The design and Realization of the automatic generation system of 2D animation

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Abstract: **Automatically generation of full life cycle computer aided animation is a combination of a cartoon art, artificial intelligence technology and film art research field. In 3D animation automatically generated there has been progress, this paper attempts to expand it to the field of two-dimensional animation, this paper puts forward a 2D animation auto generation technology. For the two-dimensional animation features, this paper designed a series of innovative technologies and methods, in principle realized from the whole process of animation script to the two-dimensional animation automatic conversion, and has developed a prototype system to verify the design idea. This topic has the important scientific research significance, the cultural significance and the creative industry significance. According to the characteristics of two-dimensional animation frame by frame display, this paper will automatically generating 2D animation design established in two-dimensional continuous spatial (horizontal and vertical) and one-dimensional discrete spatial (depth) of 2.5 dimensional layer space. Layer is the frame of the drawing carrier, in the two-dimensional animation of the planning and generation process plays a key role. 2.5 dimensional layer space is a layer of multiple layers, so the expression of animation elements in the 2.5 dimensional space and three-dimensional space is completely different. This makes the automatic generation of 2D animation can not fully follow the research ideas of the automatic generation of 3D animation, it is needed to design some new techniques for the characteristics of 2D animation. This is a challenge, but also has important research value.**

Keywords: **2D animation; automatic generation; software design; layer planning; knowledge storage**

I. INTRODUCTION

The birth of computer aided animation technology, not only to reduce the workload of the designers, but also shorten the cycle of animation production, however, the role of CAI still can only be reflected in part of the creative process, and not from the whole process from the creation of traditional hand drawn animation and computer aided animation is still a complex task. Automatic generation technology of two-dimensional animation, which is the combination of artificial intelligence technology and animation art, is the support of computer graphics technology, the use of artificial intelligence technology to achieve a new animation creation. Its essence is a cartoon production automation technology[1], the goal is the representation of natural language story text input computer, from the analysis of the text of the story started until the last generation animation, each step creation process without the need for manual intervention. By the computer automatically. As the founder of the art of animation, 2D animation was born has more than 100 years of history, in the process of creation experienced numerous reform, also contributed to many other art disciplines and the technical means for the interaction and fusion. Although 3D animation reflected in its exquisite degree of verisimilitude of the real world and production are often more than 2D animation, but it still can not replace two-dimensional animation, because 2D animation to the unique artistic style has its independent existence value, like western oil painting can not replace Chinese ink and wash painting as. Two is because the creation of two-dimensional animation with less technical conditions, easy to be mastered by the majority of animation enthusiasts. Without the support of professional animation software, it is very difficult for the individual to create 3D animation by hand. Automatically generated from the computer aided animation point of view, compared with the traditional two-dimensional hand drawn animation, computer aided 2D animation in the production process, there has been a great progress, but animation designers of art is still the exquisite degree of animation works has a great influence, amateur still can be made with exquisite degree lower 2D animation. In addition, the computer aided two-dimensional animation is only in the part of the creative process was simplified, most of the creative process is still time-consuming and laborious work. In this paper, the research content is to design a 2D animation qualitative description language adl2, the language by formal syntax to ensure that the computer can be analyzed directly, and has a readable and easy to write, the user can directly write a screenplay of the story scene, the plot description, input computer generated 2D animation[2].

II. ANALYSIS OF THE KEY TECHNOLOGIES INVOLVED IN THE SYSTEM

With the rapid development of computer aided animation technology, there is a kind of choice for animation art, that is, the animation can be divided into two main groups: 2D and 3D animation. As mentioned earlier, two-dimensional animation automatic generation is the whole process of computer aided animation automatic generation technology in the field of two-dimensional animation of expansion, but automatically generating 2D animation design can not completely follow the idea of automatic generation of 3D animation, which is due to the two-dimensional animation and three-dimensional animation, there are many different, mainly reflected in three aspects: first, in

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the 3D animation, all the characters and object model are created with 3D graphics tool. When the model is created, the image of any angle is formed. Need to show the character of any one side of the animation, just use the program will be rotated to a point of view can be presented to the audience. But in 2D animation, the character's image can only be a projection image in a certain direction. In each direction, we need to re create the characters in the direction of the projection screen. The characteristic caused by the difficulty in building character material base, on the other hand the two-dimensional animation are not continuous rotary motion representation, and make many 3D animation bank effective technology can not be transplanted to the two-dimensional animation to, such as the movement of the camera panning. Thus 2D animation requires a completely different representation of the technique. Second, in the three-dimensional animation, most of the action can be used to control the time and space changes in the animation program language, that is, the three-dimensional coordinates of the control position changes and the plot of the frame sequence control time. Therefore, the computer is through the control of each person and the object of the movement to achieve the interpretation of the plot. In 2D animation in the computer to control the object is only the different picture frame, through different times play different picture to display the story plot, and each picture character computer is cannot control. So it needs a new way to control the program[3]. Third, three dimensional animation creation automation and semi automation research has a long history, a variety of creative tools and animation material has a wealth of accumulation. Especially the appearance of motion capture technology makes it easy to create 3D animation characters. While the two-dimensional animation of the auxiliary tools are very few, basically only through a single program language (Language scripting) control of the play. Some of the game engine can achieve limited two-dimensional animation, but the performance is limited, and functional expansion is not strong.

A. The main ideas of the automatic generation technology of 2D animation

Automatically generating 2D animation design to establish in the whole process of computer aided animation automatic generation technology based on the theory, and draws some important technical ideas, including hierarchical framework of language and script analysis, quantitative strategic planning. But from the above analysis of the two-dimensional animation and 3D animation of comparison can be seen both in many aspects are different, so the two-dimensional animation automatically generated most of the work process, should be the new idea according to the characteristics of two-dimensional animation, which also makes the two-dimensional animation automatically generated design must solve some new problems. Due to different 2D animation and 3D animation itself, making 2D animation design automatically generated can not completely follow the automatic generation of 3D animation design should include new technology according to the characteristics of two-dimensional animation, also must solve some previous studies have not encountered problems. The design of the automatic generation of 2D animation is based on the whole process of the computer aided automatic generation technology, and combined with the characteristics of two-dimensional animation, adding a lot of new design ideas. Automatically generating 2D animation design process from software engineering practice commonly used in the stepwise refinement principle, the animation of the whole process can be briefly divided into as shown in Figure 1 shows the six stages[4].

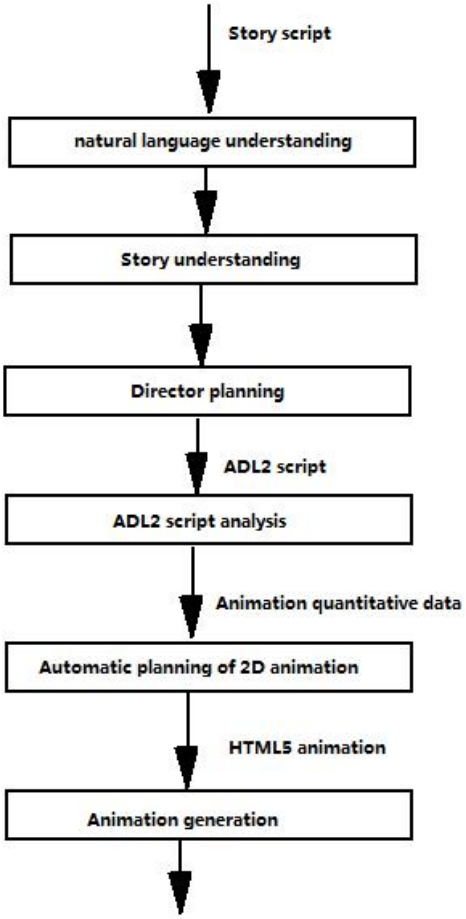

Fig. 1 Complete flow of 2D animation automatic generation system

B. The design of qualitative description language of two-dimensional animation

After the ADL2 script input system, the script analysis module will carry on the grammar analysis and the expression form transformation to the script. According to adl2 language syntax, script analysis module is used to extract the script in all the key information, analysis which contains the instruction

meaning and then said to contain different information analysis table, including role analysis, background analysis and action analysis table and camera analysis table and subsequent modules are corresponding analysis table as input. Role description: the role is not to belong to the background, the story of the characters or objects, its activities affect the overall story of the development of the story. Role description contains a series of abstract descriptions of the character's appearance and attributes. Plot: the plot is the basic element of the story, describes the role of a macro action. Scenario description is a collection of macro actions that occur in a scene and all the roles. A series of features, including the name of the role, the role of the character, category, style, gender, age, body, body parts description, etc.. Among them, the name attribute for in animation process identifies an animated character; on macro role characteristics are described, including the attribute of human or not, type, style, sex, age, figure, etc., known as global feature attributes for from the knowledge base search with the required characters or non character element representation; description of a series of sub attributes for guidance system of character or element of processing, modification, called the processing properties. Means that the character is not all attributes must be specified: name, human or not, type is a necessary attribute that must be prescribed; style, sex, age, figure and description of attributes is non essential attributes can be empty by default system.

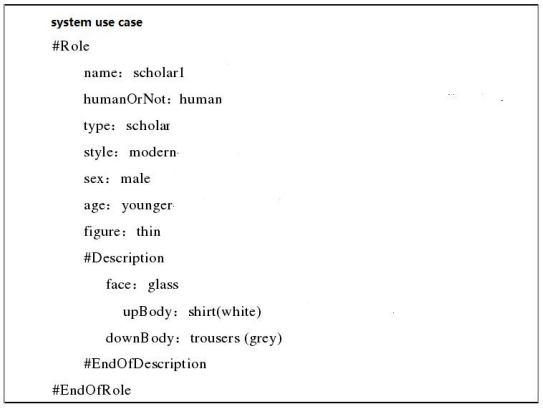

Fig. 2 System use case diagram

C. System role planning

Role planning is based on the role of the ADL2 script description, the role of the animation for the appearance of the planning. A brief process planning is to read the script analysis get the role analysis table, according to the overall characteristics of the records in a table attribute from the knowledge base search a character or a component of non characters representing the, according to the processing properties of character or element processing, modifying to obtain final angular color appearance. The same character or element can be represented by different processes. Frame to frame sequence, is a continuously varying representation of the two-dimensional animation role in the plot, so in 2D animation does not exist can manipulate the role, which and 3D animation in the three-dimensional model is a fundamental difference between the. Therefore, in the knowledge base of the automatic generation of 2D animation, no matter the characters or the characters of the characters are the documents that describe the appearance of the characters, but not a specific picture. The process of planning the appearance of the role is to document the information processing, the formation of a record of the role of the appearance of the role of the property table. When the plot of a character is represented as a sequence of frames, the role attribute list is used as the basis for processing the sequence of frames. In the system knowledge base, the characters are divided into two categories according to the sequence of frames.

III. System design and Implementation

Two-dimensional animation animation elements should be distributed in a layer of, two-dimensional coordinates of the provisions of the animation elements in the layer plane position, and layer depth property provisions of the animation element layer, namely animation elements on the stage of the depth order in the vertical. Animation elements are divided into three categories of background, props and characters, in the process of automatic generation of two-dimensional animation, based on the layout of the layer planning is responsible for planning the layout of all animation elements of the layout. According to the different planning functions, it is divided into three processes, the background, the depth of the layer and the key location planning. The design process of the system is as follows: first of all, the character database is composed of the skeleton structure and the body element. People in the library is the preservation of some of the structure after the completion of the storage of the character information, the main character of the record file. In the role of the planning section introduced, the character system according to the role that the character library search to get a character and the log file were role specification specifies the information processing that can be expressed in different roles; picture library design: character, in the selected action program must binding component images in order to achieve frame of a sequence of play, so to according to action role will be the conversion element for the specific image file; for non characters[5]. Each group of a sequence of frames is expressed by a set of complete picture. Macro action database: the macro action of the characters is usually used to describe the character of a macro action. But in the process of frame sequence, the computer can not know in order to complete a macro action, the role of the characters of the body posture changes. Need to be decomposed into a series of macro action micro action. Mobile class action jumpto (jumping to a certain location, for example, the character to jump to another site when, the gesture to experience several gradient of the microscopic state, including squatting jump, glide, feet landing; micro motion library: characters of micro

motion eventually to body is now a sequence of frames of a set of continuous change, skeletal action program calls the body element pictures changed its stance of a playback process. A skeletal action program to bind different components of the picture, you can show the different roles of the action. The automatic generation of 2D animation is based on knowledge, and the richness of knowledge in the knowledge base plays a decisive role in the production of animation. This chapter introduces the design of 2D animation knowledge base. In each section, it introduces the role of library, the action library, the background database, the design of the cycle animation library and the knowledge information stored in the database.

IV. Conclusion

From the perspective of the development of history, the birth of two-dimensional animation more than one hundred years has undergone a series of major changes. Traditional 2D animation for the audience to open up a more exciting perspective, but from the perspective of the creative process, hand drawn 2D animation is a very tedious work. Computer aided 2D animation appear to greatly simplify the two-dimensional animation creation process, and the creation of two-dimensional animation has become more and more popular, but computer aided 2D animation creation only on the part of the process simplified and cannot be completely separated from the artificial creation. In order to simplify the creation of two-dimensional animation, this paper presents the automatic generation of two-dimensional animation technology, and the technical route for in-depth research and exploration.

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