Preserving Riau’s Malay Culture Through Virtual Environment Application

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Abstract. Riau Malay culture provides inspiration and guidance for the community. Malay culture that is based on religion provides many guidelines and advice for the community in acting. Unfortunately, the community is difficult to access Riau Malay cultural objects because of separated locations of each district in Riau Province. Additional factors, many Malay cultural objects have been damaged and lost. This research aims to develop a three-dimensional virtual environment application to facilitate community access in knowing and studying Riau’s Malay cultural objects. Starting from the initiation of the environment, making surface contours, creating environmental objects to the addition of cultural objects are the phases carried out in this study. The results of this study indicate that the application is very interesting and able to facilitate public access in knowing and preserving Riau's Malay culture.

1. Introduction
Riau Province is identic with the Malay culture. This province has the vision as the center of Malay culture in the South East Asia region. Many Malay culture identities can be found in this province such as Keris (special knife), traditional houses, songs and dances.

The Malay culture has influenced the behavior of the people. It contains guidance for people in acting and interacting with others. Furthermore, the Malay culture is inline with the religion rules. All districts in the Riau Province have the Malay cultural objects.

Unfortunately, the Malay cultural objects are still separated in each district. We have to visit different location to view the different objects. Additional factor is that some Malay cultural object has been damaged and lost. These factors may cause the condition that Riau people especially the young generation do not know the Malay culture.

To preserve the Riau Malay cultural objects, we develop the virtual environment application. This application displays the environment and the Malay cultural objects in 3D. The environment will give the user the real-like environment when using the application. User may walk around the environment and view each object in the application in different angles.

This paper has two contributions. First, it can be the data backup and repository of the Malay cultural objects. Although the real objects have been damaged, we still can view them in the virtual form.
Second, it can be used as a media to learn the Riau’s Malay cultural objects. The 3D application can attract the user to learn the Malay culture.

This paper is organized as follows: Section 2 delivers the related works in this field. Section 3 describes the research methodology and Section 4 explores the result of the research. The analysis, design and screenshot of the application are presented. Finally, the last section describes the conclusion.

1.1. Virtual Environment
Virtual Environment (VE) is a synthetic environment giving the perception that the environment and its content are not synthetic [1]. In other word, a VE is created in a certain way so that the environment, content and activities occurred are similar to the real world.

Some last researches related to the VE have focus on how the interaction between user and object can be done and the user involved can be visualized in 3D [2]. User in VE may also be visualized in virtual human called avatar [3][4].

These VE applications have been used in many aspects such as surgery training, flight simulation, automotive assembly, virtual classroom, etc. They have important role to train students before involving in the real situation [5]. Furthermore, to involve many objects and users in the VE some methods have been found such as dividing simulation workload [6] and 1P1O model [7].

1.2. Riau Malay Cultural Objects
Malay cultural objects can be manuscripts, traditional houses, traditional ceremonies, dances, and so on. Previous researches have produced methods and computer applications that can be used to search for a word contained in the Malay Arabic manuscripts using Latin letter keywords [8]. With this application the public can search for words to understand the meaning of Arabic Malay writing as a result of the search process because the search results are accompanied by translations in Latin writing.

Now, an application that can be widely accessed by its users has been built in three dimensions (3D) [9]. To keep abreast of this technology, reconstruction of a 3D model has been carried out for Riau Malay cultural objects in the form of Keris and traditional houses (see figure 1). With the 3D model, of course more information about an object can be presented so as if the object is in plain sight. However, this research has only provided a 3D model for a Malay traditional house in one of the regencies in Riau Province. For this reason, 3D modeling for other Malay traditional houses is needed.

![Figure 1. 3D Model: Keris (left), Traditional house (right)](image-url)
2. Research Method
Actually, it is a development research. We develop an application using the software engineering processes. The 3D model of traditional houses used in this research are created from the 2D images taken from different districts in the Riau Province, Indonesia.

There are some phases to be done in this research starting from initiation of the environment to analysing the user responses in using the application. The last phase, we distribute the questionnaire to the users. Based on the answers, we analyse the data to get the user response about the role of application in preserving the Riau’s Malay culture.

3. Results and Discussion
3.1. Application Analysis
The developed VE application displays the environment and objects in three dimensions. This environment is needed so that users feel as if they are facing and involved in the real environment when using the application.

Each user can walk in any direction in the application. That is, the user can explore the entire environment and pay attention to the objects contained in the application. Some static objects that adorn the application are as follows:
1. Trees
2. Grass
3. Hill and rock
4. Water, etc.

Further, the Malay cultural objects included in the application are as follows:
1. Malay traditional houses
2. The panel that can play the Malay songs, dances and customs.

In addition, the application also provides several other effects such as daylight, wind and so on. When a user deals with a traditional house, the person concerned can pay close attention to the traditional house in three dimensions. Furthermore, when the user is confronted with the selection panel provided, he can play songs, dances and cultural events in the Malay culture.

3.2. User Interaction
The interaction between user and the application can be seen in figure 2. Based on figure 2, it can be noted that the user can move in the application both in translational and rotational movements. Users can pay close attention to some traditional Riau Malay houses displayed by the application.
Then, the application can also display options on the panel provided based on the choices made by the user in the form of songs, dances, and traditional ceremonies of Riau Malay. Furthermore, based on the choices made, the application can play the video or audio desired by the user.

3.3. Input/Output
Input for the application is the state of the user in the form of location coordinates. Every user movement that is guided using the arrows on the keyboard provides input data on the user's current location in the application. The output of the application is the display of traditional houses and environments based on the position of the user. In addition, the output of the application is the video or audio display chosen by the user to be played.

![Figure 3. User interface](image)

![Figure 4. Screenshot of UI](image)

3.4. User Interface
The developed VE application displays the environment to users which includes:
1. Environmental objects, such as trees, rocks, hills, water and others. This object gives the impression to the user as if he were in real environment.
2. Objects of traditional houses. Users can see this object in detail by looking at it from several points of view.
3. Panel objects. This object provides users with a choice of songs, dances and traditional ceremonies of Malay culture while also being able to display it in the form of video or audio.

Figure 3 shows the component of user interface of the application. Further, figure 4 illustrates the screenshot of a user interface. This interface shows one of traditional houses in Riau Province. User can walk around the house to elaborate this Riau Malay cultural object.
3.5. User Response
For question that this VE can able to facilitate public access in knowing and preserving Riau's Malay culture, 92% respondents give answer of “Very Agree” and 8% respondents give "Agree" answer. This means that the three-dimensional application can be used as a media to learn the Riau’s Malay culture in the information technology era. Figure 5 shows the user's response.

![Figure 5. User response](image)

### 4. Conclusion
Virtual environment application developed in this research can be used as data backup for the Riau Malay cultural objects such as traditional houses, songs, dances and cultural events. In the 3D form, the application may attract the user to learn the Riau Malay culture and it can facilitate public access in knowing and preserving Riau's Malay culture.

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