Research on navigation interface design of children's health application based on AHP-entropy weight method

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Abstract: Aiming at the navigation interface design problem of children's health applications, AHP-entropy weight method studies the navigation interface design method of children's health applications. Taking a children's health application as an example, the navigation interface design of the application is analyzed, and the design principles and methods of the application are obtained. On this basis, a children's health navigation interface is constructed by combining AHP and entropy weight method. Hope to provide reference help.

1. Introduction

With the continuous development of science and technology, people begin to pay more and more attention to their own health conditions in daily life, and various medical and health applications have also been developed rapidly, and have become an indispensable part of people's lives. However, due to the imperfect cognitive ability, poor physical fitness, weak self-control and other characteristics of children, they often have problems such as operation difficulties and search difficulties when using such applications, resulting in poor use experience, which seriously affects the physical and mental health development of children. On this basis, it is very important to design a children's health application, and such an application must take user characteristics into account, so it must pay attention to the navigation interface design, which is necessary to carry out relevant research.

2. AHP-entropy weight method basic concept

AHP is an evaluation method that combines subjective and objective factors. It mainly transforms qualitative analysis into quantitative analysis, and sorts numerous scattered factor sets and evaluation target sets to form a relatively complete and unified comprehensive evaluation index system, thus establishing a hierarchical structure model [1-3].

Entropy weight method is a qualitative and quantitative evaluation method, which mainly combines subjective factors and objective factors, and uses mathematical methods to determine the weight value of each index, thus determining the final evaluation result of the object.

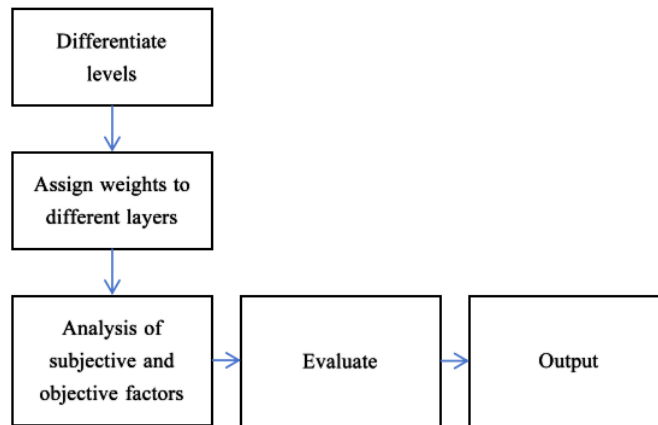The basic process of AHP-entropy weight method is shown in Figure 1.

Figure 1: Basic process of AHP-entropy weight method

Firstly, AHP and entropy weight method are combined to establish a comprehensive evaluation index system, which includes both the process of AHP and the process of entropy weight method. Then AHP is used to analyze and study the navigation interface design of children's health application. In this process, AHP is used to select indicators from the children's health application navigation interface design as the basis for building a judgment matrix, and entropy weight method is used to calculate the weights of each indicator, and finally the weights obtained by the two methods are summarized, which is the final result of the children's health application navigation interface design. Formula (1) is the expression of AHP-entropy weight method[4.5].

$$P_{ij} = V_{ij} / \sum_{i=1}^{m} V$$
(1)

Where P and V are subjective and objective factors, i and j are evaluation objects and evaluation indicators respectively, and m is the limit value.

It is analyzed and studied through the combination of AHP and entropy weight method. Because AHP and entropy weight method need people to intervene in the subjective judgment in the information processing, the final result is not objective and fair, while entropy weight method has the advantages of objective and fair, strong operability, simple and convenient.

3. Analysis of navigation interface design requirements for children's health applications

In order to facilitate users to quickly locate the information they need in children's health applications, the navigation interface of children's health applications was designed and studied, and four key elements of navigation interface design for children's health applications were summarized by combining user experience elements with user demand elements, as shown in Figure 2.
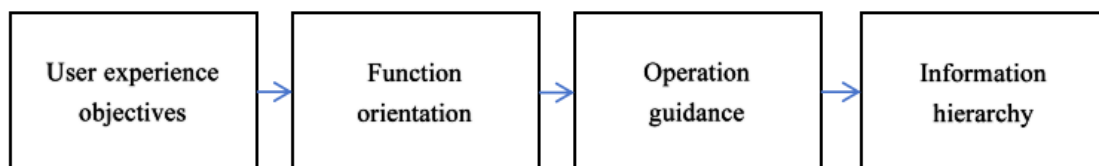

Figure 2: Four key elements of navigation interface design for children's health applications

In addition to the four elements, the other design requirements are as follows: First, the user experience goal refers to the analysis of the navigation interface of children's health application to find out the main problems that need to be solved in the current navigation interface of children's

health application, and help the designers of children's health application to improve its design; Second, function positioning refers to the analysis and classification of the functions covered by the children's health application navigation interface from different angles, to find out the relationship and characteristics of each function module, and to take this as the design goal; The third operation guidance refers to the analysis of the navigation interface of children's health applications from different angles, and the operation methods and processes involved in each functional module of the interface are obtained[6].

4. Navigation interface design strategies for children's health applications

4.1. Establishment of navigation system

When analyzing the application navigation system for children's health, the navigation elements in the application should first be sorted out, and the optimal navigation elements should be selected through analysis, comparison and comprehensive induction, and the application navigation system should be built on this basis[7-8].

The children's health application in this paper is a mobile medical application. Considering that users are usually guided to different pages during the use of such applications, and the jump and interaction between different pages are the most critical part of navigation design, it is necessary to sort out and classify the pages when studying the navigation interface design of children's health applications. According to the different functions of children's health applications, they are divided into two categories: The first category: the main function is to obtain health information and service information; The second category: The main function is to help the mother complete various online activity tasks and functional operations.

On this basis, the navigation system can be constructed through the following steps: (1) The navigation system can be classified according to the functional characteristics and user types of children's health applications; (2) Use AHP to determine the weight of each factor, normalize the weight value to get the weighted average value of each factor, and then multiply it with its corresponding standard deviation to get the importance weight of each factor[9-10].

Take the "Child health" application as an example. The main functions of the application are shown in Table 1.

Table 1: Main functions of "Child health" applications

Item	Main function
"Child Health" app	Data monitoring
	Health management
	Exercise

4.2. Information hierarchy

There are some common problems when using children's health apps, such as not knowing how to enter the page, the page is not smooth, and the function cannot be found when using. These problems will cause problems to the user's use, so when designing children's health applications, we should try to avoid these problems.

For children's health applications, the purpose of the information hierarchy is to enable users to quickly locate the content they need and to quickly access relevant features. In the process of use, the user's information acquisition and processing will be carried out in different levels, so the design should try to let the user be able to quickly and accurately obtain the required information from the most basic information level.

For children's health applications, it can be mainly divided into three levels, as shown in Figure 3.
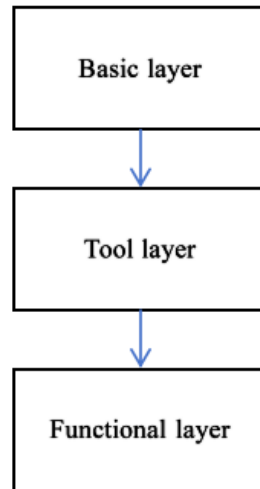

Figure 3: Three levels of child health application

Basic layer: mainly contains basic information, ICONS and text, which is the most direct part for users to contact and understand the interface, and is also the most basic part of children's health applications. When designing, you should minimize the use of too many ICONS and text, so that users can get the information they need more directly.

Tool layer: It mainly includes three parts: interaction mode, operation process and search function. Interactive modes in children's health apps include selection, query, sharing and customization. Among them, in the selection interface, you can click the icon to complete the corresponding function selection; The query interface can be realized by entering keywords; The sharing interface can share relevant information to other users by clicking the icon; The search interface is implemented by entering keywords.

Functional layer: mainly contains different types of functional modules, including basic functions, value-added functions and auxiliary functions. Basic function refers to the module necessary for the user in the process of use; Value-added functions refer to the modules that provide users with additional services on the basis of basic functions; Auxiliary functions are modules that provide additional services on top of basic functions.

4.3. Algorithm Implementation

Firstly, from the expert experience judgment matrix in AHP, 10 experts are selected as members of the judgment matrix, and the number 1-9 is given to get the judgment matrix. Secondly, the relative importance of each expert to a certain level is calculated and quantified by numbers. Finally, the weights of each index are calculated. According to the calculation results of AHP-entropy weight method, the weights of 6 elements of the navigation interface design of children's health applications can be obtained, and the results can be output.

The six elements of children's health application navigation interface design are: user operation process, navigation content sorting, navigation information organization form, navigation information presentation mode, navigation prompt language design and whether the navigation prompt language is interactive. In general, among the influences on the navigation interface design of children's health applications, the navigation content sorting is the most influential, followed by the organization form of navigation information and the interactivity of navigation prompts.

In addition, since the content presentation form of children's health applications is determined

according to the age of children, it is necessary to focus on the age group and age characteristics of children in the navigation interface design of children's health applications, so as to carry out targeted design for different age stages.

4.4. Organization of navigation information

In children's health applications, the form of information organization determines the user experience when using the application, and the user experience directly affects the user's satisfaction with the product. In children's health applications, the organization forms of navigation information include information hierarchy, navigation guidance, information feedback, etc. As the most important navigation function, navigation guidance has a direct impact on the user experience of children's health applications.

In child health applications, different types of information can take different forms of navigation information organization. For children's health apps, the first thing to appear in the interface is the content page, where users can see more content by tapping the navigation button or swiping left and right. For this type of page, you can use a flat design style and simple text to navigate. For more complex pages, you need to use hierarchical or guided navigation design. For this type of page, everything in the interface can be divided into a level 1 navigation menu and placed in a place where the user can easily find and manipulate it.

According to the interface design method of children's health application, the first-level navigation menu can be divided into three levels: the first layer is the content directly entering the second-level navigation menu; The second layer is the content page; The third layer is the main interface.

In children's health applications, each level corresponds to a different navigation function. The first level can enter the secondary navigation menu by clicking the corresponding button or sliding the screen left and right; The second level appears in the form of text or pictures in the main interface, and its function is to supplement the information of the first-level navigation menu; The third layer is in the form of "drop-down menu" in the main interface, the user can click the menu to enter the secondary navigation menu; The last layer appears in the main interface in the form of a "pop-up", which serves as supplementary information to the secondary navigation menu.

5. Conclusion

To sum up, AHP-entropy weight method is objective and effective. Therefore, in the design of children's health application navigation interface, AHP-entropy weight method can be applied into practice as a scientific decision-making method to obtain the optimal interface design scheme and provide more references for the design of children's health application navigation interface.

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