

GROWING MUSEUM

Keyword-based Self-growing CG Virtual Museum with Annotation System

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ABSTRACT

We have been building a keyword-based virtual museum that allows users to search a database of artworks by giving search keywords, pick up the artworks, and automatically display them in a CG museum space of variable dimension. This time, we have added an annotation system to this museum, allowing users to freely annotate the artworks while enjoying the exhibition. In this way, the database of keyword search is naturally updated, and the descriptions of the artworks freely viewed in the virtual exhibition is elaborated over time. In this way, while enjoying the exhibition, the museum itself becomes richer and evolves on its own, which we call the Growing Museum.

Keywords: keyword search, annotation system, self-growing content, virtual reality

1. INTRODUCTION

The importance of virtual museums is increasing. The virtual museum provides a virtual display of artworks in contrast to a real museum. We have been developing virtual museums that allow users to freely walkthrough the realistic museum space using high-quality real-time computer graphics [1]. The most important requirement is to create a space where the rooms and artworks of the museum harmonize well as a whole as if one is enjoying themselves like in a real museum without stress. This time, we are proposing a system that combines this virtual museum with an annotation system to update the museum itself as the user uses it. We named this idea "Growing Museum". In this paper, we describe our approach, the system design, and the actual test system that we are building, using woodblock prints by Katsushika Hokusai.

2. OUR APPROACH

While keeping the aesthetic aspect of a virtual museum as our basic form, we have been pursuing functions that only a virtual museum can provide. One of the attempts is the automatic generation of the exhibition [2][3]. In

this application, a large number of artworks are registered in a database, and users can search for them by giving keywords to the museum, and the searched artworks will be automatically displayed in the virtual museum. The room of the museum is made to be expandable and contractable so that the room transforms according to the number of artworks to be displayed. It also has a function that allows users to display various related information about individual works registered in the database.

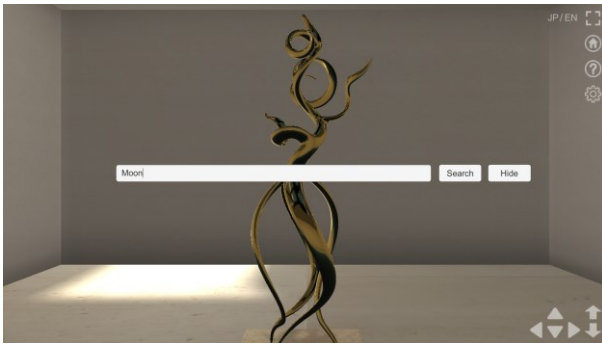
The most important thing to consider when constructing such a database is how to build it. The most straightforward way would be to use the information that is already bound to each work, mainly that given by professional curators. If you access the websites of museums around the world, you will find a lot of such text information, and you can use it. In other words, virtual museums have been using this method for a long time, except for a few experimental attempts [4]. The famous attempts such as Google Arts & Culture and Louvre Virtual Tours, for example, use the data attached to the artworks that were made by professionals who have studied the artworks individually.

We propose a new way to create this data: to provide a system that allows art enthusiasts to freely add data to the artworks. The user can view the work displayed in the virtual space as if it was the real thing, and annotate the work on the spot. By repeating this process, the exhibition system itself, including the database, will evolve. We named this approach "Growing Museum" as a concept that the museum itself grows by the hands of ordinary users. This time, we are implementing an experimental system based on this idea and conducting an experiment.

3. SYSTEM DESIGN

3.1. Base system - Keyword-based museum

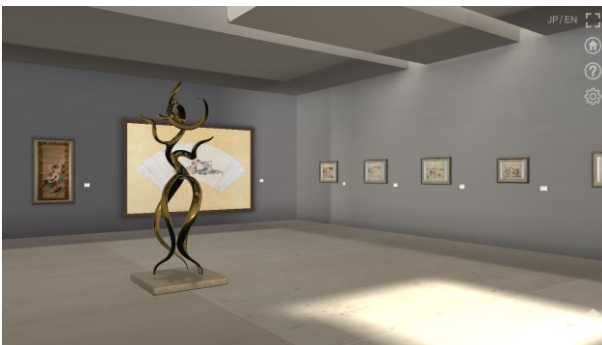
The Growing Museum is built on the keyword-based virtual museum that we developed. The museum allows users to give keywords to the system, and the system will pull in works that match the keywords and display them in a virtual space. Fig. 1 shows some examples of an exhibit. As you can see in Fig. 1-b and Fig. 1-c, the walls of the museum move according to the number of



(A) Keyword input (“Moon” in this example)



(B) Result of (A), moon-related pictures are displayed



(C) Larger room for many pictures

Fig. 1 Screenshots of keyword-based virtual museum

works retrieved according to the keywords, and the exhibition is automatically displayed in the optimal size. The user can freely walk through this space with the mouse to view the artworks.

3.2. Annotation system

Fig. 2 shows the annotation system that the user can give necessary information to a selected artwork. The keywords are ranked into 4 levels. Each level has some weight value used by the keyword search of the museum described in section 3.1. The user can also input/edit the description associated with the artwork that will be used when the user wants to see it while doing walkthrough.

3.3. Growing museum



Fig. 2 Annotation input window

With the keyword-based museum in section 3.1, the user first enters some keywords to get some artworks into the virtual space and then walks through it. During the walk-through, the annotation system in section 3.2 can be activated at any time to update the database of the artworks. As a result, the search pattern of the museum itself and the description of the artworks will change each time the museum is accessed.

4. TEST SYSTEM IMPLEMENTATION

We are implementing the system described in chapter 3 on the Unity Game Engine. As a start, we used approximately 500 woodblock prints works by Katsushika Hokusai from the Metropolitan Museum (MET)'s Open Access free data. Five hundred images and their metadata provided by the MET are downloaded using the MET's open API and are stored locally. On the other hand, the database of this system is constructed locally by reading all the original metadata stored with the images. Initially, the keywords are temporarily registered with the words in the titles provided by the MET. Therefore, when the user starts the museum and enters keywords, this will first hit the title of the work and the work will be pulled up. Then, the user is able to modify, add, or delete these keywords to register them again. This allows that particular user to iterate the process to elaborate the database of Hokusai's works. We expect this Hokusai museum becomes to reflect the user's personality after the iteration.

5. POTENTIAL OF THE SYSTEM

The more a user uses this system, the more her/his need is reflected in the exhibition system meaning the artwork database is naturally created and formed. Therefore, if this artwork database is made into a package and opened to other people, the people can enjoy experiencing the unique exhibition made by that person who could be an amateur Hokusai-lover.

Conversely, if the entire system is deployed on the internet so that multiple people can access it and rewrite

the database of artworks, multiple people can collaborate to create the exhibition.

Furthermore, if we use a virtual museum with a video generator, which we developed in the past, users can view artworks with commentaries added through the system, just like watching TV programs [5].

In this way, we aim to open up to the public the way of interpretation and categorization of artworks, which until now has still been the work of professional curators. It could provide a service that allows a wide range of amateurs to create and publish their own curating works. By taking this approach, the intention is to change the relationship between artworks, museums, and exhibitions.

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