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Research on AI-based interactive digital signage interface design standard model

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Abstract

With the advancement of AI technology, digital signage has improved interaction with users, which has improved advertising effectiveness and user experience. AI-based interactive digital signage is a system that provides information and advertisements electronically. It has recently evolved further with the introduction of AI technology, and is improving the efficiency of marketing and information delivery by analyzing user behavior and providing customized experiences. In this paper, the touch interface of digital signage, switching of multimedia content, high visual utility, interactivity, readability at a distance, geographic and temporal flexibility, efficiency of information delivery, customized experience, and efficient content management are based on the main characteristics of the interface. A standard model for design was established. This study analyzed the main features and various effects of AI-based interactive digital signage, and the interface design standard model for digital signage proposed five standards to optimize user experience and effectively deliver messages. Ultimately, the purpose of this study is not only to efficiently transmit media content based on the interface standard model, but also to optimize the interface design to provide real-time information for users, information of interest, emergency disaster information, etc. quickly and accurately, communicate with citizens, and create a beautiful city street environment. It is used as a platform to create.

Keywords : *Artificial Intelligence, Digital Signage, Interactive, Interface Design*

1. Introduction

AI-based interactive digital signage provides various information and performs advertising and guidance functions. Most Smarter Shelter bus stops have digital signage installed, but it is only used for a limited role, such as transmitting simple advertisements, and in particular, it often does not have a significant role behind the bus stop. Digital signage's media content transmission is a system that can provide real-time information and emergency disaster information for the public interest, and is used as a platform to communicate with citizens and create a beautiful urban street environment. Experts in various fields such as architecture, art, and engineering are conducting research on digital signage, and have recently been actively researching pilot models for digital signage such as responsive signage and transparent LED modules. It is a system and service

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that can be applied to waiting areas in multi-use facilities using smart integrated connection and control technology. The biggest difference between digital signage and existing signs is that while existing signs go through a physical process of being installed once and removed and reinstalled every time the content changes, digital signage can be installed once to create a variety of products. The point is that content can be output flexibly. It is a standard for AI station-based interactive digital signage interface design that allows users to receive customized aesthetic improvement and environmental information services using AI technology. I would like to propose a model.

2. Theoretical Background

Digital Signage is a medium that displays various information, including advertisements, on network-connected displays, such as kiosks, panels, building exterior walls, and holograms, for commercial or public purposes in various places or environments. In other words, it refers to a method of delivering visual information to the audience in any form that can reproduce the video, such as a monitor, LED sign, or projector, by transmitting content such as video, images, or text through a digital information display to a set-top box through a wired or wireless network. Do it. In the early 2000s, LCD screens were installed in some subway cars and video advertisements began. The screen did not simply play video advertisements, but also displayed various information about the subway, naturally attracting the attention of the recipients, and developed rapidly. The initial form was produced in a way that the video source was directly connected to all videos and operated manually, but with the development of wireless network speed and the decline in the price of data storage media, it became larger and the development of video and audio compression methods allowed thousands of video set-top boxes to be remotely operated. It has developed into a method of batch updating easily and quickly. Recently, smart shelters at bus stops have been installed as empathetic communication smart shelter bus stops that build digital signage that actively utilizes the latest ICT technologies such as city administration information and traffic information, and improve conditions such as providing daily life information, city aesthetics, and citizen safety. there is. In addition, we maximize advertising effectiveness by exchanging user information through digital signage displays, establish a system that allows citizens to feel at ea se through real-time guidance, provide guidance spaces in response to fine dust, heat waves, and col d waves, and provide consideration for the socially vulnerable. It can provide various services and is using digital signage to increase user convenience and safety. Digital signage is a medium that is greatly influenced by time and place, and it can only serve its role well by providing customized content tailored to the place and time. In this paper, the scope was set to the content of the digital signage at the smart shelter bus

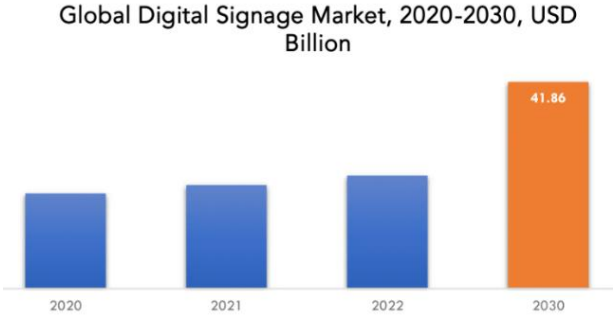

Figure 1. Current status of digital signage
Offer: Digital Signage Market | Exactitude Consultancy

stop. We need content that understands the characteristics of public transportation and is planned with time and place. The figure below (Figure 1) is a chart analyzing the current status of digital signage in 20 20-2030. According to Exactitude Consultancy, the growth of the digital signage market is expected to expand significantly from 2022 to 2030.

According to Mordoro Intelligence Markets Ltd., the digital signage market is expected to experience significant growth driven by the expansion of transportation networks, public infrastructure, and commercial buildings, especially in developing countries. The digital signage market size is estimated at USD 25.52 billion and is expected to grow further by 2029, growing at a compound annual growth rate (CAGR) of 2024% during the forecast period (2029-8.40), especially in developing countries, due to the growth of transportation networks, It is estimated that the growth of the media façade market for public infrastructure and new commercial buildings will create more opportunities. Digital signage provides real-time location and situational awareness across all modes of public transportation and traveler information and advertising to attract viewers on the move. Digital signage systems are used in many educational settings, including schools, businesses and campuses. It is quickly becoming the standard.

However, recently, breakdowns and errors in smart shelter digital signage have occurred frequently, revealing points that need improvement.To improve these issues, many companies are developing their own systems. It is an AI-based interactive and responsive digital signage system that builds a monitoring system to ensure a positive experience for users and attempts real-time situational recognition and response based on remote monitoring and situation propagation functions and sensor data. Therefore, in order to solve local traffic problems, revitalize the old city center, and improve the quality of citizens' cultural life, we developed a smart shelter bus stop digital signage to utilize local cultural content, and an AI-based interactive system that can suggest display modules at bus stops by reflecting trends. A standard for digital signage interface design is needed.

3. Interface design for Interactive Digital Signage

3.1 Key Features of Interactive Digital Signage

Interactive digital signage is attracting attention as an important means of providing various information and innovatively improving user experience. It is used in various fields such as advertising, provision of information, and promotion of customer participation, and enables effective communication with users. The main characteristics of such interactive digital signage are as follows.

First, one of the key features of interactive digital signage is the touch interface. Users can browse information and utilize functions by directly touching the screen, enabling intuitive and user-friendly interaction. The touch interface serves as an important element to increase accessibility to digital devices and encourage user participation. Additionally, high-resolution screens and various multimedia elements (videos, animations, images, etc.) can leave a strong visual impression on users, resulting in greater visibility.

Second, it supports various types of content, including videos, images, and animations. These multimedia presentations can provide additional information and play an important role in maintaining the user's attention. In addition, the appropriate range of size and color differences makes it easy to understand even from a distance, making it highly readable from a distance.

Third, it provides the ability to collect and analyze user behavior and interaction data. This helps you evaluate the effectiveness of your content and make better strategic decisions. It supports interaction with users by utilizing technologies such as touch screens, QR codes, and NFC, and allows interaction by providing user-tailored information, and increases consumer attention by conveying information intuitively with simple and

clear messages. By increasing the information delivery efficiency, marketing effectiveness can be maximized by providing customized content targeting specific customer groups.

Fourth, the ability to provide customized content tailored to individual needs or preferences based on user data is one of the main advantages of interactive digital signage. User experience can be differentiated and improved by providing personalized marketing messages or information using data such as location information and time zone.

Fifth, it provides the ability to update content in real time through a network connection. This can provide users with up-to-date information and enable timely content changes. Real-time information provision increases user satisfaction, content can be displayed in real time in various locations, and digital signage in multiple locations can be managed simultaneously through a central control system, ensuring geographical and temporal flexibility and ensuring time and event control. Converting dynamic content to suit is easy.

Sixth, in connection with location-based services, it provides convenient functions such as surrounding information through interactive maps or navigation that provide real-time route guidance to users. This can be especially useful in shopping malls, airports, and large event spaces. Content can be easily managed and distributed through a cloud-based platform, and the effectiveness of the content can be evaluated through statistical analysis, enabling efficient content management.

3.2 Interface design Standard Model

The interface design of AI-based interactive digital signage should aim to provide a user-friendly and intuitive experience. Below we propose a standard model for effective interactive digital signage interface design.

-Text is designed to be easily readable from a variety of distances and lighting conditions using hig h-contrast colors and large fonts, and graphics and animations are designed to be eye-catching and i nclude only the necessary information to convey the message concisely, but in a way that the user can understand. Design without being excessive.

-It strengthens brand recognition by consistently using brand colors and logos, and includes the ability to dynamically change content to suit various weather, times, and situations. In the case of touchscreen signs, interaction with users must be intuitive and immediate. Do it. Additionally, interaction with mobile devices using QR code or NFC technology must also be considered.

-It is designed with color blind users or visually impaired users in mind, must be able to include a voice guidance function, and covers a variety of user bases by supporting a variety of languages.

Important information should be placed in the center or top of the screen to attract attention, and be careful to use margins appropriately to avoid overcrowding the screen. Designing the interface of digital sign advertising by considering these factors can provide a more effective and efficient user experience.

-Categories are clearly distinguished so that users can easily navigate through intuitive navigation and an accurate menu structure, and upper and lower menus are intuitively arranged.

-The responsive interface optimizes touch response speed, and buttons and interactive elements are designed with sufficient size to minimize user touch errors.

-Ensure readability by using contrasting colors and sufficiently increasing the color contrast between text and background, and maintain a simple and clean design by minimizing unnecessary decorative elements to make information easy to understand.

-The use of multimedia content effectively conveys information by drawing user attention through video and animation. The use of images and icons conveys information intuitively through visual symbols and reduces

the amount of text.

-It increases accessibility by allowing users to change their location with local content recommendations, providing personalized information based on past ancient combinations, etc., and providing content tailored to the user's location language and culture.

-It includes an assistive use function so that visually impaired or physically challenged people can easily use it, and provides a voice guidance function that can convert text into sound, allowing users to hear and understand visual content.

-Improves user experience by providing immediate feedback on changes to system state when the user takes action, Use animation effects to smoothly show transitions and state changes.

Figure 2(a) below is a virtual installation scene of digital signage and Figure 2(b) is a schematic diagram of the AI-based interactive digital signage interface design standard model.

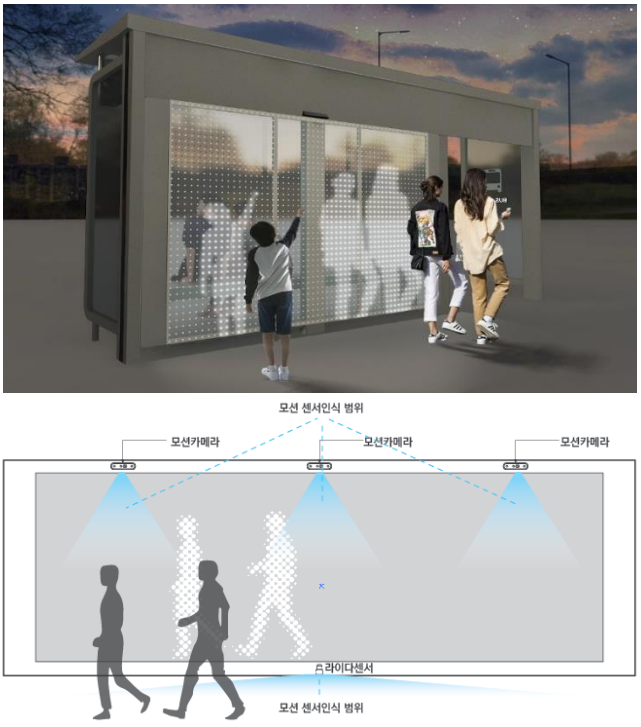

Figure 2(a). Virtual installation scene of digital signage
Figure 2(b). AI-based interactive digital signage interface design standard model

4. Conclusion

Interactive digital signage has become an important tool that innovatively improves user experience and leads changes in the way information is delivered. Its various features promote active participation and interaction of users, and functions such as multimedia content, real-time updates, and provision of customized experiences enable innovation in information delivery. These features have the potential to further expand the use of interactive digital signage in various fields in the future.

In this study, we analyzed the characteristics of AI-based interactive digital signage and the changing user experience resulting from it, and proposed a standard model for interface design based on this. While digital

signage is innovating advertising effectiveness and information delivery methods through interaction with users, the introduction of AI technology is playing a major role in providing personalized experiences and improving user satisfaction. The main features cover not only everyday information use but also provision of information in public safety and emergency situations, and the standard model of the new interface design that integrates these functions has the potential to be used in a variety of fields.

In conclusion, AI-based interactive digital signage will go beyond a simple advertising medium and become an important tool that promotes public safety and convenience by providing users with necessary information in real time. In future research, it will be necessary to prove the practical usefulness of the proposed interface design standard model and find ways to improve it through empirical research on actual application cases and effects. We hope that this ongoing research and practice will help create better user experience and social value.

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