International Journal of Communication Networks and Information Security
ISSN: 2073-607X, 2076-0930
Volume 15 Issue 01 Year 2023

Design of Digital Museum System Based on Optimized Virtual Reality Technology

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Article History

Received: 23 March 2023
Revised: 28 April 2023
Accepted: 31 May 2023

Abstract

Although China's cultural characteristics were diverse, its museum supply is limited. Traditional institutions would be unable to meet the people's needs for culture dissemination, historic preservation, cultural exchange, and science and research in history's era of the internet. By utilizing VR Technology in the field of furniture decorating, a new viewpoint and method for the development of a virtual museum are unveiled. Using optimum VR Technology in museum exhibition design based on the ideas of architecture, atmospheric art, light settings, coloring style, and ecological design, humans may be presented with natural and cultural heritages. The advancement of completely separate HTML text languages, QuickTime Virtual Reality innovation, Interactive Virtual Model-based Linguistic, three-dimensional (3D) applications, and data interaction systems for the exhibition has done result from an inquiry into virtual reality's history, definition, application, and present state. Ultimately, the planned work's effectiveness is analyzed and compared to other related projects to maximize its efficacy. Using the Origins software, the results of this study are shown.

Keywords: Digital Museum, Virtual Reality, Interior Design, Cultural Traits, Origin Tool

1. Introduction

The virtual exhibit is a repository of photographed and digitized materials, specimens, and publications. Figure 1 depicts a digital museum system that would be completely revealed via exhibition, collection, and research activities, using photos, 3D modeling, as well as other means. There are various advantages to attending a virtual gallery rather than a physical one. Because of the growth of the Internet and interactivity, museum resources may now be digitized and disseminated using new media and communication tools. Such virtual museum pieces may become available to our scientific, social, and economic models at any time. The transformation of traditional buildings into digital institutions brings up the possibility of having museum content accessible to experts as well as the public at large all over the world. A digital museum is indeed a virtual organization in which sets of exhibition artifacts and a wide range of participatory learning goals relevant to particular topics are placed in an immersive experience, in contrast to a typical catalog, which also focuses on conserving, cataloging, attempting to connectivity, as well as monitoring use of digitized elements. In general, a virtual museum should be more engaging, intriguing, readily accessible, & visually spectacular to grab users' attention through examination of either the biggest features of a worldwide virtual team. A significant part of creating virtual museums is using diverse media, data,

technology, and dynamic creative creations. The computer programming and architecture of power infrastructure museum software must include more than simply a traditional library [1]. Natural and heritage groups may be able to reach a broader audience in new ways by using modern technology. Utilizing computer network tools and data imaging, universities can now present their whole assets to a wide audience, surpassing the restrictions of the region. So far, the concept of "digital museums" has been limited to a data transmission perspective, with a primary emphasis on the socio-technical setting for the creative procedure. The approach of the digital museum has been limited to cognitive and retrieval. The approach of the digital museum has been limited to data transfer and retrieval.

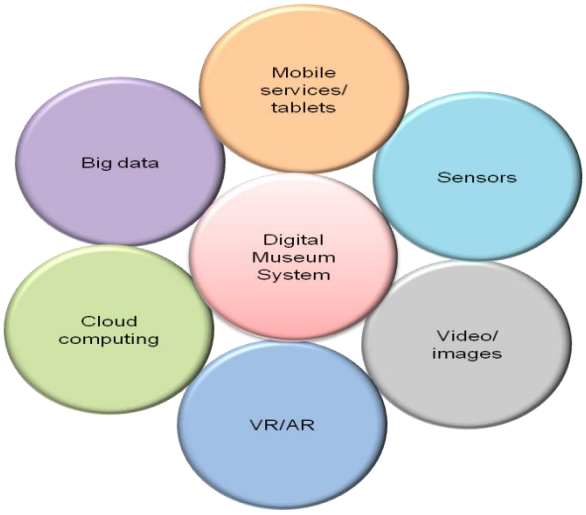

Figure 1. Digital Museum System

Modern virtual museum efforts display a wide range of cultural artifacts as well as the digital representation methods utilized to show them. Among the sampling and measurements is detecting and categorizing developing kinds of graphics systems in online organizations. Inside the virtual museum, digital documents containing user engagement are ideal for "labeling" purposes [2].

Virtual reality (VR) is the use of technology means to create a "virtual" world. That was a strategy that combined several data hybrids with active three-dimensional fluid scenes and activities. VR technology, in addition to its realistic features, can effectively blend sound, video, textual, animation, images, and other components, and provide training material to people from all perspectives and views. VR screen replicates all anatomic sense capacities, such as taste, vision, hearing, and fragrance, and its better modeling might give users an interactive experience. Virtual reality (VR) is the use of computer technology to create a "virtual" world. It was a technique that combined several data fusions as well as participative three-dimensional dynamic landscapes and physical actions. Virtual reality technology is enthralling and fascinating, and the technique and equipment: Interaction is strong relationships with people, which may result in human interplay and device interaction; simulating is a kind of daily life that uses machine designs to imitate truth, while modeling refers to the modeled everyday world life. Virtual reality was increasingly widely used in fields such as healthcare, industrial modeling, home construction, entertainment, and daily life. A digital museum is a place that has been built atop the digital environment utilizing digital technologies. It not only violated the geographical and metaphysical restrictions of the actual museum but also changed the way information was distributed to every individual, significantly increasing audience engagement and the amount of sharing permitted for collected contents. [5] Virtual reality technology has been widely used in the creation of online museums due to its distinct advantages. [3]

2. Related Works

In designs and implements a highly sophisticated digital museum system employing hybrid VR technologies. [2] This strategy, in contrast to the current digital museum management solution, eliminates that time-consuming navigation procedure, and tools to support the more diverse and genuine historical artifact data, and humanizes deep relationships. In explores the design work of an

intelligent memorial based on artificial intelligence to start investigating this same execution of clever exhibitions in AI, [4] analyze them based on the geographical application of smart exhibitions using web browsers, start investigating a good plan for maximizing the features of clever exhibitions, and end up making a few suggestions for smart exposition spatial arrangement. The study [5] presented the design of a digital museum narrative space based on perceptual experience data mining and computer vision. To complete the effective model, the suggested design makes use of the computer vision and data sensing framework. The study [6] compares the intelligent display mode of museum cultural artefacts with the conventional display mode in order to demonstrate the superiority of the intelligent wireless sensor network that it proposes. In the article [7] the authors proposed the 3D landscape modelling technology and the way of creating a digital museum environment in virtual reality are used to assess and research the overall idea of designing a VR environment and based on several distinctive modelling techniques. In the research [8] the authors proposed online platform for the construction of virtual museums with a focus on the presentation and visualization of cultural heritage materials in online virtual museums was made. This common implementation Framework (CIF) enables users to upload large 3D models, which are then converted and optimised for web display and embedded in an HTML5 application that can range from a straightforward interactive display of the model to an entire virtual environment like a virtual walk-through. The study [9] proposed a method for comparing and evaluating various design options for user interaction with VM systems that is based on user studies. The methodology has been verified using a testbed connected to a virtual machine system hosted at Cetraro's "Museum of the Bruttians and the Sea" (Italy). The research [10] suggested a collaborative filtering-based strategy for recommending museum objects that makes display design simpler, enhances the effectiveness of recommendations, and solves the scalability issue. To increase the effectiveness of recommendations and achieve the highest level of consistency, the recommendation system's algorithm combines the benefits of memory collaborative filtering with smoothing processing. The study [11] suggested a design approach for a multi-view virtual display system of Museum Cultural Relics based on AR-VR fusion technology in order to realise the scientific development of the Museum. The multi view virtual display system of Museum cultural artefacts is successfully designed by optimizing the hardware configuration structure of the system, enhancing the operation effect of the system, further optimizing the multi view virtual display algorithm, and optimizing the system software performance. In the article [12] the authors examined the veracity of the cultural relic image from the digital museum using the data mining technique. It is suggested to use data mining to reproduce photographs of cultural treasures with authenticity. This paper designs a digital museum cultural relic′s image authenticity reproduction simulation system to address the issues of poor noise suppression, missing holes, poor reproduction quality of cultural relics, and insufficient details in conventional systems in order to realize the authentic reproduction of cultural relics images. The paper [13] creates a museum user experience model based on sensory, behavioral, cognitive, and emotional experiences; establishes a user experience design framework; conducts specific theoretical analysis and research from four aspects; uncovers specific factors affecting museum user experience; analyses the impact of each experience factor on user system design and potential design entry points; and proposes corresponding user system design strategies to direct further development.

2.1 Problem Statement

The following elements are heavily emphasized in studies on the connection between modern technology and museums in Chinese-language literature: First, a focus on how new technologies can be used in museums. Second, a focus on digital museums' communication channels. The third topic is a discussion of the educational role museums would play in a virtual setting. To investigate the extent to which factors affect the evolution of the digital museum, however, little research has been done. The research question, "What influences the development of the digital museum in China?" has been put forth as a result.

2.2 Proposed Methodology

The Origins program provides a visual representation of the findings of the study. Figure 2 shows the proposed methodology.

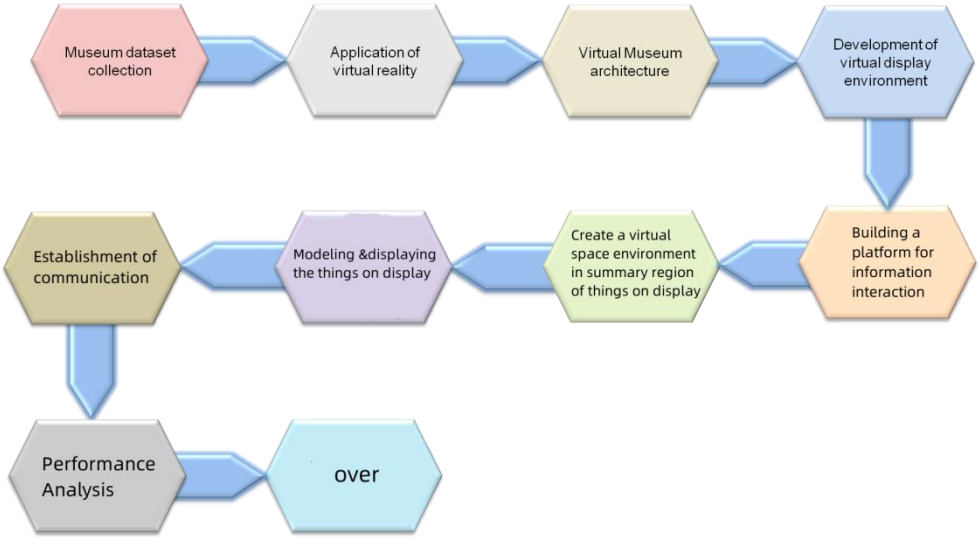

Figure 2. Proposed Methodology

2.2.1 Dataset

The statistics identified in the study are obtained during a five-month public research project that took place between March 23rd May and 30th, 2017. The study looked at the acceptability and use of mobile technology including such Augmented Reality (AR), Virtual Reality (VR), Projection Shows, Interacting 2D (i2D), and Interface 3D (i3D), Mobile Installations, or any unexpected highly controlled within the odd region. This data was collected in 22 sites in 15 cities, encompassing Chinese national and community institutions, producing 806 types of information. There have been 36 distinct digital systems found in all [14].

2.2.2 Application of Virtual Reality

Since the early 1990s, VR technology had piqued the curiosity of researchers from a variety of fields, and it has been used or extended inside the business sector. The technology is unusual because it generates a digital space in which a computer makes a three-dimensional digital representation of the digitized picture as well as a virtual world. All of them provide users with a real experience in this sort of environment, which itself is known as Immersion. Virtual Reality differs from both Computer-aided design prototypes and traditional three-dimensional visuals in several ways. It's an open fluid GUI world where people can monitor and manipulate, rather than a set cosmos; this style of the protagonist also is known as Interactive elements. Virtual Reality is both a presenting media as well as a kind of design. The author's thoughts are represented in the form of a picture. VR Technology can transform a writer's concept into a virtual object and environment, which is usually built using the traditional sand design process. Creativity, the 3rd interactive virtual personality mentioned above, greatly improves the efficacy or effect of designing in creating a good setting utilizing electronic platforms. Due to the obvious three properties listed above, Virtualization Technology can be used in some settings to lower the cost of production and drawbacks all while giving a completely new user experience as well as a significant financial benefit.

2.2.3 Virtual Museum Architecture

Museum virtual boasts a glass is a complimentary transfer between physical and virtual settings during the design stage. Because the museum's location is unsuitable, it is in a unique situation in terms of slow transfer and addressing the public's desire for art. As a consequence, this same various casting floor plan within the presentation would be predicated just on the presence of a tangible inner surface, that it would use a virtual learning environment to encapsulate the actual condition all through olden history, it is not a replica, and will create a new a kind showcase with such fantasy, predicated just on crossroads of society, heritage, backstory, landforms, social science, and programming skills, and that will not be an identical replica. Using independent Digital Reality technologies such as HTML text basic, QuickTime Virtuality, and Virtual Reality Modelling Language, as well as integrating other files to create an actuality and interaction impact in various scenarios. Simultaneously, provide spectators with a seamless experience from the outset, including

in figure 3, by gathering data, purchasing tickets over the web, and experiencing the digital reality in a real-world museum setting to develop an engaging art environment.

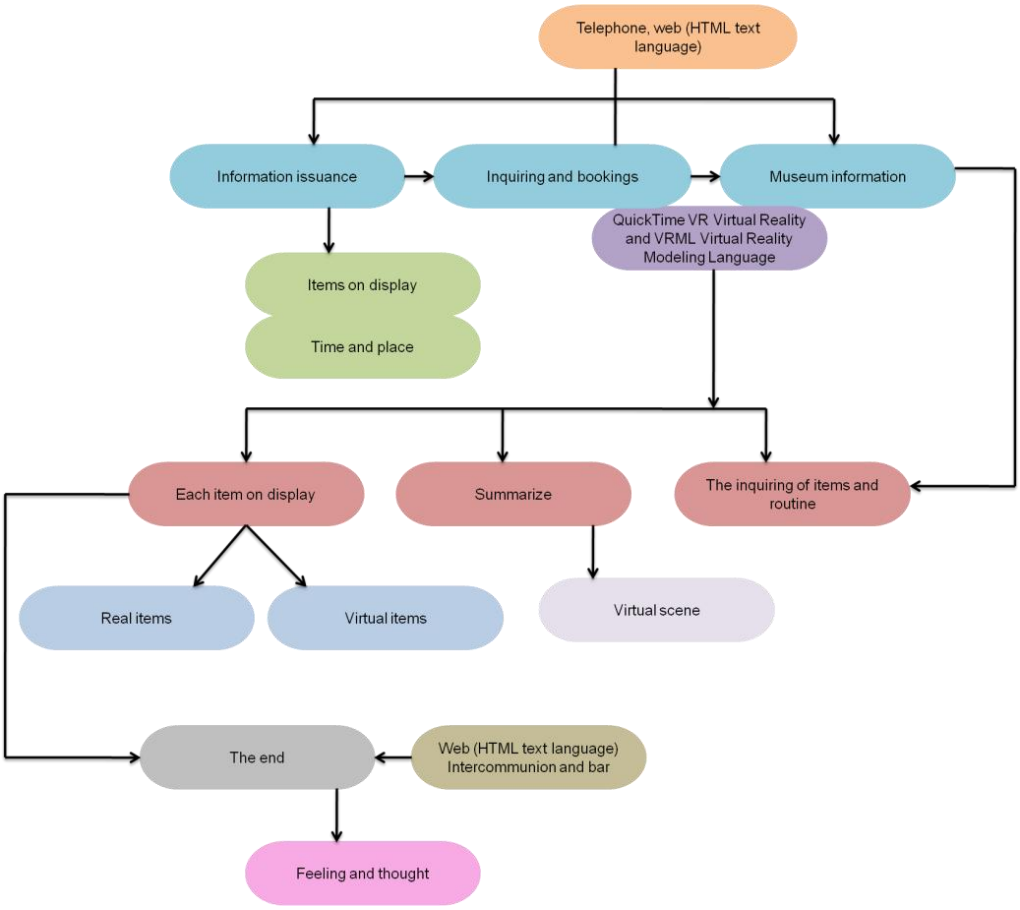

Figure 3. Designing Image in a Framework

2.2.4 Development of Virtual Display Environment

To accomplish a suitable architecture of virtual display space in terms of style choices, we first must investigate the overall perspective plus comprehend the viewers' habits. Derived from research to viewers from expertise issuing, capacity to reserve seats available, going to visit the monument and artifacts in the art gallery, and ultimately, the communication among numerous viewers, the framework of the simulated display must be focused on 3 virtualization worlds, namely HTML, QuickTime Virtual Reality, and Virtual Reality Model-based Language, based on the research to tourists from expertise issuance, ability to reserve reserved seats, going to visit this same exhibition and artifacts on the exhibition, and ultimately, the interplay among various audiences, study to visitors from expertise issuing, ability.

2.2.5 Building a Platform for Information Interaction

The construction of an informative interaction is straightforward when compared to certain other virtual reality technology. Using existing HTML & associated software like Adobe, create an interactive or ASP reactive database that is depending on the interactive experience. By adding images, videos, and actions, and also finding similarities, users can quickly query about the appropriate organization or obtain seats.

2.2.6 Create a Virtual Space Environment in the Summary Region of Things on Display

As customers journey downstream through history, people enjoy engaging within and feeling the majesty of a display area via the senses of sight, music, and feel. One of the most essential aspects of the presentation is the overview section, which transitions from one area to the other. Virtual reality and media content, such as graphics, automatic monitoring methods, massive screen projectors, ultra-thin TV displays, and capacitive panels, are used in the large display to provide a

technology that allows people to experience a real-world environment. For example, we rarely picture the prehistoric period, but we may use multi-tools such as 3DMAX / MAYA to simulate the out from of the dinosaur age based on literary and archaeological data. Instead, to create the outside environment extra fascinating, we might include related images and movies. An interesting technique is to use assistive technology like headgear display to limit seeing and hearing, as well as reconstructing creature models and using the Virtual Reality immersion method to improve a sense of being in this period. Viewers, especially children, could enjoy a self-induced self-journey that captures the attention of your interest in the study.

2.2.7 Modeling and Displaying the Things on Display

When we get to the display space, researchers could use three-dimensional components like sound, illumination, as well as electronics to represent the personalities as well as faces of the products on showcase. Because actual things are frequently hard to view properly, we can project things on such a display using media, keeping those real goods from being seen from different angles as well as rotations. Concurrently, the function of things on display or procedures is done utilizing key contact activities and varying media measurements including sound, movement, text, etc. By integrating virtualized digital museums, this strategy enables historical museums to display items next to visitors. The virtual exhibit concept adds another level to a user experience, enabling visitors to engage with it instead of simply staring at it. The tactile sight has the potential to provide a new way of showing museums' architecture and a clearer answer, enabling individuals to build much more efficient & engaging materials habits.

2.2.8 Establishment of a Communication System

Visitors would've been left with such a variety of ideas and sentiments after visiting the exhibit. As a consequence, the location or system of communication is required. A Telecommunications Industry's display was split into two categories to fulfill guests' communication needs: "travel" and "dialogue." Two buildings with white and transparent sides that mimic two people chatting make up its "Speaking" area. An identical amazing tunnel connects the two buildings, providing all of us with a fantastic spot to contact individuals from all over the world. After the trip, guests can put information such as mail, URL, emotion, as well as other items inside the lighting display, as well as constructions, to engage with these other visitors. In this type of presentation, its value of diversity and intensity could be stressed. A visitor could communicate via sight, videos, stationary pictures, or rich literacy directly on top or on a computer display.

3. Simulation Results

In this section, we analyze the performance of the proposed system based on various education parameters and compare the model with existing approaches. The traditional model includes the feature model technique [15], machine learning [16], and semantic analysis.

3.1 Interaction Ratio

While analyzing the link between several or even more factors, interplay can occur, since the concurrent impact of 2 factors on a third is not cumulative. The existence of interaction can have a big impact on how mathematical techniques were interpreted. The link between these interacting variables and a third "dependent variable" relies just on the quantity of all the other interaction parameters when two factors of interest intersect. In reality, this makes it harder to forecast the consequences of altering a variable's value, especially if the variables with which it interacts were hard to measure or manage. Figure 5 depicts the interaction ratio for existing and proposed techniques.

When compared to the existing work (feature model technique [15], machine learning [16], and semantic analysis [17]) the proposed methods have a greater interaction ratio. In a "digital museum system", interaction ratio can be achieving the greatest amount of output from existing works.

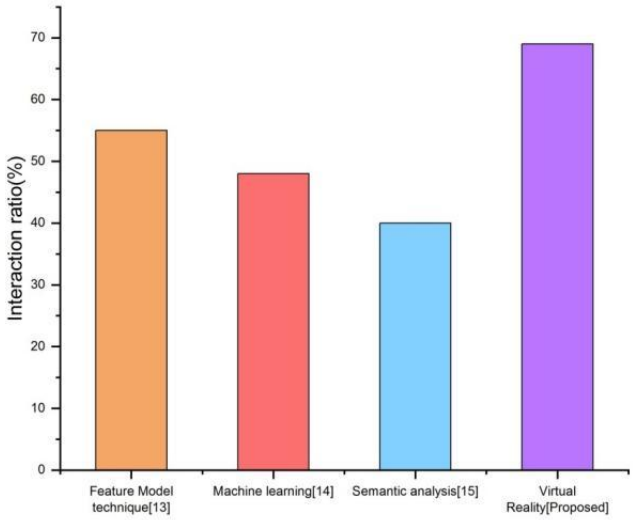

Figure 5. Comparison of Interaction Ratio (%) for the Existing and Proposed Technique

3.2 Implementation Cost

Installing or managing Change that results throughout Completed Measures results in Implementation Costs, which are the total that all or a portion of the real overall costs to construct and implement Measures. Costs associated with implementation. Figure 6 explains the implementation cost of comparative analysis for the existing and proposed methods.

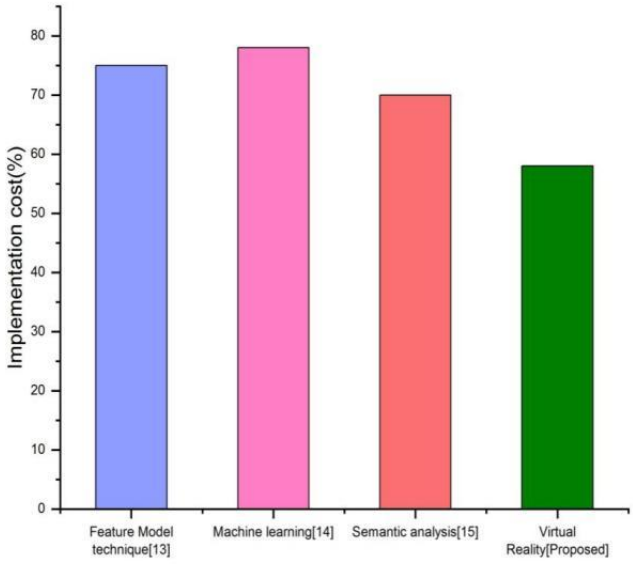

Figure 6. Comparison of Implementation Cost (%) for the Existing and Proposed Technique

When compared to the existing works (feature model technique [15], machine learning [16], and semantic analysis [17]) the proposed methods have a low implementation cost.

3.3 System Efficiency

The proportion of the quantity of available power given out by the system ("outcome power") to an entire quantity of electricity taken in ("intake power"), and the value of hard work power as a percentage of the total power input, is used to determine the power system efficiency or equipment that converts energy. Figure 7 represents the system efficiency of the control group and study group for existing and proposed methods.

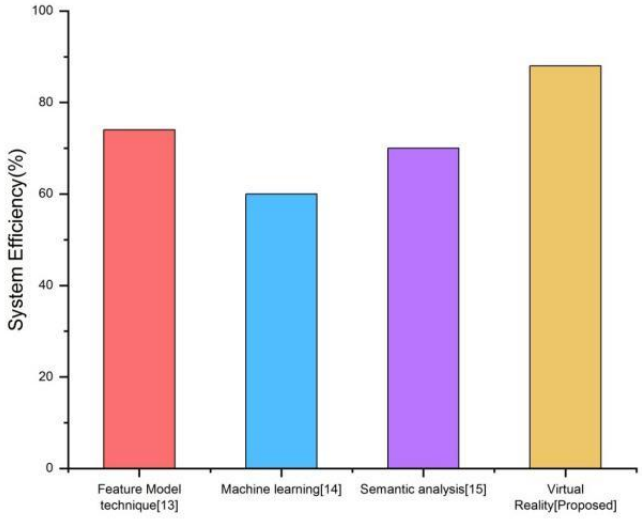

Figure 7. Comparison of System Efficiency for the Existing and Proposed Technique

When compared to current works (such as those in the fields of feature model technique [15], machine learning [16], and semantic analysis [17]), the suggested approaches have a higher level of system efficiency. When the suggested virtual reality approach has a score of 88 percent, the feature model technique has a score of 74 percent, the machine learning technique has a score of 60 percent, the semantic analysis has a score of 70 percent, and the feature model technique has a score of 60 percent.

4. Discussion

In the feature model technique [15] inadequate information increases the likelihood of classifier, which increases the danger of classifier. When the number of possibilities is huge, computation time becomes important. In machine learning technique [16] Among its significant drawbacks are the expense and time attack batches necessary to create modeling techniques. Additionally, standard models perform badly when applied to complicated substances, rendering them inaccurate for predicting the characteristics of an array of substances. In semantic analysis (SA) [17] a large amount of memory is required for semantic analysis matrices. Despite significant advances in electronic storage medium, the decrease of sparseness as a result of large data remains a much more severe concern. Because there are just a few context vectors utilized to characterize every content, SA works well enough for large papers. Nevertheless, the vast amount of data necessitates more storage capacity and computing time, limiting SA's effectiveness.

5. Conclusion

The virtual museum system based on VR technology comprises the museum's database and pertinent information resources, and it enhances the collision detection method that is employed in the network. Users can obtain extra information through the connection between inside and outside virtual reality technology to trade various sorts and materials & conserve area, which would be created inside the monument's exhibition space can considerably extend the capacity of data. The storing of data in a museum is not restricted by its size, and geometrical series are used to extend the

outflow. At some moment, the online world offers greater freedom than the actual environment in terms of the patient's viewpoint, path, and materials, so augmented reality allows people to experience a genuine mental makeup that they didn't even know existed. VR in museum design modifies the barren, cold, or inactive aspect of true displays, resulting in a much more human-looking event space. The application of virtual reality technology to furnishings design not just to improve human presence area, but also make living more contemporary more colorful.

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