A Study on Role Behaviors in Virtual Environment

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ABSTRACT: With the constant development of the study on intelligent virtual environment, it has become a hot research topic of the current virtual environment field that researches and analyses on initiative perception of role behaviors in virtual environment are carried out through computer technology. In this paper, the author classifies features of role behaviors in virtual environment through SOM algorithm and trains the computer to carry out automatic behavior identification so as to establish a role behaviors cognition model in virtual environment based on SOM algorithm, providing a new method and a reference for the automatic identification of role behaviors in virtual environment.

Keywords: SOM algorithm; virtual role; automatic identification; behavioral cognition

1 INTRODUCTION

Intelligent application of virtual roles in virtual environment is an important field of the current study and the study on virtual role behaviors in virtual environment is an important one. Transforming from advanced mathematical algorithm to executable codes, big data has accelerated the pace of human development. It has become a hot research topic of the current virtual environment field that researches and analyses on initiative perception of role behaviors in virtual environment are carried out through computer technology. The author carries out a comprehensive analysis on data features by focusing on behavioral data features, namely attribute, information, relationship, etc., and studies virtual role behaviors by mining the existing virtual role features [1]. Based on the intelligent algorithm of data mining, the author studies the relationship between behaviors and influencing factors by constructing a machine learning model of role behaviors identification in virtual environment, aiming at obtaining a model with better robustness and high precision [2].

2 MODEL CONSTRUCTION

2.1 Research method

The model can be constructed with the help of behavioral model, which is a learning-based model that fully applies artificial intelligence strategies to role behavior analyses in virtual environment. Typical learning-based behavioral patterns, from the perspective of studies at the present stage, can be divided in accordance with the principle, examples and neural network.

The model based on rules cannot be processed in line with original rules under the circumstance of a certain condition or a conflict. At this time, a specific solving process is needed for the problem. Therefore, new conditions and the final solution constitute new rules, which are then added in the existing rule base by the system. The process based on learning is over. However, an accurate trigger state of the matching model is needed for this method. The model cannot be used flexibly if there is noise interference. Besides, the capacity of the rule base becomes excessively large once there are complicated problems. Not all rules can be added in the base.

Features of the model based on examples are: rules and methods of learning are simple; the specific learning process of an individual behavioral model reappears vividly. This model is now successfully used in many fields such as memory identification, classification and learning. Reasonable and proper
matching and exhibition is the kernel of examples of this type.

The mechanism of the model based on neural network is to simulate human brains to carry out work. The learning process is carried out on the premise that the network frame structure and the response function of neuron are determined. With the help of some operational rules, the initial weight value of network links is updated through values output by the system model after the completion of samples input. At the present stage, the strategy of neural network plays a key role in numerous fields like machine learning, public security, etc. It is also a focus of studies on role behavioral model in future. Advantages of the neural network technology include excellent self-learning ability, associated storage, rapid positioning of optimal solution, etc. A large number of various image templates and corresponding final identifications should be first input into the artificial neural network in order to achieve the goal of identifying images. The neural network can then initiate the self-learning process, identify similar images gradually, and feedback and store image information so as to improve the efficiency of the subsequent matching and find the most suitable matching image.

Another model that can be applied in the study of virtual roles is the model based on computer animation. This strategy is only suitable for conditions that are relatively simple, which fails to provide satisfactory descriptions on complicated behavioral processes. Besides, this model brings huge stress for staffs of animation. It requires the strategy of finite-state machine to deal with virtual roles of definite states and behavior acts. Normally, it is not easy to create models for virtual targets of random states and behavior acts. But the strategy of scenario planning can be used to increase the artificial intelligence degree of virtual targets. The modeling strategy can be achieved according to the search tree. Therefore, whether the efficiency of the search tree can be improved or not has become a key problem of scenario-based virtual targets. The strategy of studying simulated virtual targets of the natural ecosystem is a strategy of artificial life. The kernel of this method is the whole process of continuous reproduction, evolution and mutation of natural life. This method is relatively complicated in terms of creating behavioral models.

It is not hard to find from the introduction of the above research method that a virtual target can be searched out and achieved through the identification of its virtual environment. It covers behavioral planning of the virtual target and the corresponding behavioral screening process, which not only reduces the burden of animation staffs but also helps the automatic realization of vivid behavioral animations. The process of conducting thinking forms of human brain with the help of computer includes reasoning, planning, thinking, etc. Therefore, the intelligent network algorithm can be used to construct the model of identification behavior of virtual targets.

2.2 Model construction

Cell-correlated multi-connection network group is also called kohonen network. This algorithm is proposed by TeuvoKohonen in the 1980s. This network can be organized as a group, which is featured by non-supervision, self-feedback and self-ordering. The mapping of each node is an equivalent many-to-many array, which is similar to cranial nerve. The labor division is featured by similar main classes while different subclasses. With the feature of being anisotropic from external stimulus, the network group is able to cluster itself through self-identification and classification. The export is also featured by polymorphism [3]. The reaction mechanism is shown in Figure 1:

Network kohonen carries out cognition and transformation through the link mode of heterogeneous space. The kernel is that a cell group is obtained through the generalization of network cells. That is to say, network kohonen forms its own frame when the characteristic parameter space is formed, which is also the architecture form of characteristic parameters. Through their own cognition, cells are connected to form a topological structure, where cells are mapped with each other. The strong neural basis will be renewed in self-renewal and nerves around the neural basis will be renewed in a certain way as well. There will be a large pattern move at the preliminary stage of

![Figure 1. Reaction mechanism of the network.](image-url)
self-cognition. Fuzzy sequencing of link parameters can be carried out through this algorithm. A single basis that is not evolved requires only small adjustment when all cells are mature [4].

The algorithm flow can be roughly described as follows: link parameters will be ordered in line with the above-mentioned algorithm, which means that the base group has the feature of input matrix on flexible grid, namely mutual interference. Transformation function adjusts the kernel of the base group through transformation of special coordinates in the grid. Normally, the influence of surrounding cells decreases progressively with the increase of the radius of the base group. A good clustering effect can be achieved after the training of the algorithm. All model kernels are positioned and placed on different network nodes. A typical structure is shown in Figure 2:

![Figure 2. Typical structure.](image)

The algorithm of network group is able to obtain the distance between input spaces through self-learning. Different base groups are classified and configured integrally. This algorithm can determine the constitution of input base group automatically with reactions. [5] Steps are list as below:

1. **Initialization of base group**
   Link factors of input spaces are set randomly. It is necessary to set the initial value as a smaller value that is no larger than a certain value and select a base group set when link factors are initialized. Attributes of the set become distinct and the structure becomes refined through evolution.

2. **Aggregation of input spaces**
   Input spaces are linked to the competition space set for training through assignment link. Input spaces are:
   \[
   X = (x_1, x_2, \cdots, x_n)^T
   \]

3. **Calculate the mapping weight of input spaces and output spaces**
   In output spaces, the formula of calculating \[ \| \bullet \|_2 \] of input and output spaces is:
   \[
   d_j = \| X - W_j \| = \sqrt{\sum_{j=1}^{n} (x_i(t) - w_{ij}(t))^2}
   \]

4. **Self-learning of link factors**
   The mapping that prints link factors and adjacent factors is modified through the algorithm. The formula is:
   \[
   \Delta w_{ij} - w_{ij}(t + 1) - w_{ij}(t) = \eta(t)(x_i(t) - w_{ij}(t))
   \]
   Here \[ \eta(t) = \frac{1}{t} \]

   The print value can be obtained through the mapping of the algorithm:
   \[
   O_k = f(\min \| X - W_j \|)
   \]

Four parameters are selected in this paper: behavioral characterization, periodic characteristic, behavioral prediction and behavioral classification. Intelligent classification and cognition are carried out on date through a cell-correlated multi-connection network [6]. Behavioral data of a randomly selected virtual role is searched peripherally and the relationship between historical conditions and behaviors is mined through real-time capture of information in the network. According to the basic information of 60000 samples and objective parameters such as the obtained objective data, the node number of individual interaction degree and the communication between individuals and groups, data can be classified through the network group algorithm. There is no need to set parameters for the network group algorithm because it has the function of self-learning [7]. The algorithm classified for itself automatically.

### 3 SOLUTION METHOD FOR THE MODEL

Steps of the solution are:

![Diagram](image)
The influencing weight of periodic characteristic is:

The influencing weight of behavioral prediction is:

The influencing weight of behavioral classification is shown in Figure 6.

A favorable classification effect is acquired through training for 1000 times. The network topology is shown in Figure 7.

It can be known from the above figure that network group obtains weighting factors of key nodes and its peripheral effect has an important impact on robustness and precision of the network. Neighbor weight distances are shown in Figure 8. Different colors stand for different distances. The darker the color is, the closer the distance is [9].

Behavioral cognition classification map of virtual roles is presented in Figure 9:
4 CONCLUSION

Automatic and intelligent processing on virtual roles in a virtual environment system has gradually become a trend at the present stage. It is now widely used in fields like behavioral animation, simulation of intelligent life, intelligent virtual characters and intelligent interaction, etc. More and more systems hope to get improvement with the help of intelligent virtual roles and to enlarge the coverage of intelligent applications. Meanwhile, it is able to lay a theoretical foundation for the establishment of intelligent virtual models through the application of intelligent virtual roles in other fields, indicating the practicability of the establishment of intelligent virtual models that roles can be anything that is alive in intelligent virtualization.

It takes a lot of time of design a complicated virtual character animation, so all behaviors of characters can be only defined roughly. Some of the behaviors cannot be defined normally because the change of a specific behavior of a role caused by the change of virtual external environment is a randomly defined behavior. It is not easy to create a model with conditions and behaviors for this kind of virtual roles, so the problem of its randomness should be dealt with through the strategy of online learning. Therefore, people are always willing to make virtual roles control themselves intelligently and automatically. All these can be realized with the help of specific behavior models. In this paper, the author makes a detailed description on the specific method of modeling and introduces the concrete procedure of modeling as well as the modeling strategy of specific behaviors in kohonen network algorithm. The performance of former cognitive-behavioral model is poor and the modeling process is complicated. Besides, the execution efficiency of the model is low and the automatic and intelligent effect is bad as well. Behavioral planning for the changing process of roles in virtual scenarios cannot be applied properly. The author elaborates the strategy of establishing behavioral models of the behavioral layer and the cognition layer in kohonen network, deals with problems in the process of creating the behavioral model of the cognition layer, and describes the accurate strategy of modeling as well as the behavioral modeling process and the final simulation of the cognition layer that is similar to kohonen network.

As for the behavioral cognition of virtual roles in virtual environment in computer field, the author uses SOM algorithm to classify behavioral features. According to intelligent classification and cognition that are carried out on date through a cell-correlated multi-connection network and data of objective parameters such as the node number of individual interaction degree and the communication between individuals and groups, data can be classified through the network group algorithm. It has high emotional concentration and good robustness because of the automatic classification of the algorithm. The behavioral cognition model of virtual roles in virtual environment is thusly established based on SOM algorithm. In this paper, the author realizes the relevant behavioral model by combining practical cases of the algorithm. Group virtualization and the creation of the virtual role of driver are realized during the construction of the behavioral model. How to obtained data needed by training samples is contained in the maximum simulation process of cognitive model. Data should be pre-processed beforehand and relevant operations are carried out then, such as training and use of the training sample set. Methods of obtaining relevant data of training samples in this paper can be classified as procedure form and factitious form. Data of training samples is processed in the form of conflict and normalization so as to make sure that training samples can be expressed through I/O mapping. It can be known from the above discussion that the network model used in this paper can realize automation and intelligentization integrally. Compared to former virtual roles, ones in this paper eliminate deficiencies and satisfy the planned objective. In the study on behaviors of virtual roles, the operation of activating virtual roles animation is bound to be one of the problems that should be considered emphatically.

REFERENCES


Figure 9. Classification map of music emotion recognition.


