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Research and Optimization of Dynamic Stochastic Neural Networks in Computer Systems

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Abstract. Computer vision systems are at the forefront of computer research, but there is no complicated computer vision mathematical model. Based on computer system and fuzzy theory, a computer vision service system based on dynamic random neural network is proposed. In addition, a new learning method called Fisher forest is proposed which enables the motion recognition method to use different types or even various numbers of joints for different actions, postures or situations. Fisher forest proposed method can also be used as an effective classifier vector for the present class having a different quality or even to classify different dimensions, and therefore may be used in other applications using the data having different types or dimensions under certain conditions in. After building a more accurate mathematical model, we performed simulation experiments on the model to verify the superiority of the system compared to other traditional computer vision systems.

1. Introduction

Robotic visual is a technique that can indirectly detect the robot's current posture or its relative posture on the target body by using visual sensors and related algorithms. While there are different proposed methods that use one of these data types as input, there are some ways to use fusion of different data types. In this paper, the proposed method uses skeleton data as input. This paper uses space-time technology to improve the motion recognition method we proposed earlier [1]. This is a new interdisciplinary subject neural network, automatic control, real-time system analysis and more. In recent years, with the rapid development of related fields such as image processing and pattern recognition, the information contained in images has been explored and applied more. First, the robotic system itself is a highly nonlinear, strongly coupled, time-varying dynamic system whose control is complex. Due to this inaccurate measurement and modeling, load variation and external disturbance effects, it is difficult to obtain an accurate, complete robot motion model. In addition, vision also has a complex feeling. High complexity algorithms are often required to extract feature information from a large amount of visual data. Video capture devices such as video cameras are also affected by many factors. On the other hand, space-time techniques for skeleton data have also been proposed through the Kinect sensor developed in the past decade. In this method for spatiotemporal methods, the position of the joint can be considered as a spatial feature, and the movement of the joint or frame over time can be considered as a temporal feature (see Figure 1-a). In addition, Figure 1-b depicts the hierarchy of spatiotemporal techniques in the skeleton data. As shown in the figure, important joints can be considered as spatial features and are named key joints. For time techniques, information between frames is typically extracted as features, or important frames with important information are sampled from a sequence of frames. These frameworks are often referred to as key

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poses in literature; however, their methods are more likely to be called key in our work.

2. Discussion on Dynamic Random Neural Network

2.1 Adaptive Resonance Theory

The Adaptive Resonance Theory Network was recommended by Professor Carpenter of Boston University. Subsequently, Carpenter and his student Grasberg S. proposed the ART neural network. [2] The purpose of art design is to have a stable and fast recognition ability, and it can quickly adapt to the new purpose of not learning. Another example of a selection key can be found in the joint, where the joint action manual selection, such as a hand, leg, knee and elbow joint as a key joint. They see key joints as roots in the tree and other joints as leaves in the tree. Finally, the joint vector of the face and the root joint is regarded as a feature vector. overall. It does not need to know the results of the sample in advance because it is unsupervised learning. The starting point of ART is to take advantage of people's cognitive processes and the characteristics of brain work. In order to automatically obtain the key poses, the frame should be re-sampled from the sequence. In this work, the sampled frame is called a key frame. The following first explains the extraction of key frames. After that, the automatic extraction of key poses is described in detail. The accumulation and storage of knowledge is rigid and flexible. That is to say, on the one hand, they can firmly retain what they have learned, on the other hand, they can learn a lot of new knowledge. Input data and top-down learning expectations simultaneously enter a competitive collaborative network, while bottom-up learning is a competitive production cooperation network. At the same time, bottom-up learning can also be used as an input to a competitive collaborative network. In our proposed model, fabric is a component of the system that roughly represents the original forwarding capacity. In theory, the fabric should be able to support any number of edge designs including different addressing schemes and strategy models. The opposite should also be true; that is, a given edge design should be able to accept the advantages of any fabric, no matter how it is implemented.

2.2 Fuzzy Theory

Fuzzy theory is a mathematical theory established by studying and summarizing various intelligent activities in which humans use language as a medium. It is based on fuzzy sets, and its basic spirit is to accept the existence of factual ambiguity and the fuzzy uncertainty of the concept of contract. Isn't this another layered approach? To some extent, one can think of edges and cores as different layers: the edge layer that "runs" on the core layer; in this regard, this is really just another layering approach. Layering provides some of the same benefits: it separates different protocols and allows different levels to have different scopes. However, current data plane can be considered "vertical", which makes the difference between protocol and hardware very different, and each layer goes all the way to the host. The membership function was first proposed by Professor LA to express ambiguity in complex systems. [3] With the help of membership functions, fuzzy concepts can be expressed as quantitative representations. The matching of fuzzy concepts refers to the similarity between two fuzzy concepts, and the similarity concept of two fuzzy concepts is also called the matching degree. There are two basic ways to calculate matching, semantic distance and proximity. Another standard that can be used to make decisions between clusters is cluster scatter symbols, which is a new standard. This standard is inspired by the Fisher discriminant standard. In this standard, the best clustering is clustering clusters that are far apart from each other, i.e. the variance of the clusters is large enough.

2.3 Dynamic random neural network.

Dynamic stochastic neural networks combine fuzzy inference with self-resonance theory. It has strong adaptive ability and good resolution, and has strong operability. Fuzzy Theory by the random integration of a dynamic system, we can achieve an arbitrary mapping between the input and output space, mapping and clustering for higher dimension space. A new minimum and maximum learning style is achieved via a tracking process. That is, the prediction error is minimized and the coding compression ratio is maximized. These two modules can be divided into a focus subsystem and a direction subsystem. Using this model to learn the trading subsystem of interest, fine-tuning will establish the intrinsic value of the accurate familiar pattern representation; when using the new mode of the positioning subsystem, there are unfamiliar events, which focus on the degree of modulation, and the internal coding is unfamiliar A new internal representation of the event. Therefore, it may be better to consider different joints in various key postures. The selected joint may be required to differ in the number of joints and joints. Therefore, a method should be proposed that is capable of handling different joints in a critical posture and possibly a different number of joints. And the art and fuzzy logic of this advantage of combine harvesters. The dynamic random neural network logic is shown in Figure 1.1.

3. Computer Vision System based on dynamic random neural network

3.1 Camera Imaging

As to identify the pose of the test skeleton, it should be projected to all Fisher subspaces in the Fisher forest. To project a test skeleton on the Fisher subspace, consider the important joints corresponding to the Fisher subspace in the test skeleton. After projecting on the Fisher subspace and using a distance measurement function such as Euclidean. Please note that Fisher Forest does not mean trees. The forest here means the collection of Fisher subspace. The camera is fixed on the arm at the end of the machine. The camera coordinate system is fixed relative to the robot coordinate geometry, but the relative coordinate system is changed to the machining space. The model can see the local scene accurately. A camera with an axis that coincides with the fiber axis. The robot takes an image of the target ball through the camera and extracts its features to form a closed loop. Fuzzy vision adjuster based error image factors. A recognized posture for testing the skeleton. If data exists critical concentration P posture, the posture is obtained in the tests identified skeleton Fisher P forest. However, only one pose should be the final recognized pose. To this end, two criteria are presented below. It is difficult to adopt traditional object-based model control methods. Take effective control. [4] However, as mentioned earlier, key poses can be automatically defined and sampled. As suggested here, there may be two criteria for determining the best clustering in several clustering runs. For the minimum distance criterion, it is appropriate to find 10 clusters by tracking and error, which is close to the number of manually selected key gestures.

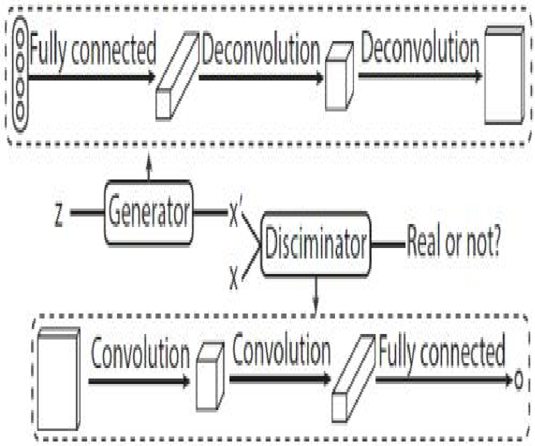

Figure 1. Dynamic Stochastic Neural Networks structure

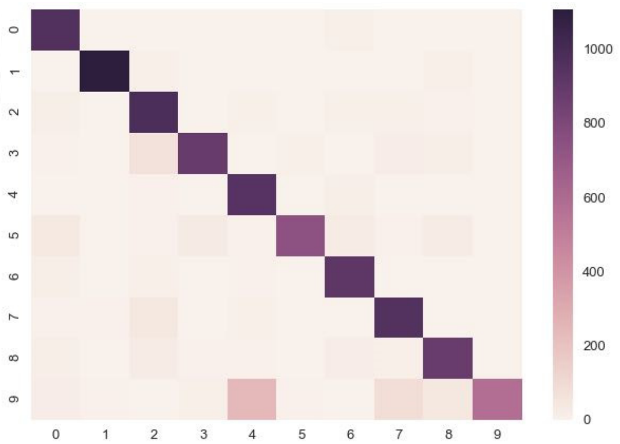

Figure 2. DTMAP method

So far, many scholars have proposed different methods of motion feature analysis and different background recognition methods. In this visual servo system, we use the method of FTMAF G Abebi et al. [5] The frequency characteristics of different motions (i.e., inter-frame features) are extracted through the correlation processing of the transition domain, and the hand of the manual button posture to start throwing and approaching the shoulder has not been automatically found. Moreover, the third automatic button gesture that is manually bent at the back is not manually determined. It should be noted that some automatic key poses, such as stents, are similar but have different dimensions, the configuration of 3D vector group

$$\boldsymbol{I} = \{i_1, \ i_2, \ i_3, \ \ldots\}, \quad \boldsymbol{in\ which} \quad i_n = \{freq_n, pos_n, chroma_n\} \tag{1}$$

3.2 Fuzzy vision controller design.

Through trial and error, 12 cluster centers were found to be suitable for this standard. According to the figure, the automatic key positions 1 to 12 other than the skeletons 4, 6 and 10 correspond to the manually selected key postures, which are standing, bending, hand opening, crossing, hand straight front, sitting, hand front, image The feature value indicates that the robot hand has reached the target position. This collection is the target of expected eigenvalues. When the target center reaches the center of the camera imaging plane and the imaging radius of the target is the radius of the ball, it indicates that the robot end clamp has reached the desired position. The rule is based on defined input and output linguistic variables, and all possible state controllers should consider and indicate each best operation. All the experiments in this work were carried out with one subject left. This setup is quite difficult because in each fold, no samples from the tester are seen during the train phase.

	D^-	QD^-	N^-	VN	N^+	QN^+	D^+
D^+	C^+	VC^+	VA^+	X	VS^-	VC^-	C^-
QN^+	C^+	VC^+	A^+	X	S^-	VC^-	B^-
N^+	VB^+	VB^+	A^+	X	A^-	VM^-	VB^-
VN	VB^+	VS^+	A^+	X	A^-	VM^-	VB^-
N^-	VB^+	VS^+	A^+	X	A^-	VM^-	VB^-
QN^-	VB^+	VS^+	A^+	X	A^-	VM^-	VB^-

Table 1. Fuzzy Control Rule Table

Therefore, by the X and R values determined by the controller, we can combine the values of the variables X and [R] to construct a two-dimensional vector group Ø, such as the yield of the data set. After a series of non-linear operations based on stochastic theory, you can direct control output vector.

$$\boldsymbol{O} = \{o_1, \ o_2, \ o_3, \ \ldots\}, \quad \boldsymbol{in\ which} \quad o_n = \{x_n, r_n\} \tag{2}$$

In this paper, As can be seen from these two figures, the cluster scatter standard is generally superior to other standards, especially in key frames. We need to group some key parameters first.

$$\begin{cases} \alpha \in (0, +\infty) \\ \beta \in [0,1] \\ \rho \in [0,1] \end{cases} \quad \textbf{and} \quad \begin{cases} \sum_J \mathbf{w_J} = 1 \\ \mathbf{w_J} \in [0,1] \end{cases} \tag{3}$$

Note that the first parameter a is dynamically determined by the neural network , and β and ρ are the learning rate and threshold of the network, respectively. The parameter w J. is the weight coefficient of the Jth mode. In order to select the best matching vector in the second layer of the dynamic network , we give the following selection functions.

$$\boldsymbol{T_d} = \frac{\sum_{d=1}^{3} min(i_d, w_d)}{(\alpha + \sum_{d=1}^{3} w_d)} \tag{4}$$

A new pattern vector is added when the degree of matching between the input vector and each of the existing patterns is less than the threshold. This mechanism is not only based on neural networks, it

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ensures an increase in learning, but also adapts to the system. If the system determines that the input vector matches the pattern vector, the pattern weight is updated to make the input vector more compatible with the pattern vector, as shown below vector.

$$w_J^{new} = \beta \cdot \begin{pmatrix} min(i_J^1, w_J^1) \\ min(i_J^2, w_J^2) \\ min(i_J^3, w_J^3) \end{pmatrix} + (1-\beta) \cdot w_J^{old} \tag{5}$$

If there is a case where the classification is valid in a or b, the mapping field F ab will be activated. The role of F ab is to contact network a and network b to perform matching tracking. The output vector x ab can be calculated by using the following. The output vector x_{ab} can be calculated by using the following formula.

$$x_{ab} = \begin{cases} min\left(y^b, w_J^{ab}\right) & if \ A \wedge \ B \\ w_J^{ab} & if \ A \wedge \neg B \\ y^b & if \ \neg A \wedge \ B \\ 0 & if \ \neg A \wedge \neg B \end{cases} \tag{6}$$

4. Simulation Experiments

The experimental simulation results are shown in Figure 3. When the target mode is approximately 15 (randomly assigned to [10, 20] evenly distributed), its performance is better than the normal design.

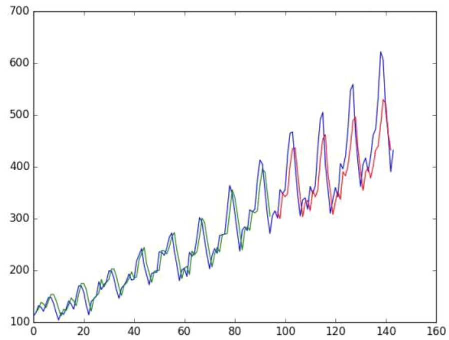

Figure 3. System Accuracy Test with Mode Number Around 15

Therefore, this document proposes to design a network by combining SDN and MPLS methods - extending SDN. Introducing a new concept called "network structure" components. It consists of three components: the host, as the source and destination of the packet; the edge switch, which is both the entry component and the exit component; the core structure. The fabric and edge are controlled by (logically) independent controllers, the edge is responsible for complex network services, and the fabric only provides basic packet in Figure 4.

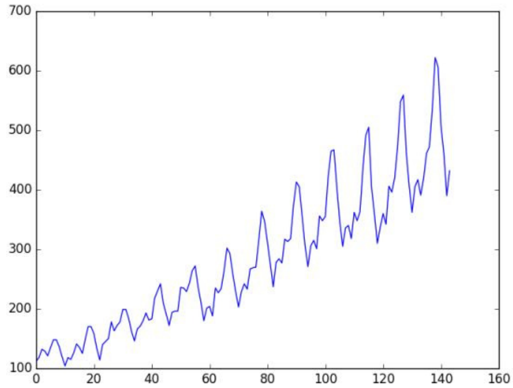

Figure 4. System Latency Test with Unfixed Mode Number

In addition, the increased number of movements results in increased delay and reduced accuracy. However, as shown in FIG. 5, even if the number of motion modes exceeds 30, the accuracy of the system is still close to 85%, which is in contrast to the severe degradation of the accuracy of conventional computer systems.

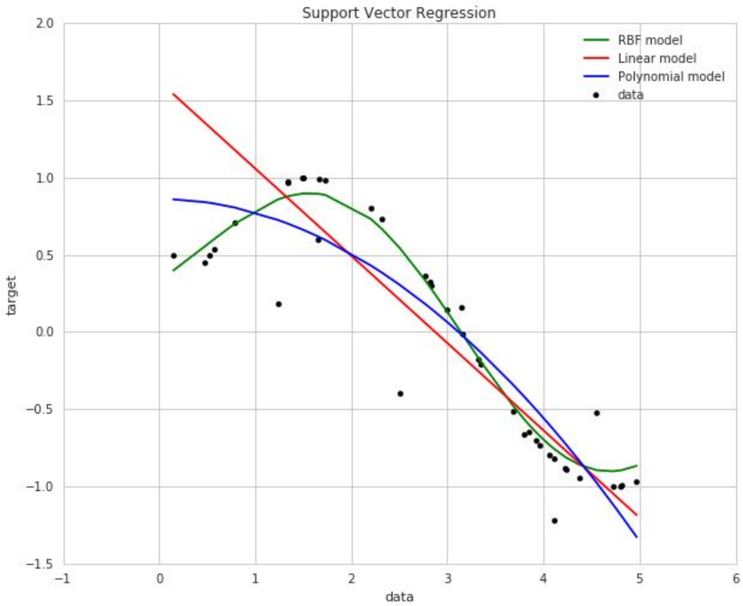

Figure 5. System Accuracy Test with Unfixed Mode Number

We can easily study the performance of key frame-based computer systems, because some interfaces of the emulator retain the extension of system functions, opening up favorable conditions for further research on new computer systems. [6].

5. Conclusion

The dynamic stochastic system designed in this paper is applied to computer vision system control. It does not depend on the exact model of the object or the exact motion pattern. Control rules come from the rules of the user's daily life. It can solve the nonlinear, time-varying, and coupling problems encountered in existing computer systems. In order to design a computer system with more powerful identification and processing capabilities, it is sufficient to use dynamic random programs and some other rules. Another contribution of this work is the introduction of Fisher Forest, a novel learning method that allows action recognition methods to use different joints in different situations or postures.

The method can also be used in other applications that use different types of data, or to process data with different dimensions under various conditions. In this work, Fisher Forest is used to have key joints in the process. The unsupervised learning of the system, the enhancement of the scalability function not only requires the stability of the system, but also provides a personal computer system that meets different needs, which will be a trend.

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