



Research on the Evolution of Mobile Game UIs

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Abstract. Thanks to the increase of mobile terminal devices, mobile games have gradually become an important part of human life. People use games to please themselves or kill time. The user interface of excellent games can attract users or make it easier for users to immerse in them. By studying the changes in the game user interface from its birth to the present, this paper discusses the internal reasons for its changes and the future development direction. This paper studies the game user interface in the era of the Saipan system and the era of smart machines through qualitative methods and discusses the current mainstream game user interface types. Through research, it is found that the mobile phone hardware has a serious impact on the game user interface, and as the mobile phone screen gradually becomes larger, the game user interface can present more content, and the interaction between the user and the game system also presents a variety of modes.

Keywords: UI · HCI · Game · Mobile

1 Introduction

Nowadays, mobile games are deeply loved by people and gradually become an indispensable part of people's entertainment life. Interaction design for mobile game user interface (UI) can intuitively display the content and interaction methods in mobile games to users, bringing better service and more convenient interaction methods to gamers. Now the research on mobile games is more inclined to the field of human-computer interaction, that is, how to make users interact with the mobile game system more friendly, and how to provide more comfortable feedback [1]. At present, there are not much research on the history of UI changes in mobile games. Based on the history of UI changes in mobile games, this paper discusses the factors that affect the changes and the effects. The UI interface interaction design of mobile games can be divided into hardware design and software design. Considering that there are no physical buttons in mainstream mobile phone models, software design is the focus of UI interaction consideration, which also brings new challenges to it. Therefore, this paper will study the changes in game UI in the post-full-screen mobile phone era [2]. The significance of this research lies in how the game UI will evolve to adapt to new hardware devices due to changes in mobile phone hardware and the significance of this evolution to future development. In the context of the disappearance of buttons, discuss the evolution history and evolution trend of mobile game UI, and make suggestions for the future development of the game UI field.

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2 UI

2.1 The Meaning of UI

UI is the medium of interaction between people and information, and it is the functional carrier and typical feature of the product. UI exists as a usable form of a system, such as a visually themed interface, that emphasizes the organization and presentation of visual elements. This is the design of the physical presentation layer, including graphics, icons, color, and text design, through which users use the system. In this layer, UI can be understood as User Interface, which is the basic layer of UI as human-computer interaction [3].

Secondly, UI refers to the collection and feedback, input, and output of information, which is the interaction between people and products based on the interface. At this level, the UI can be understood as User Interaction, which is the meaning of interface generation and existence. The user completes the task through the metaphor and guidance of the interface to the function. The UI should not only have a beautiful visual performance, but also have a convenient and quick operation to conform to the user's cognitive and behavioral habits.

Finally, the advanced form of UI can be understood as User Invisible. At this level, UI is "invisible", which does not mean invisible at the visual level, but means that users interact harmoniously with the system under the interface, and users are immersed in their favorite content and operation, thus forgetting the existence of the interface. This UI state requires developers to have a better understanding of user psychology and user behavior, and design the interface structure, behavior, and visual aspects from the user's point of view [4].

2.2 The Meaning of Optimizing the Game UI

Optimizing game UI is one of the principles that developers must abide by in the game development process, because these UI components not only affect the size of the game, but also have an important impact on the operation of the game. Before users touch the game content, they usually make a preliminary judgment on the game content based on the size of the game. The bigger the game, the harder it will be for potential users to download and try it. On the other hand, game UI has a direct impact on user experience from multiple perspectives such as usefulness and ease of use, and these human-computer interaction principles play a guiding role in UI design.

2.3 History of Game UI Changes

User interfaces can be ignored by some unwary users, especially when they are doing their part. But UI plays an important role, especially in gaming. Throughout the history of game development, the game interface has changed from simple to complex, and the number of game control interfaces has gradually increased. In the early arcades, the 13-inch screen could only display a few elements due to resolution issues, which was very harmonious with the fewer display elements of the game interface (such as health bars, scores). In the game era that started with "Pac-Man" and "Mario", the game display area

is no longer static, and the game interface presents more interactive elements. The new generation of games represented by PlayStation has more UI elements, and these game elements are more interesting, and CD-ROM technology provides more possibilities for the game interface. Games represented by “The Elder Scrolls III” can allow users to rearrange UI windows and customize the size, which is an important innovation in the UI field, and games represented by “Detroit: Become Human” weaken the presence of UI elements. It allows users to get a better gaming experience. Through the exploration of the development of the game UI field, it can be found that after the game UI elements have changed from less to more, they have gradually decreased through independent discretion and scientific settings. The reduction in the number of UI elements does not affect the user’s experience, but instead makes the user more immersed in the game [5].

3 The History of Mobile Games

3.1 The Original Mobile Game UI

As the carrier of mobile games, the hardware system of mobile phones has natural restrictions on mobile games. At that time, game manufacturers and game developers would develop corresponding mobile games according to the current mobile phone hardware. The performance of the early mobile phones was relatively weak. Taking the Saipan system as an example, the game size is generally less than 10M. Therefore, the corresponding mobile games are relatively simple in terms of picture quality and content, and their interaction methods are also relatively simple. Some games can only be interacted with two physical buttons, and their resolutions are also low. The built-in “Snake” of Nokia 6110 marks the beginning of the field of mobile games. The game is only a few KB and is a monochrome 2D game. The user can only interact with the game through the four arrow keys to control the direction of the characters in the game. Even though the game looks very simple now, it attracted hundreds of millions of users at the time. At that time, the game was generally relatively simple in terms of interaction and operation logic, the user interacted with the game through physical buttons, and the options that could be operated were very limited [6].

3.2 Virtual Buttons

The smartphones represented by the Apple iPhone4 have ushered in a new era. The performance and resolution of mobile phones have been greatly improved, the upper limit of mobile games has been liberated, and the new generation of games represented by “fruit ninja” and “Temple Escape” have undergone qualitative changes in image quality and gameplay. Smart phones have also brought new UI and interaction methods, physical keys in the era of Symbian machine systems have been replaced by touch screens and a “Home” key. Therefore, mobile games can only choose between virtual keys and touch screens in terms of interaction methods. However, virtual keys can easily lead to the problem of accidental touch, and the touch screen cannot provide more refined interface positioning, but only provide relatively rough services. The UI in this period also benefited from the performance of mobile phone hardware, gradually enriched in

expression and function positioning, and gradually played an important role in blood bar, feedback action and background environment [7].

The arrival of the full-screen era of smartphones represented by MI MIX provides more possibilities for game UI. Before that, most mobile phone screens used a 16:9 aspect ratio, while the full screen used an 18:9 aspect ratio. When users play the game in a landscape mode, the game will present more game elements, which provides the possibility for the rise of open-world mobile games.

Through research on the development process of mobile games, it is found that the development of games and game UI needs to be synchronized with the development of hardware. Only when the mobile phone hardware is satisfied, will the game UI generate new modes. Mobile phones that can only interact with physical buttons cannot satisfy games such as “Fruit Ninja”. Similarly, games such as “Snake” will also have a bad gaming experience when they are operated through virtual buttons. From the current point of view, future interaction methods include VR glasses. Users can interact with mobile games through VR glasses, which may bring about a new UI revolution [8].

4 Mobile Game UI Status

Mobile games have grown considerably in the past decade. Especially after the full-screen mobile phone became the mainstream mobile phone and the physical buttons of the mobile phone were canceled, the mobile game developers have comprehensively designed and created the game UI from the structural level to cope with the new demand and trend, that is, without physical buttons. Several typical UI interactions will be discussed in this section.

4.1 Clash Royale

The staff of clash Royale created a quick UI with sliding labels, as shown in Fig. 1. Its purpose is to allow users to complete all interactions with one hand. The game allows users to complete the interaction with the system by sliding labels or by two clicks. The first click completes the function of selecting labels in the label list, and the second click completes the function of placing labels. This design of clash Royale can meet the interaction mode of users in various scenarios, and perfectly demonstrates the importance of user experience (UX) in UI design [9].

4.2 Persona 5

As shown in Fig. 2, Persona 5 presents a brand-new user interface on the mobile interface, a perfect fusion of 1970s punk culture and comic style. This UI style looks different and is very attractive to the user, but it also increases the learning cost, because the UI style is different from the regular turn-based game, and the user needs extra time to interact with the system. But thankfully, since the game type is turn-based, the game does not require immediate user feedback, which gives the user enough time to adapt to the UI and provide feedback to the system. Game designers break some human-computer interaction principles in the UI design process, such as ease of use, but the benefits are obvious. This provides a new UI interface for the game and binding the game, and the UI together can provide a special immersive experience [10].



Fig. 1. Clash Royale interface



Fig. 2. Persona 5 interface

4.3 MOBA Games

The increasing screen size of mobile phones provides the possibility for game developers to port MOBA games to mobile terminals, and the “Double Roulette + Lock” technology provides an excellent interaction method for MOBA mobile games. The “Double Roulette + Lock” was first improved by the “Fight for Freedom” mobile game R&D team on the basis of virtual buttons. Press and hold the attack button and swipe up and down to freely lock and switch between local units in the game. The popular explanation of the “Double Roulette” operation is that the player controls the movement of the character through the turntable with one hand and controls the character’s skills through the turntable with the other hand, which is an important design of “separation of character orientation and skill orientation”. Compared with the point-and-click interaction method and the virtual joystick interaction method, the “Dual Roulette + Lock” technology makes user control more delicate, while avoiding the problem of fat fingers, which



Fig. 3. King of Glory interface

is very important for MOBA games and RPG games that require an operation. Language is very important, not so important for card-based or turn-based games. Although the “Fight for Freedom” team and the “Honor of Kings” team have conflicting patent rights on the “Dual Roulette + Lock” technology, this does not affect its greatness [11] (Fig. 3).

Through the research on the current situation of mobile games, it is found that different types of mobile games will have different UI models. For example, games that pursue operation and reaction time need to adapt to the “Dual Roulette + Lock” UI model, while games of strategy type need a simple interactive model.

5 Conclusion

Through the research of this paper, it is found that the game UI is usually limited by its carrier - mobile phone hardware. At the same time, when the mobile phone hardware changes greatly, the game UI will also start to change and develop different models, but usually, developers and users will only leave a model that is most suitable for the mobile phone hardware and the way of game interaction. The trend of game UI changes is to be more humanized and more in line with the principles of human-computer interaction. The homogenization of UI model will reduce the threshold for users to use, but it may also make users feel bored. The future development of game UI will be more in line with the game itself, while allowing users to have a better immersive experience. The deficiency of this paper is that the sample size is insufficient, and the research is not deep enough, and the impact of potential factors on the development of game UI is not considered.

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