile Internet has become a major way of obtaining information. Data from the ministry of industry and information technology showed that the total number of mobile Internet access to mobile Internet from January to November of 2017 reached 212 billion G, up by 158.2% over the previous year.

Mobile Internet users become the main part of total Internet users, Internet users through mobile phones in China in 2017 accounted for 97.5%, compared with 2016 increased by 2.4%, the proportion of using the Internet gradually decline. It can be seen from the figure below that the number of mobile Internet users has increased significantly in the past ten years, and more and more Internet users are choosing more convenient ways to get information online.

![Chart showing the increase in mobile Internet users and proportion of netizens from 2007 to 2017.](image)

Note: Data from China Internet Network Information Center

You can be learned from the China Internet network information center until November, 2017, the Chinese market to detect the number of mobile applications for the 3.91 million model, more rich the mobile Internet market resources, brought convenience to our daily life, but also brought a lot of challenge and change.

The huge amount of information on the Internet brings us a huge problem, but we need to identify it. The mobile search to solve the above problems, become a more convenient way to get the information you need for mobile Internet users, and mobile search on mobile devices are indispensable to a function, such as mobile phones, people can through mobile phones and other mobile devices with a browser or other related software to query concerned news, web pages, knowledge, images, and other related content.

2. **Overview of mobile search**

Search engine refers to automatically collect information from the Internet, the information organization and processing, provide users with retrieval service, and put the user to retrieve relevant information to provide users with access to the system⁷. Search engines include full-text index, directory index, met search engine, vertical search engine, etc. The general working principle of the search engine is divided into three steps. First, collect the information, then organize the information and finally accept the query.
Mobile search is to point to by related mobile devices such as mobile phone, tablet, etc in SMS, WAP, IVR and other access to relevant information retrieval search technology, to obtain information on the Internet, mobile value-added services and local information, such as information service content[3].

Mobile search is not a simple copy of PC search, due to the restrictions on mobile, and more strict with mobile search, the interface on the display content need to be redesigned in order to enhance the comfort of reading. In addition, mobile search can meet the needs of users to develop voice and image search functions to more accurately search results and more personalized search.

In basic technology, the difference of mobile search technology and PC search is not obvious, mainly lies in the presentation and the diversity of the network environment, will not bring big obstacles to the development of mobile search. With the improvement and popularization of 3G and 4G mobile communication networks in China, mobile search time will be further shortened to improve user experience. The mobile search experience is also related to mobile devices and search methods. Smartphone users to buy at present stage have been bought from a new transition to give priority in order to upgrade, the smartphone is no longer a pure price competition, but to high-end development, lay the hardware foundation for the user’s mobile search experience.

Search, mobile search, different from the traditional PC, is no longer limited to the search of the word, as a result of the smartphone camera and microphone Settings, mobile search produced new search techniques, such as voice search, image search Baidu search at present stage, which is a good search, Sogou search, search and other mobile search engines have been realize voice search and support qtr. code scanning.

3. The rise and development of mobile search

In 2004, business providers such as Cgogo and easy search began offering mobile search services, marking the beginning of mobile search in China. In 2006, China mobile began to enter the mobile search field, and then began to cooperate with Google in mobile search, which further developed Chinese mobile search market[4]. With the rapid development of mobile Internet and smart phones in 2011, the mobile search market has reemerged and presented its unlimited potential. In recent years, the majority of mobile search market share in the world is three major searches: Google search, yahoo search, Bing search. According to the public data, Google search accounts for 84% of search users in the United States, and Google parent Alphabet announced in its 2016 annual report that it is still working on intelligent search based on existing ones. The company, which was founded in 1994, was a fast developing company. It was successfully listed in 1996. It was valued at more than 100 billion Yuan in 1999. However, the market value declined, and it was sold to Verizon in 2016, and it was renamed Altaba on January 9, 2017.Bing search was launched by Microsoft in 2009 and further developed in 2013 with yahoo. By the end of 2016, Microsoft integrated relevant teams and began to integrate Microsoft's artificial intelligence and Bing search in March 2017[5].

Mobile search in China experienced a voice message search, WAP web search time and APP search phase, all now as smart phones become more and more advanced, our using of the related function is also more convenient. In recent years, the state vigorously promote the development of the Internet, pay attention to the key technology such as mobile Internet combined with life in all industries, and steady economic growth, the Internet offers a new way for the economic growth and direction, these factors will further promote the rapid development of mobile Internet, as a mobile search throughout the mobile Internet market, will also subsequently and benefit, maintain a good momentum of growth.

At the end of 2017, Chinese number of search engine users reached 2017, and as the basis of Internet applications, search engine users scale with netizens basic synchronization, the growth rate of the overall size and the number of mobile search user growth is slowing, but still significant increment, as shown in the figure below, therefore the mobile search with AD clicks are growing.
Table 1. Chinese search engine user size

|          | 2017             | 2016             | annual growth rate |
|----------|------------------|------------------|-------------------|
| search   | user scale       | Internet usage   |                   |
| engine   | (10,000)         |                  |                   |
| mobile   |                  |                  |                   |
| Search   | 63956            | 82.8%            | 60238             | 82.4%            | 6.2%             |
|          | 62398            | 82.9%            | 57511             | 82.7%            | 8.5%             |

Note: Data from China Internet Network Information Center

In recent years, mobile search market in China is mainly composed of Baidu, Sogou search, what search, 360 search, mobile search user preferred brand is stable[6], and scale of mobile search users tend to be saturated state, stable growth speed slow, stable share of the main mobile search, detailed below.

Note: Data from iiMedia Research

Figure 3. China mobile search share ratio in the first half of 2017.

While Baidu search on PC clients is still the main entrance to the Internet, but in the aspect of mobile terminal, because the user is used to find the service from the APP, to brought him a large share, now in the image and voice recognition for the foundation, to achieve the user needs to Baidu accumulated knowledge better matching; Sogou search mainly relies on Sogou input method, Sogou browser such as its own resources and its applications such as QQ, WeChat product content resources and vast users, bring a large number of mobile search traffic for Sogou search; 360 comprehensive search was launched in 2012, relying on products such as 360 security guard, 360 safe browser and other products, with good safety genes and obvious vertical features of functions; What search launched by UC and Alibaba in 2014, relying mainly on UC browser to obtain traffic, positioning as a supplement to other modules of Alibaba.

4. Mobile search vision

Mobile Internet has been gradually integrated into all aspects of user life. Whether it's shopping platforms such as Tmall, JD.com and food delivery platform such as Meituan, Ele.me and online travel platform such as Ctrip, Qunar.com, such as all of the rise of the development of mobile Internet, mobile Internet has deep into the various aspects of food and clothing live line consumers.

Mobile Internet presents significant characteristics for the mobile terminal acceleration upgrade and the increase of the amount of data in 2017, the mobile Internet will affect more and more ways, to accelerate the mobile devices and mobile Internet technology upgrading and ascend. Mobile Internet era, information between each other is not open to the search engine has brought great challenges, but also it is because of the expansion of information and the growth of demand for services, the importance of search engine is more obvious for the user to comb all aspects of information, access to a variety of services. The importance of overall is the mobile search opportunities and good prospect. And the promotion of mobile search in the hardware and searched mode, will further promote China mobile search development. Future search engine is a very complex product, it may be combined with a large amount of data, voice recognition, natural language processing, artificial intelligence and other high-end technology, introduce more forms of search, it will make search way diversification, make
search more fresh up voice search, image search, multimedia search, and other diversified search engine function will appear\[7\]. Artificial intelligence technology improves algorithms to help mobile search better understand customer needs. And related technologies of artificial intelligence technology related products such as natural language processing can provide a better search experience for mobile search. You can also use cloud computing technology to get more information more easily. Combining multiple contents together to form a different way of information acquisition may be the function that next-generation search engines should have.

In the era of mobile Internet, people's demand for the Internet has exceeded the connection between people and information and people. More and more attention has been paid to the search for more connections between people and services, better user experience, and more convenient service search. Therefore, from the point of view of search development, artificial intelligence with stronger capabilities in terms of voice image recognition machine learning and natural interaction will become the core of mobile search.

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References
[1] Peng Dan. Public Opinion Research Based on Network Comments[D]. Hefei University of Technology,2010.
[2] Yang Xiao-hui. Study of China mobile Search [D]. Beijing University of Posts and Telecommunications,2008
[3] Yu Ying, Wan Cheng-guo, Deng Zhong-yuan, Cai Zhi-ping. Research on Search Engine Optimization Technology for Recruitment [J]. Computer Technology and Development,2014,24(08):35-38+44.
[4] Wang Yong-jie. Analysis of China Mobile's Search Market [J]. China New Telecommunications,2007(04):77-80.
[5] Huang Zhen. Adolescent use of mobile search behavior[D]. Shanghai Jiao Tong University,2013
[6] Deciphering trends in mobile search. KAMVAR M,BALUJA S. Computer . 2007
[7] Wang Zhong-min, Huo Yi-wei, Deng Wan-yu. Personalized Query Expansion Based on Environment Information for Mobile Search[J]. Computer Science ,2013,40(09):182-184+189.