Application of Human-Computer Interaction Technology in Mobile Interface Design for Digital Media

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Abstract—In order to design a mobile interface based on human-computer interaction (HCI) technology to meet the needs of diverse and comprehensive user interface functions, we propose a design concept for digital media mobile interfaces. Through the introduction and research of human-computer interaction interface, the usability of human-computer interaction interface is analyzed, and optimized and improved by combining with GOMS model. By means of modern computing and communication, the abstract information is transformed into a technology that can be perceived, managed and interacted by comprehensively processing words, sounds, graphics, images and other information. A detailed analysis of the information presentation of the digital media interface for multi-screen HCI, and the interface of multi-screen HCI digital media systems for TV and cell phones, including system information architecture, rasterized system, drawing interface block diagrams, multi-screen interaction model, and ensuring consistent visual style, detailed interface design, graphics and focus states. Applying the designed system to the actual test, it is found that the system design idea can realize the effective combination between multi-screen interaction and digital media based on human-computer interaction technology, and also create a better prospective interaction experience for the future development of digital media mobile.

Keywords—digital media mobile, interface design, human-computer interaction technology, information display, multi-screen interaction, visual design

I. INTRODUCTION

The concept of interactivity comes from the world of computing. The ultimate goal of human-computer interface design is to enable the computer and the user to 'communicate' better. In the field of digital media, interaction is equivalent to interaction. Based on digital media technology, people can interact with TV, Internet, advertising media and other aspects of life. As a computer technology system, HCI involves different software, links, apis, and various interfaces, so as to realize the transformation function, and realize the interdisciplinary combination of artificial intelligence, multimedia systems, software engineering and so on. At the same time, it also absorbed the cognitive psychology, design psychology and other aspects of the results. The interactive function in the digital media era is based on the technological development. The former digital media technology includes scene design, game image design, programming, multimedia post-processing, etc. With the development of technology, CG technology, virtual technology, interactive terminal technology and so on have been added.Unlike traditional interfaces, the human-machine interface successfully achieves the exchange of information between human and machine, and more importantly, enables

the user and the computer to achieve an "intelligent system" of communication and dialogue. In the early stages of computer development, the system was mainly operated by professional computer operators, and the system was slow and unreliable and could not be used interactively.

As the computer performance continues to improve, the system can also realize human-computer interaction processing, and different types of users gradually put forward the demand for natural, friendly and simple human-computer interface. Therefore, this paper proposes a new GOMS execution hierarchy quantitative optimization model based on human-computer interaction technology, applied to digital media mobile interface design and improvement of human-computer interaction interface prediction model.

II. OVERVIEW OF RELATED TECHNOLOGIES

A. Human-Machine Interaction Interface

Human-machine interface (HMI), which refers to the main media interface between human and computer to achieve information transfer and exchange, is able to meet the common interface of a variety of types of equipment and used for the software connection of computer terminal equipment. The design of HMI commonly refers to the user-visible page in the operation of human-computer interaction, and the communication operation between human and system is realized through the HMI. The HMI consists of two main components: software and hardware. The human-machine interface is also known as the machine, which is the object of information response output as well as an important information interaction carrier between human and the system. The software is the final displayed graphic information form based on the hardware.

B. Human-Computer Interaction Interface for Digital Media

For digital media, it is able to fully transfer information between TV users and digital media if the human-computer interaction interface is achieved. As shown in Figure 1, the digital media HMI can transfer information, so that users can obtain digital media content through the TV screen and then process it, make decisions based on specific needs, and feed it back into the digital media system.
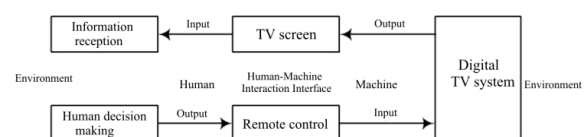

Figure 1. Digital Media Human-Computer Interaction Interface

The design of digital media human-computer interaction interface enables direct human-machine friendly operation of information display, operation, and specific responses that occur in digital media pages. It's important to the HCI experience to achieve fast and efficient interaction with digital media pages in HCI design, and whether the HCI design is consistent with human's own cognitive rules and physiological reactions. Therefore, it is necessary to design the human-computer interactive digital media interface to ensure a reasonable structure, easy operation, and to match the aesthetics of the public to improve the digital media interactive experience.

III. DIGITAL MEDIA HUMAN-COMPUTER INTERACTION INTERFACE DESIGN IMPLEMENTATION

In traditional film and television, the viewer only acts as a spectator, with a single point of view, making it difficult to identify with multiple characters, often only experiencing the emotions of the protagonist and not gaining a deeper understanding of the other characters.Interactive technology has changed the traditional way of communicating, no longer sticking to one-way output, the audience has become a participant and this has forced the creators to focus more on two-way communication with the audience and to explore more possibilities for the film.When designing a digital media interface, it is first necessary to input the results of the corresponding final design task to establish the access mechanism as a network, hierarchical direct mechanism, via the task structure directly determines the type of mechanism and influences the final design style.

In the human-machine interaction information display interface, navigation is designed to facilitate the selection of information to jump to and complete the target task, which is influenced at some level by the content of the information, as well as the system architecture and hardware facilities. Figure 2 shows the structure of the interface with a well-defined navigation layer.

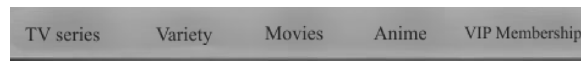| TV series | Variety | Movies | Anime | VIP Membership |

Figure 2. Navigation interface

The information architecture is based on the interplay of information architecture, including navigation, categorization, and organization, and it also affects the usability of the end-user consultation. A good information architecture for an HCI interface allows the user to quickly find the information he or she needs. Figure 3 shows the four main types of simple operational architectures, the content of which can lead to visual disorientation and the inability to find the desired information, depending on the size of the screen, the different modes of operation, and the distance.

There are also differences in the layout patterns of different human-machine interaction interfaces using different terminal devices for reference in the design of digital TV interactive interfaces. The layout pattern of the nine-pattern human-machine interaction interface is shown in Figure 4, which can bring a regular and neat visual experience to users and can form a very regular function jump and eventually switch to the selectable content quickly.
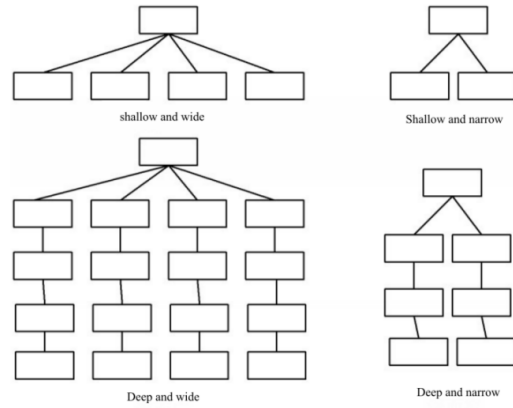

Figure 3. Information architecture type

Figure 4. Nine-pattern human-computer interaction interface layout

IV. DIGITAL MEDIA HUMAN-COMPUTER INTERACTION INTERFACE DESIGN IMPLEMENTATION

A. System Information Architecture

Figure 5 shows the functional architecture of the HCI digital media interface, which includes two information architectures: TV and cell phone.
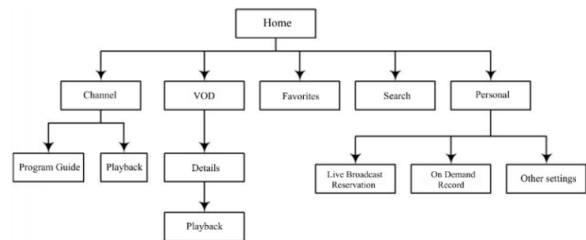

Figure 5. Information architecture of digital media human-computer interaction interface

In the development of the information framework needs to be integrated with the system function, first of all, we want to make the whole design around the user to achieve. In combination with the characteristics of differentiated terminals, on the one hand, when designing the human-machine interface, we should combine the user groups using the product, understand their general needs, and analyze their psychological characteristics and behavior activities

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according to the differences of different users, so as to effectively improve the design of the interface. Based on information interaction design rules, and complex secondary page classification content. To ensure system flexibility on smart mobile devices, you can switch functions on the TAB bar to enter the remote control interface. Benign interface design can improve users' perception and experience of the game. User-centered interface design should be designed to meet users' psychological needs and behavioral cognition.

B. Grid-based System Page Layout

In this layout design of system page, it is required to take the physical size, resolution and other related information of the main pages into consideration, lay out reasonably, tile and divide the columns, and then introduce the grid system into it.

Design grid system as a graphic design style, through the use of fixed grid board design of the overall layout, the design of the layout of the web page to form an accurate and readable block. Considering the interface compatibility of THE TV side, the system display rate can be modified, such as technology to solve the TV redisplay problem, and built-in rather than external input of the TV system interface. Figure 6 shows the design of TV interface grid system. Take this part of the design code as an example:

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<div id="sinaadToolkitBox1" class="sinaad-toolkit-box" style= "position: fixed;width: 640px;height: 90px;z - index: 10 501; display: block;left: 114px;top: 662px;transition: all 0.3s;"><div id="sinaAD_type_blogbf"><a style="display: block;line-height: 0"
<div id="sinaadToolkitBox0" class="sinaad-toolkit-box" style= "position: fixed;width: 120px;height: 288px;z-index: 99 999; display: block; left: 0px; top: 120px;" ><div style= "width: 120px; height: 18px; position: absolute; right: 0px; top: 270px;z-index: 10 000;background: url(&quot;//d2.sina.com.cn/ litong / zhitou / sinaads / 60x18_ 1_close. gif&quot;)right center no - repeat rgb(235,235,235);margin: 0px;padding: 0px;cursor: pointer;" ></div><div style= "width: 120px; height: 270px; position: absolute;right: 0px;top: 0px;"><iframe adtypeturning= "undefined"
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C. Drawing the interface block diagram

This design uses Axure to draw the interface based on the prototype block diagram, which can draw wireframes and generate html prototype diagrams to complete the demo interaction. By The wireframes and page layouts were designed using the TV as an example of information architecture. As a combination of the system design functions, information, and content, the grid system was designed to combine with the differentiated function pages, and the navigation layout was refined to design two types of layouts: zonal and columnar.
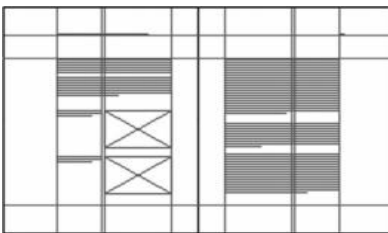

Figure 6. TV-side grille system

D. Dual-screen interaction model

After analyzing the user's prototype operation process, we use cell phone terminal to search for TV channels and push them to the TV terminal, so that the user can directly make a reservation for watching programs in the evening through the cell phone terminal to achieve advance reservation. Users can also turn off the TV after watching a TV program and use their cell phones to select the history to watch it on demand.

V. DIGITAL MEDIA SYSTEM INTERFACE INTERACTIVE VISUAL DESIGN

A. Visual style consistency

In the context of human-computer interaction, the elements used in the interface should be consistent in style to ensure visual unity. First it is necessary to determine the visual style of the interface. When setting the color of the interface, the simple and visible interface can make the user happy and make the user feel simple and comfortable. The designer can also combine the corresponding aesthetics, art and aesthetics of the user according to the visual needs of the user, so as to effectively improve the design of human-machine interface and meet the design needs of human-machine interaction interface.The boundary position of the graph is precisely calculated to ensure that the position design of the object matches the whole scene, which is convenient to better control the rationality of the position of the graph segment in the later stage, and greatly improves the operation efficiency and effect of the designer. When designing the interactive visual style of interactive software, the characteristics of different terminals should also be consistent. For example, the design style of mobile phone terminal and computer terminal should be consistent as far as possible.

B. Interface details design

The design interface details include color, picture, icon, text, operation area and other elements. In order to ensure visual unity, it is necessary to simplify the layout as much as possible, including the system interface composed of pictures and lines. For example, when designing a game interface, the game interface is relatively small and the output information is limited, so the distribution of text and ICONS should be considered when designing such an interface. Simple, easy to use and clear interaction design can accurately bring information to users. In the design of background details, to ensure visual unity, interface background design needs to make targeted elements adjustment. The design of the interface should be consistent with international and industry standards in terms of color, graphics, fonts, logos and so on. This will help to reinforce the memory of the game.

C. Icon Design

For the icon design process, based on the IOS7 system interface, a line diagram was developed to match the system interface style, and cell phone icons were drawn to make it easier for users to operate and identify. For the design of the TV side, since the lines of the IS07 chart will have a greater impact on the user's recognition, it is necessary to redesign the TV side icon, and draw different styles according to different icons to meet the user's design needs in the process of use, as shown in Figure 7.

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Figure 7. Icon design

D. Focus status bar design

When designing the focus status bar, it usually involves the selection and use of a variety of drawing tools, for example, by choosing to use the blue-white inverse color method, to design the differentiated focus state for navigation differentiation. The first-level navigation selection is turned from white to blue, and the second-level navigation selection is turned from the bottom to white. Through such a differentiated design, the two-level navigation can be satisfied. In addition, some individual tabs at the top of the three dimensional animation creation software contains various functions ICONS, such as selection icon, lock processing icon, connection icon, such as tablet covered cursor device contains multiple button switch, the use of these push button switch with mouse button switch function, same design by using the push button switch, You can implement the choice of any function. Not only so for TV, mobile phone and other terminal operations, still need to use the direction key remote control, focus on the location of the focus set focus box, and the corresponding selection of focus position can be successfully activated after the subsystem interface of the focus state.

VI. DIGITAL MEDIA MOBILE INTERFACE HUMAN-COMPUTER INTERACTION APPLICATION TESTING

After entering the design case, the system user navigation and beginner's guide will be presented, which can guide the user to better understand the software functions more easily. Since the main user groups are students and offices, the interface design needs to be as simple and clear as possible, with specific button text to clearly represent the corresponding functions, so that users can quickly learn to use the graphic design system in a limited time. The software data in the interface is designed to allow users to store and upload information locally to the server during operation. The graphic design system interface consists of three layers, all of which are implemented in the main interface to help users complete their pending tasks in a timely manner.

The system interface consists of three layers, all of which are implemented in the main interface to help users complete their to-do lists and integrate functions visually.

VII. CONCLUSION

In this paper, we designed the human-computer

interactive digital media interface, and analyzed the necessity of researching the interactive interface of multi-screen digital media by combining the functional characteristics of digital media. Taking human-computer interaction interface design as the research starting point, this paper analyzes interactive digital media interface, navigation mode, information architecture, layout mode, which meets the diversified needs of users when using this interface, and also enriches the content of interactive design of digital media interface.

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