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Construction of Computer Aided Animation Appreciation System

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Abstract

By using computer multimedia and database technology to build the animation appreciation auxiliary system (AACAS), we classify the classical animation works according to types, categorize the appreciation main points and define the attribute, and input the corresponding information into the relevant database in real time so as to realize the logical connection of massive animation resources, and make appreciation information be able to realize free storage, rapid retrieval and easy for calling. In addition, the horizontal comparison of multiple works and the vertical comparison of the same work can be realized. This will significantly change the past inefficient situation of animation appreciation under a single thread, greatly improve the timeliness of the appreciation.

Keywords

Animation Appreciation, Multimedia, System, Database, Information

1. Introduction

The people and teaching staff who professionally learn animation or engage in animation practice, need to appreciate a large number of animation works, thus to accumulate professional accomplishments, and constantly improve the professional abilities. However, in the face of massive animation works, the connoisseurs often feel unable to start: unable to immediately find the works they want, more difficult to instantly cut into a particular paragraph of a works. Even if the target works or paragraphs are found, due to the limitation of appreciation mode, the timeliness of appreciation cannot be guaranteed.

The relatively simple appreciation mode is the single-thread appreciation mode, that is, the appreciation of each works, one paragraph by one, cannot

achieve multilinear appreciation, that is, the comparative appreciation between multiple works or between different paragraphs of the same works. In addition, in the process of appreciation, even if the experience record has been made, it is an isolated behavior, the natural matching association between appreciation information and related content cannot be achieved. To change this situation, it is necessary to move to multithreaded appreciation mode. This model is based on directed graph theory of animation database management method, it is possible to closely link the relationship between the similarity of appreciation paragraphs and graph theory knowledge, combine the minimum part of the tree theory to provide a complex similarity relationship diagram for appreciation paragraphs, and simplify it as an animation database management technology of "multithreaded" structure tree [1]. The experiment shows that this management method has great flexibility and timeliness, and has important theoretical significance and application value for the actual needs of animation resource database such as browsing, retrieval, summary and so on (**Figure 1**).

In the single-thread appreciation mode, the appreciation behavior can only be carried out for one animation at a time, and the animation content can only be browsed based on a single linear jump mode. The possible appreciation nodes are limited in the current work, and are very limited, as shown in (1, a), (1, b), (1, c) in **Figure 1** moreover, the nodes cannot synchronously advance and retreat at the same time point, so that the content comparison cannot be carried out. In the multi-thread appreciation mode, the appreciation behavior can be simultaneously carried out for a plurality of animation works, and a plurality of appreciation nodes can be obtained at the same time, as shown in (1, a), (2, b), (3, c) in **Figure 1**, and the nodes can be randomly matched and synchronously changed as required, so that the comparison of contents of different works and different time periods can be realized. This will undoubtedly greatly enhance the timeliness of appreciation.

2. Constructing an Appreciation Retrieval Database

Animation appreciation retrieval refers to the process of finding the information or materials you need from the collection of animation appreciation information. It can be the names of animated works, directors, appreciation attribute, file format and so on as an index [2].

2.1. Appreciation Retrieval

2.1.1. Types of Works

Modern animation, whether it is the form of animation, animation implementation process, bearing function, much more than before, much more complex, is not only in the traditional sense of film and television animation. In order to distinguish from traditional animation cognition, some people call modern animation pan animation (**Table 1**). In fact, even film and television type of animation, due to the computerization of the means of production, production is also increasing, the type is becoming more diversified (**Table 2**). They are stored in

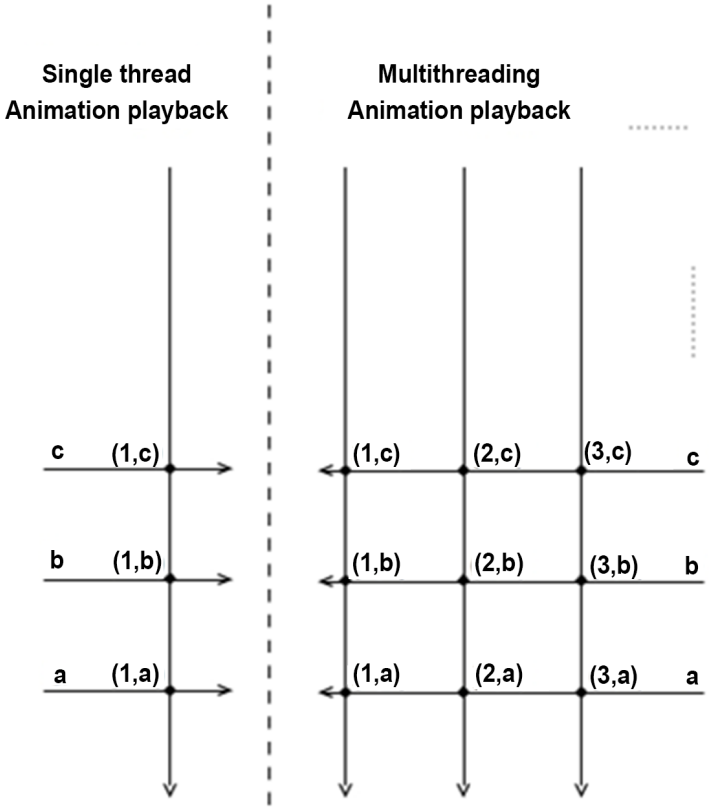

Figure 1. Comparison of two modes of animation appreciation.

Table 1. Classification of pan-animation.

Film and television animation	Popular science animation	Demonstration animation	Decoration animation	Programming animation	Dynamic illustration
Scene classification	Mysteries of the universe	Demonstration of professional principles	Interior decoration	Game	Web page animation
Emotional classification	Geographic exploration	Demonstration of product structure	Building decoration	Interactive display	Book motion picture
Style classification	Chemical universe	Operational process demonstration	Stage decoration	Sound visualization	Store map
…	…	…	…	…	…

Table 2. Classification of cartoons.

Scene	Emotional style	Style	Age	Nationality	director/Editor
War film	Comedy	Action	Children	American	Disney
Disaster film	Love	Music	Family	Chinese	Hayao Miyazaki
Western film	Thriller	Document	Adult	French	Spielberg
…	…	…	…	…	…

different media, paths, or files. All in all, animation types are diverse, surprising in number, and growing [3]. In the face of complex and disorderly, good and bad intermingled animation works, how should the connoisseur accurately and quickly obtain their desired works? The answer is to define the type of animation works, establish a relational database of the corresponding information, and search through keywords.

2.1.2. Appreciation Interval Attribute

After obtaining the target animation works, the animation appreciation interval should be divided and the interval attribute should be defined. The definition of that animation appreciation interval include the beginning and end of the appreciation paragraph. This starting and ending point, once defined, means that the animation paragraphs it intercepts maintain the same appreciation goal, that is, the attribute definition of the current appreciation interval has been completed. Assume that an appreciation node starting point is t1, the end point is t2, from t2 to t1 is an appreciation interval. The interval must be identified by a keyword, such as "large close-up". Professional animation appreciation is to divide the appreciation intervals for animation works and to specify the corresponding attribute. Appreciation attribute can be expressed by the expression p (tn, tn-1). In it tn = attribute starting point, tn-1 = attribute ending point, p = appreciation attribute. The expression "large close-up (17.1, 21.1)" means that the seconds from 17.1 to 21.1 in the animation work is a large close-up.

The appreciation interval attribute is a set of descriptions about the animation appreciation points, the elements of which are unique. The description of the elements may be based on the narrative language and rules specific to the animation. In animation language, pictures and sounds are words, and its grammar is montage. A montage of many pictures and uses forms the animation language [4].

Various combinations of appreciation interval attribute collection elements are carried out to form indexes of various appreciation requirements, relevant appreciation resources can be immediately organized, and corresponding appreciation work can be carried out. Therefore, it is of great significance to construct a relational database based on the attribute of animation appreciation interval.

2.2. The Definition of Appreciation Database

The index and the corresponding associated content of the animation appreciation retrieval naturally form a relational database. The animation appreciation relational database is a collection of animation appreciation tables, each table having a unique name, and a row in the table represents the relationship between a series of appreciation information. Mathematically, this relationship can be defined as a subset of Cartesian products over a series of fields, and tables are also subsets of Cartesian products over a series of fields. The difference between a relationship and a table is that the attribute in the table are given names, while

the relationship is not, and the most important difference is that in practice, the table allows duplicate rows (the table is actually a multiset concept), and in the relationship does not allow duplicate tuples (because the relationship is a collection) [5].

The appreciation behavior of AACAS system is based on the appreciation relational database. These databases are independent of each other and store various kinds of information required for appreciation; at the same time, relate to each other and communicate with each other through a key field.

2.2.1. Information Base of Animation Type

The database stores type definition information for animation works. Each type corresponds to a number and a corresponding meaning description. The number is unique, that is, the number and the type are strictly one-to-one correspondence without repetition; the number is extensible, and the user can add records according to the actual situation, and is not limited to the information provided by the system. The key field of the database is the number, which is the bridge to communicate and supplement other databases (**Table 3**).

The field AniTypeID occupies a width of 4 bytes, with the first 2 bytes corresponding to a large class and the last 2 bytes corresponding to a small class. For example, each column in table 1 corresponds to a large class, and each row in each column corresponds to a small class under the large class to which it belongs. The field AniTypeNM, which takes up 20 bytes in width, identifies some type for a serial number for easy to read while appreciating output. But not as a basis for system appreciation information association (**Table 4**).

2.2.2. Basic Information Base of Animation Works

The database stores basic information about the animation work. Each animation works corresponding to a number and corresponding meaning. Number is unique, that is, number and work strictly one-to-one correspondence, there is no repetition; the number has expandability, and the user can add records according to the actual situation. Of course, records can also be deleted (**Table 5**).

The key field AniId, which stores the work number information, is a bridge to communicate and supplement other databases. The first four bytes of the number correspond to the work type number, and the last six bytes are the actual work serial number information. This arrangement is to reduce the information capacity of a single database, but in the integrated output can be accurately associated, supplement the relevant information (**Table 6**).

Table 3. Animation type information base.

Field name	Type	Width	Meaning
AniTypeID	Character	4	Animated work type number.
AniTypeNM	Character	20	Animation work type name.
…	…	…	…

Table 4. Examples of animation type information base.

AniTypeID	AnitypeNM
0000	Scene class movie
0001	Comedy class movie
…	…
0100	Universe mysteries movie
0101	Geography exploration movie
…	…

Table 5. Basic information base of animation works.

Field name	Type	Width	Meaning
AniID	Character	10	Animated work number.
AniFile	Character	50	Animation name, with extension, path.
AniCntry	Character	10	Country
AniFctry	Character	30	Manufacturer
AniYMD	Date	8	Time
AniDrctr	Character	10	Director
AniEdtr	Character	10	Writer

Table 6. Examples of basic database of animation works.

AniID	AniFile	AniCntry	AniFctry	…
00000000000	G:\Movie\American\Snow white.avi	American	Disney	…
00000000001	G:\Movie\China\Catch turtles in a jar.mpg	China	Film Studio, Changchun	…
…	…	…	…	…

2.2.3. Information Base of Appreciation Interval Attribute Definition

On the surface, the database structure is very simple, only two fields, the number of records is not much, generally not more than 100. In fact, the database is the embodiment of the value of AACAS system, because it stores the animation appreciation points information and reflects the professional nature of the appreciation behavior (Table 7).

Field TmintervalID stores work appreciation interval attribute number information, and field TmintervalNM stores work appreciation interval attribute name information. Interval attribute number, name is unique, are defined according to the animation language syntax, vocabulary (Table 8).

2.2.4. Information Base of Appreciation Interval Definition

The database stores animation appreciation interval division information. Connoisseurs watch animation, while mining appreciation points, when determining a point, need to compare the appreciation interval attribute definition table, specify the interval attribute and appreciation time start and end point. The

Table 7. Information base of appreciation interval attribute definition.

Field name	Type	Width	Meaning
TmintervalID	Character	2	Time interval coding.
TmintervalNM	Character	10	Time interval attribute name.

Table 8. Examples of appreciation interval attribute definition.

TmintervalID	TmintervalNM
00	Titles
01	Start
02	Development
…	…
06	Panorama
07	Medium shot
…	…
16	Push
17	Pull
…	…
26	Fade-in fade-out
27	Jump cutting
…	…
36	Sound montage
37	Parallel montage
…	…

database does not have new fields, are related to the database definition results of comparison, correlation application (Table 9).

The database record input is very large, if rely on manual entry, it is relatively difficult. This is to control with the help of the program to get intelligent assistance (Table 10).

2.2.5. Information Base of Appreciation Communication

The database is responsible for storing animation appreciation results, and storing appreciation and evaluation information of works in the process of animation appreciation, and has a large amount of information. Representative, reference value appreciation information may be entered at the initial stage, or subsequent appreciation experiences of the connoisseur may be recorded (Table 11).

Because the same works has multiple opportunities to be appreciated, the same appreciator can appreciate multiple works, so, in the database whether works number (AniID) or appreciator number (AnireaderID), the corresponding values are not unique. But the records corresponding to the comprehensive information of all fields are still unique (Table 12).

Table 9. Information base of appreciation interval definition.

Field name	Type	Width	Meaning
AniID	Character	30	Animated work number.
TmintervalID01T	Character	13	Time interval 01 corresponds to the time start and end point.
TmintervalID02T	Character	13	Time interval 02 corresponds to the time start and end point.
TmintervalID03T	Character	13	Time interval 03 corresponds to the time start and end point.
…	…	…	…

Table 10. Examples of appreciation interval definition.

AniID	TmintervalID01T	TmintervalID02T	…
0000000	00; 00; 05; 00 - 00; 00; 08; 00	00; 00; 08; 00 - 00; 00; 1208; 00	…
…	…	…	…

Table11. Information base of appreciation communication.

Field name	Type	Width	Meaning
AniID	Character	10	Animated work number.
AnireaderID	Character	10	Connoisseur number, unique.
AnireaderNM	Character	10	Connoisseur number.
TmintervalID	Character	10	Time interval number.
TmintervalNote	Memo	300	Current time interval appreciation notes.
…	…	…	…

Table 12. Examples of appreciation and communication information base.

AniID	AnireaderID	AnireaderNM	TmintervalIDT	TmintervalNote	…
0000000	000000000	Zhang Shan	1208.0 - 3608.0	Memo	…
…	…	…	…	…	…

3. Frame Structure and Module Coupling

3.1. Framework Structure

The AACAS framework is generally shown in **Figure 2** and is essentially consistent with the actual workflow, as the accumulation of elements of the collection of entities composed of appreciation attribute may be continually refined as the appreciation progresses.

System flat module main module for work entry, appreciation agreement, comparative appreciation, code maintenance. Among them, the three modules of work input, appreciation agreement and code maintenance are responsible for completing the input of appreciation information, while the comparison appreciation module is responsible for completing the output of appreciation information (**Figure 3**).

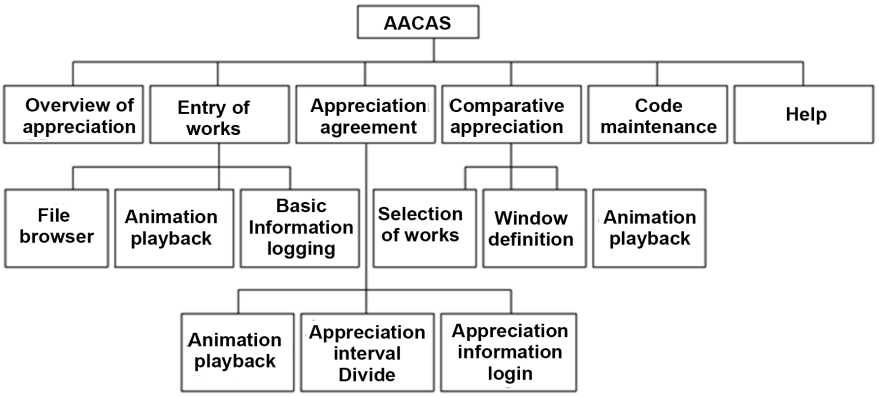

Figure 2. AACAS frame diagram.

Figure 3. AACAS main interface.

3.2. Module Coupling

There is content coupling between the four main modules. Where in the coding maintenance module provides coding preparation necessary for initial appreciation information input and output, and the results of coding maintenance need to be accessed frequently during appreciation information input and output. The coupling between modules actually highlights the relevance between related databases. But this coupling does not interfere with the cohesion of the individual modules themselves. Because each module in the case of other modules stop working, still can work normally, that is, the original design function can also be realized normally [6].

4. Input Design

AACAS input design is about the input mode, content, flow and other aspects of appreciation information design, is the initial link of system design, is also the premise of the system to achieve good output.

4.1. Input Design

The input design of AACAS is about the design of input method, content, process of appreciation information. It is the starting point of system design, and also the prerequisite for the system to achieve good output.

4.1.1. Physical Storage

For that original obtain appreciation work, the actual storage medium transfer reading and write, namely the so-called physical storage, needs to be completed. In view of the current appreciation of animation works mainly come from CD, U disk or network download, so transfer write can take two ways: 1) Program control, that is, write the relevant files of the read and write program, automatically complete the animation works collection work. This method is suitable for the original storage of the target work is CD, U disk or mobile hard disk, etc. 2) Manual operation now a large number of animation works are provided in the relevant network platform, at this time can be directly downloaded and stored to the target path by clicking on the relevant link address.

Problems to be considered in physical storage: 1) Orderly control although the subsequent appreciation and retrieval is realized through database technology, the initial read-write storage should also be orderly followed. Because of the large amount of animation file data, it is not possible for all files to be stored on the same hard disk or optical disk, and they must be stored separately on multiple hard disks or optical disks. At this time the establishment of the folder is very important, folder name and file name naming must be carefully considered, from beginning to end should follow the principle of "easy to remember". Animation works reasonable storage, one can avoid a large number of data redundancy, save computer resources; Second, it can be quickly tracked by the system, which lays a good foundation for the output design. 2) Storage security because the original file need to configure large-capacity storage media, now usually use array disk. Array disk products of various capacity levels are available on the market and can be selected as needed, but data storage security must be fully understood, including power supply, data communication, abnormal repair, etc. [7].

4.1.2. Logical Storage

That is, the animation works and appreciation related information for attribute definition, and then the definition results as a relational database fields, records, such as animation file path, file name, extension, appreciation paragraph (time starting point, end point agreement), paragraph attribute and other information stored in the corresponding database, then can be based on this information tracking, rendering the original animation file, appreciation paragraph [8].

4.2. Input Content

Referring to **Figure 2**, it can be seen that the content input of AACAS mainly includes four aspects:

4.2.1. The Basic Information of a Works

Such as a storage path, file name, extension name, etc. The extension defines the storage format of animation works, such as mpg, dat, VOB, avi, mov, RM, FLC, swf, w3d, gif, exe, etc. [9].

4.2.2. The Coding Information of Appreciation Interval

That is, the direction of appreciation is agreed, and the appreciation information to be obtained is classified and defined.

4.2.3. The Division Information of Appreciation Interval

That is, the appreciation interval attribute definition result is compared with the appreciation interval attribute definition result, and the appreciation interval division record is carried out on the currently appreciated animation works.

4.2.4. Appreciation Communication Information

It is convenient to carry out word expression and storage in that appreciation process, so as to be used as a reference for comparison appreciation and output and presentation in the follow-up.

4.3. Basic Process

The basic logic input flow of AACAS is: 1) prepare the coding definition and input of appreciation object and information; 2) obtain appreciation resources (animation), input the basic information of animation works; 3) in the process of presentation compare the work results of 1) to divide appreciation interval and the corresponding interval input appreciation notes. In order to ensure the smooth flow of all the input processes, a large number of control links are embedded (**Figure 4**, **Figure 5**).

5. Output Design

5.1. Output Mode

AACAS output can be designed as display output, print output, network output and so on, but in practical application mainly display output.

5.1.1. Display Output

In order to realize multi-threaded comparative appreciation, it is necessary to design multi-window display output. The number of windows depends on the computer system memory conditions. Because more windows consume more memory. For example, it is now designed to display [10] in up to six windows at the same time. In order to facilitate the comparison of appreciation, there is also a need to design a variety of window selection control and animation content rendering control (**Figure 6**).

5.1.2. Printing Output

In order to be convenient to remember and communicate the appreciation results, it is sometimes possible to print the output for various appreciation information in text form.

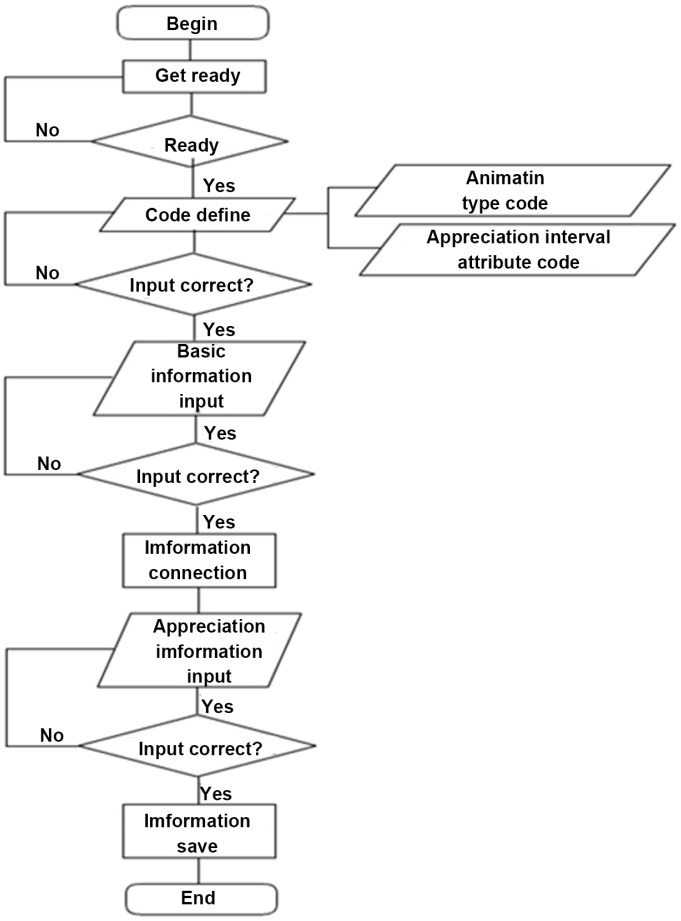

Figure 4. AACAS input flow diagram.

Figure 5. The UI screenshot of works input module.

Figure 6. The UI screenshot of output module in comparison appreciation.

5.1.3. Network Output

If need to apply to distance learning, the design of network output is needed.

5.1.4. Output Hardware

If possible, the projection system with larger size and resolution can be configured, and it may be necessary to configure the multi-screen to meet the demand of multi-screen display output in comparison appreciation.

5.2. Output Content

The output of AACAS is mainly a variety of appreciation information recorded in the process of appreciation. Before the formal output, it is necessary to collate the results of the code maintenance, perform the correlation of the related database, and finally present on the various display media in a complete, readable content (rather than an abstract code).

5.3. Basic Process

The basic logical output process of AACAS is: 1) window preparation, to appoint the number windows; 2) Output information, to choose the animation works needed to be appreciated output, to read the code maintenance, works entry, appreciation interval definition, appreciation interval classification, and other information database related records, and collation, correlation, integration, to form a output content collection which can be readable; 3) the control o f connoisseurship performance, to determine the presentation method based on the format of the works and implement various controls (such as play, pause, etc.) in the rendering process (Figure 7).

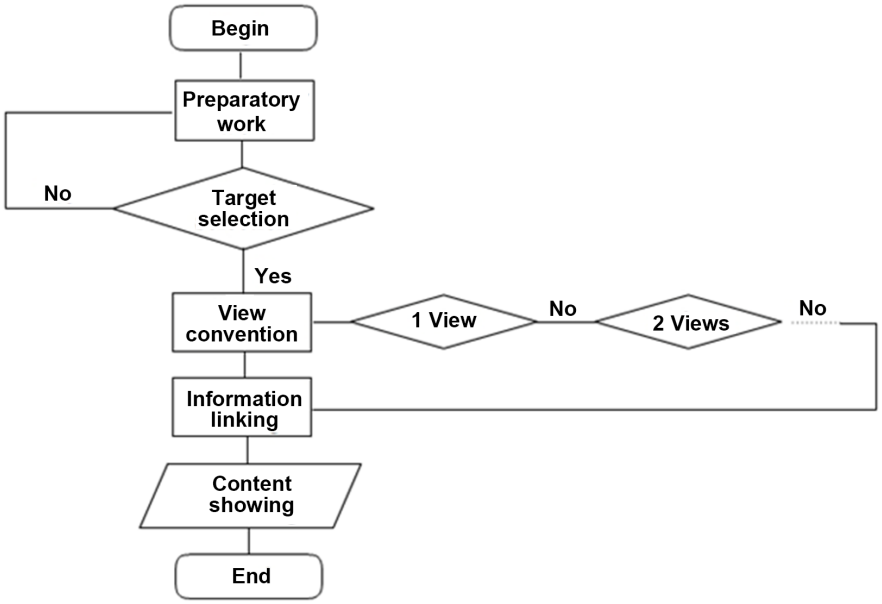

Figure 7. AACAS input process diagram.

6. Procedural Control

AACAS program control is to ensure the effective implementation of appreciation work. From its control object can be divided into appreciation information library corresponding access documents and corresponding readable output elements. From the functional division, roughly as follows:

6.1. Safety Security

Comprises two aspects of hardware and software. The former refers primarily to the ready state of the target storage medium. Both the input of appreciation information and the output of appreciation information should be established in the normal working state of the relevant storage medium. The latter mainly refers to the information input of authentication and data type, format, scope and other aspects of the specification verification.

6.2. Intelligent Assistance

AACAS is built for ease to work, and this sense of pursuit will run as consistently as possible. Appreciation of large amount of information, complex structure, need to write a large number of programs, to achieve intelligent assistance, will effectively reduce the difficulty of information entry work. For example, when the appreciation interval is divided, the time point value of the current animation work can be obtained in real time by a program, and the value is automatically inserted into a corresponding access table as a time starting point or an end point of the appreciation interval when appropriate. As another example, the appreciation information attributes are randomly combined by a program to define various indexes, thereby realizing fast and complex retrieval of appreciation information [11].

6.3. Information Sorting

AACAS information entry is out of order, in order to ensure the readability, need to write a special program to realize the intelligent arrangement of records (such as sorting, summary, etc.); When an invalid data entry occurs, it can be cleaned up by rendering.

6.4. Association and Fusion

The coupling between AACAS modules is actually obtained by various association fusion processes of the corresponding databases.

6.5. Interactive Control

AACAS finally realizes various functions through various interactive operations of software interface. These UI interactions rely entirely on background program control [12]. Because the UI is based on video, games as the main media, including sound, images, text, a combination of a variety of media applications, sound UI interaction here, in fact, the program of multimedia interaction control

7. Conclusion

Based on the database and multimedia technology building animation appreciation computer aided system AACAS, we accurately classify the classical animation works according to types, categorize the appreciation main points and define the attribute, and input the corresponding information into the relevant database in real time so as to realize the logical connection of massive animation resources, and make appreciation information be able to realize free storage, rapid retrieval and easy for calling. In addition, the horizontal comparison of multiple works and the vertical comparison of the same work can be realized. This will significantly change the past inefficient situation of animation appreciation under a single thread, greatly improve the timeliness of appreciation. The experimental results show that the system has considerable popularization and application value.

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