Control and Monitoring System for Intelligent Network Devices

Metha Sirigol and Nongluk Promthong

Abstract*—Nowadays, the informatics technologies have applied in almost every fields such as banking, retail, transportation, public safety/law enforcement, and education. Whilst, all information of process will be need to validate and verify as the requirement. Therefore, the monitoring becomes the important technique to keep the required standard of products or services. There are many organizations using the intelligent devices to monitor for their business profit as well as the security protection on their properties. The intelligent motion detect has become important technique in many monitoring process such as transportation, security, or checking point. Almost every devices have applied into their products to recognize the correct performance of product. These detections may be mixed together between several signals and difference information of the images, voices, and multi-transmission technique. However, this is very difficult methodology to identify these integrated signals during their online transceiver process. Whilst, this becomes important and necessary to identify between client and server. There are not many publications in this problem. Radial basis function neural networks can be employed to recognize these integrate signals as classification action.

With objective of this monitoring can be merged the remote sensing with identification system in function to maintain their safety, and also for authorize tracking on their customer demographics. It can be also to identify the intruder or attacker. They would be following the plan to defraud their organization. This becomes important problem, and there are not many researches to publish for this solving. There are not many research have been done on this personal detection and authorize details tracking. Traditional statistical classification procedures such as discriminant analysis are built on the Bayesian decision theory [1]. Neural network is one of popular technique and can be emerged for conventional classification as an important tool. The neural classification has established with its advantage in the following theoretical aspects as self-adaptive methods, which can be adjusted themselves to the data without any explicit specification of functional. Since any classification procedure seeks a functional relationship between the group membership and the attributes of the object, which can provide the basis for establishing classification rule and performing statistical analysis [2]. Classification is one of the most frequently encountered decision making tasks of human activity as monitoring.

On the other hand, the effectiveness of neural network classification has been tested empirically. Neural networks have been successfully applied to a variety of real-world classification tasks in industry, business and science [3]. Applications include bankruptcy prediction [4], [5], [6], handwriting recognition [7], [8], speech recognition [9], product inspection [10], fault detection [11], medical diagnosis [12], [13], and retail market & consumer [14]. This paper is to present the technique to classify the integrated signal during real-time online process as monitoring to recognize the requested location and identify on their characteristics of signal.

***Keywords*— Classification, Monitoring, Radial Basis Functions, Neural Network.**

1. INTRODUCTION

The development of remote security system had been done in various fields. This system can be referred to the camera system used or served on the internet and also called as remote sensing system, which is compound word of world-wide-web plus control and monitoring. This can be service enables us to monitor our children's after-school activities, old parents and patients at their own home, take a look at children educated in private academies at Real time monitoring. The exits technologies and devices have available for these Surveillance Systems as remote sensing. However, the multi surveillance devices to identify the important access point for the internal staff at secrete place or specified time to access would be need to develop. There are less research on this personal detection and authorize details tracking. Whilst it becomes necessary to develop for important place such as: at several gates in airports, sport stadiums, or path ways to secret office.

Furthermore, with the development of remote sensing technology and network, a wide range of space information civilian use make remote sensing images security more and more attention. On the basis of the characteristics of large amount of remote sensing data but real-time transmission or access, a scheme of authorizing the use of remote sensing images based on multi-rank security through Internet distribution can be included in this research proposal. Therefore, Pattern Recognition technique with emphasis on the neural network methodology as Radial basic function has been included in this paper for the automated multi-devices as Remote Sensing Surveillance System.

The remote sensing application, specified area detection, and authorize tracking on their demography of people have involved to identify with important and special office, which are very important function to monitoring.

It can be called as the intruder identification and surveillance systems have studied widespread with enable to share and apply to these knowledge domains. As part of remote sensing images are mostly related to military security and political stability. However, the currently remote sensing images can only be acquired by small-

Faculty of Science and Technology, Rajamanagala University of Technology Thanyaburi, Pathumthanee, Thailand 12110, Tel. +662 549 4194 Email: metha@mail.rmutt.ac.th, nomgluk661@hotmail.com

scale users, so the value of remote sensing images is not taken full advantage.

2. LITERATURE REVIEW

This section is to review the related remote sensing and the involved surveillance system applications, which have many publications in recently as following:

Yu Wenshuai, Yu Xuchu, Zhang Pengqiang and Tang Xiong [1], they proposed the GVSN system, which could be separated into four basic functional parts that include changing detection, object recognition, target tracking, and target positioning.

I. Draganjac, Z. Kovacic, D. Ujlaki and J. Mikulic [2] proposed an integrated system for intelligent video surveillance, control and alarm generation in security applications, which related to protection of public buildings. They applied only two networked cameras, video information to collect, dispatch via network and processed on-line with a group of integrated image processing algorithms. This can to detect humans in motion, track their motion, and check the visibility of their faces while entering the building. In addition, the developed system counts people's traffic and keeps the record of a number of people in the protected area.

Rohit Nair, Benny Bing [3] had presented two key activity detection methods with applications of an advanced surveillance system, specifically in suspicious activity detection and human fall detection, for both indoor and outdoor environments. The implemented prototype captures and analyzes live high-definition (HD) video that is streamed from a remote camera.

Jin Liu, Zhengquan Xu, Jing Sun, Xi aojun Liu, Zhe Wu [4] proposed a methodology to provide guidance for mining remote sensing image databases. The basic idea is to use domain concepts to build generic description of patterns in remote sensing images, and then use structural approaches to identify such patterns in images. They shown a multi-rank secure network distribution scheme for remote sensing images with based on content multi-object selection and multi-authorization algorithm were presented.

Ali Saglam and Alptekin Temizel [5], they presented the adaptive algorithms to detect and identify such cases with low false alarms rates in typical surveillance scenarios where there is significant activity in the scene. They also proposed the camera tampering detection methods to detect occluded camera view, defocus and camera displacement. These methods are designed to be adaptive to changing conditions and to work in cases where there is high degree of motion. The low computational complexity of the algorithms makes them suitable for real-time operation in multi-camera systems as well as embedded systems.

Mark J. Carlotto [6] presented a new nonlinear prediction technique for measuring changes between images and temporal segmentation and filtering techniques for analyzing patterns of change over time.

These methods are applied to the problem of detecting facility construction using Landsat Thematic Mapper imagery. Full scene results show the methods to be capable of detecting specific patterns of change with very few false alarms. Under all conditions explored, as the number of images used increases, the number of false alarms decreases dramatically without affecting the detection performance.

Marcelino Pereira and his team [7] proposed a methodology to provide guidance for mining remote sensing image databases. The basic idea is to use domain concepts to build generic description of patterns in remote sensing images, and then use structural approaches to identify such patterns in images.

W. D. Ross and his team [8] developed a processing architecture enabling the unified interactive visualization of firs multi-sensor site data which utilizes a color image fission algorithm based on retinal and cortical processing of color. We have also developed interactive web-based tools for training neural network search agents capable of automatically scanning site data for the fused multisensory. They concluded their work as a multi-sensor 3D image fusion system which brings together complementary sensor information into a single interactive display.

Balaji Sivasubramanian and Malur K. Sundareshan [9], they are to analysis an incompatibility problem that arises when end-to-end security through IPSec implementation is contemplated in IP networks that employ popular Network Address Translation (NAT) functions, and the development of enhanced protocols that remove this incompatibility and ensure interoperability of IPSec and NAT. So, they development is to support generic implementation in the sense that the implementation of the security-related protocol is transparent to the use or not of NAT scheme in the network.

Mike Myung-Ok Lee and Chil-Woo Lee [10] proposed the remote recordable security system based on Linux, which is to introduce database system for overall function enhancements and various applications, and can record and play images online. Remote user can use the system through authentication process by using web browser. When recording signals are sent, web cam recording demon starts through database and image information of corresponding time is played through file classification processor. Also, user can be added or deleted by administrator settings. Four different authorities can be assigned to each user by using the information obtained from user account processing.

Since, the feed-forward neural networks have increasingly been applied in many field for the solution of difficult real-world problems. This is due to the approximation capability of these devices, such as: to the property that any continuous function can be approximated within an arbitrary accuracy by means of a neural network, provided that its topology includes a sufficient number of hidden nodes (the sample can be seen in [11]–[14]).

Almost every result has shown the effectiveness of the approach in RBF network training for pattern recognition, mainly in terms of computational time saving but no research has consider on multi device on the network.

On the basis of these observations, we formulate the training problem simply in terms of a system of nonlinear inequalities and, for solving it, we consider a threshold error function to which only the patterns corresponding to the violated inequalities give a contribution. Then, making use of a standard routine for minimizing an error function of this kind, a specific algorithm is designed by introducing two scalar parameters, which represent the upper and lower reference levels for the network outputs with respect to the fixed threshold.

The values of these parameters are automatically

updated during the training process, according to the progress made in the recognition of the training patterns. In this way, it is possible to avoid that the algorithm will converge to points of the parameter space which do not provide an acceptable solution of the training problem.

In this paper is to introduce with focusing on the problem of training radial basis function (RBF) networks in the field of pattern recognition, and more specifically for classification intruders problems, where the task will be to assign a label to one of a number of discrete classes or categories with consideration instead of RBF networks. In this connection, we observe that in the sigmoidal function is used as activation function, so that saturation of a number of node outputs may occur, i.e., a number of hidden nodes may become insensitive to the training process in this paper.

3. INTELLIGENT NETWORK DEVICES TECHNIQUE

The Network Devices become the popular tools, which able to employ and implement in many projects with the specified function. However, these tools have developed and designed to be the intelligent devices as basic wireless network , which can be communicated with emphasis on the IEEE 802.11 standards. Therefore, the multi device technique has performed by using the signals that originate in the different signal routes, and mixing together between signal as multi standard signal. It can be referred to both digital and analog formats on the same chip and then analysis the associated with the automated integration and intelligent decision to identify their routing and process. The intelligent network device can be connected as the multi devices network, this process has shown in Fig. 1.

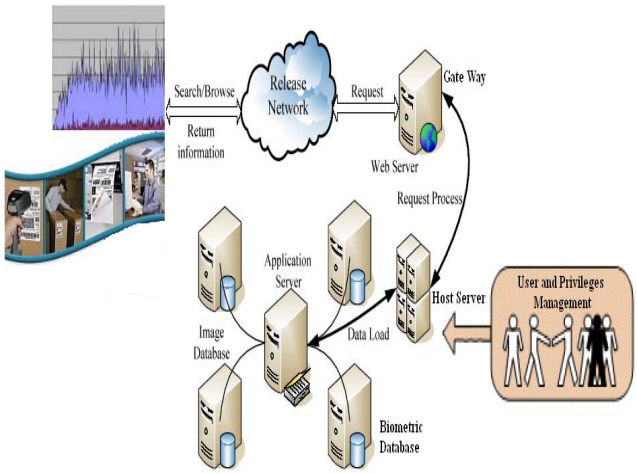

Fig. 1: The intelligent network device process

The high-performance wireless transmission can be introduced as an intelligent network device, which will provide with a wide coverage range according to the IEEE 802.11g standard, as well as backward compatibility with IEEE 802.11b.

4. MONITORING METHODOLOGY

Classification is an important problem in monitoring. Any classification method uses a set of features or parameters to characterize each object, where these features should be relevant to the task at hand. This can be considered as methods for supervised classification, meaning that a human expert both has determined into what classes an object may be categorized and also has provided a set of sample objects with known classes. There are a number of standard methods to apply the neural network methods to classification problem on digitized photographic plates. They had obtained the good results for objects in a limited brightness range.

The interest of classification technique has grown awesomely over the last decade. The neural network theory has offered means to obtain classification function by a learning algorithm with the interpretability. Its learning system plays the role of the brain, which learns contractible knowledge, which can be acquired from the historic performance data by the learning function. The raw data as test rig will be collected and then stored in the historic performance database.

Then the neural networks will be simulated the operating functions of the human brain and used to present in form of training, learning, and testing process by consideration the human brain as the most complex and powerful computing system. This likes the operation system of the computer as an Input, Process, and Output function, the schematic operation has shown as neural network conceptual in Fig. 2.

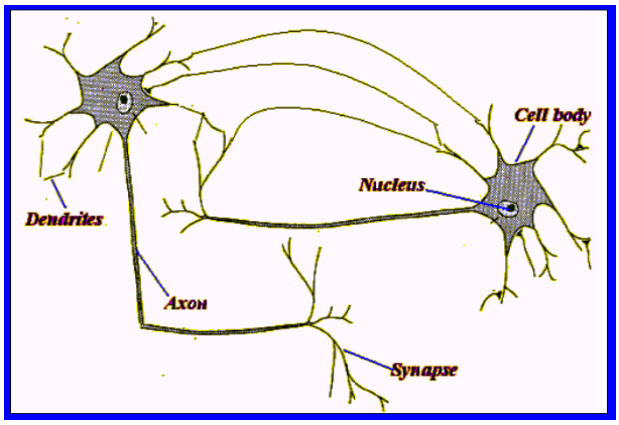

Fig. 2: Neural Network conceptual

However, A neural network is a computing device whose processing units (the nodes) are distributed in adjacent layers connected through unidirectional links (the weights). The RBF formula process and standard structure shown in Figs. 3 and 4. The n inputs (x_n) and weights (w_n) have used to calculate threshold of RBF process with the output condition for the final decision as y, see Fig. 3.

In particular, a RBF network is a fully connected network with one “hidden” layer, whose nodes have some radially symmetric function as activation function.

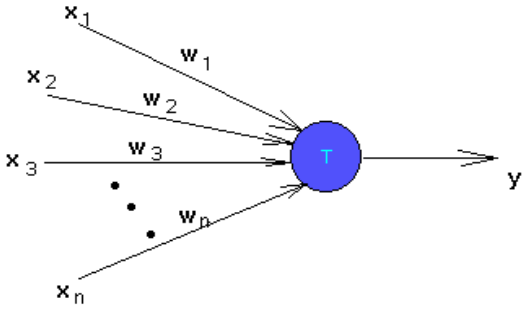

Fig. 3 : RBF formula process

The number of input x_n and the number of weight w_n to archeive the output y will depend on the applied parameter.

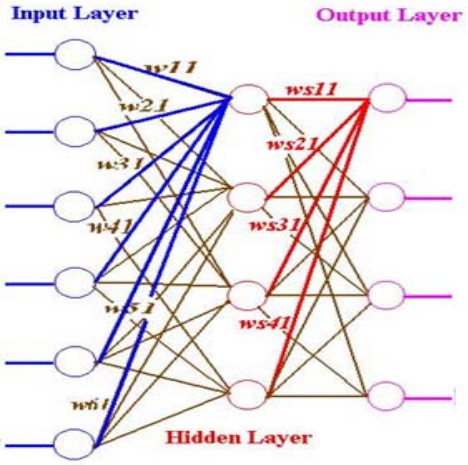

Fig. 4 : RBF standard structure

Such a network implements an input–output mapping $f: R^n \rightarrow R$ according to

$$f(x)=\sum_{i=1}^{n_r} \mu_i \sigma(\|x-s^i\|)$$

Where

$X \in R^n$ is input vector,

$\sigma(\cdot) : R+ \rightarrow R$ is radially symmetric function,

$\|\cdot\|$ is Euclidean norm,

$\mu^i \in R$, $i = 1, \ldots, n_r$ is weight,

$s^i \in R^n$, $i = 1, \ldots, n_r$ is RBF centers,

n_r is number of hidden nodes.

Typical choices for the function $\sigma(\|X - s^i\|)$ are

$\text{Exp}(-\|X - s^i\|^2/2\sigma^2)$ is Gaussian function

$(\|X - s^i\|^2/2\sigma^2)^{1/2}$ is Direct multi-quadric function

$(\|X - s^i\|^2/2\sigma^2)^{-1/2}$ is Inverse multi-quadric function

Where

$\Sigma > 0$ is the so-called "shift parameter."

In this paper, the RBF technique of Neural Network methodology has employed the theory with the number of the hidden nodes is sufficiently large. This property makes the network a powerful tool for dealing with many real world problems. From both theoretical and practical investigations it appears that the performance of the RBF network is not greatly influenced by the choice of the activation function.

However, as observed in the introduction, the use of the direct multi-quadric function will avoid automatically saturation of the node outputs.

In order to approximate a nonlinear mapping could be mapped, the network parameters of μ^i, s^i, $i = 1, \ldots, n_r$, have to be determined by using a finite set of input–output data (training process). As regards the centers s^i, they may be chosen randomly among the input data or fixed at specific locations using some "clustering" technique i.e., placed in the regions where the input data are more meaningful. Then, the weights are computed by applying an optimization algorithm for minimizing a suitable cost function. A different approach with based on a supervised learning process has involved both the weights and the centers of the network. Although this approach is more complex and computationally more expensive, it usually leads to an improvement of the network performance, and hence it will be adopted here.

5. CONCLUSION

This paper have reviewed on the key activity detection methods with applications of an advanced surveillance system, basic functional parts that include changing detection, object recognition, target tracking, and target positioning.

They also employ the technique to detect humans in motion, track their motion methodology with alarms rates in typical surveillance scenarios, where is significant activity in the scene using the camera tampering detection methods to detect occluded camera view, and providing the guidance for mining remote sensing image databases. The modern nonlinear prediction technique had been also introduced the measuring changes between images and temporal segmentation. The filtering techniques for analyzing patterns of change over time with end-to-end security through IPSec had also implemented in IP networks that employ popular Network Address Translation (NAT) functions.

Therefore, the database system for overall function enhancements and various applications had been proposed to introduce with able to record and play images online, where the remote user can use the system through authentication process by using web browser. And then to able to record the signals that are sent, whilst recording can be started through database and image information of corresponding time is played through file classification processor.

REFERENCES

[1] Yu Wenshuai, Yu Xuchu, Zhang Pengqiang and Tang Xiong, "Using of Geospatial Video Surveillance Networks for Urban Security and Emergency Applications", proceeding of 2009 Urban Remote Sensing Joint Event, IEEE 2009.

[2] I. Draganjac, Z. Kovacic, D. Ujlaki and J. Mikulic, "Dual Camera Surveillance System for Control and Alarm Generation in Security Applications", Industrial Electronics, ISIE 2008, IEEE International Symposium on 30 June – 2 July 2008, p. 1070-1075.

[3] Rohit Nair, Benny Bing, "Intelligent Activity Detection Techniques for Advanced HD Video Surveillance Systems", Sarnoff Symposium, IEEE, 12-14 April 2010.

[4] Jin Liu, Zhengquan Xu, Jing Sun, Xiaojun Liu, Zhe Wu, "Network Distribution of Remote Sensing Images Based on Multi-Rank Security", proceeding of Fourth International Conference on Computer Sciences and Convergence Information Technology, 2009, p. 1101 - 1104.

[5] Ali Saglam and Alptekin Temizel, "Real-time Adaptive Camera Tamper Detection for Video Surveillance", Advanced Video and Signal Based Surveillance. IEEE Computer Society, 2009,p.430–435.

[6] Mark J. Carlotto, "Detection and Analysis of Change in Remotely Sensed Imagery with Application to Wide Area Surveillance", IEEE transactions on image processing, vol.6, no.1, january 1997, p.189 – 202.

[7] Marcelino Pereira S. Silva, Gilberto Câmara, Ricardo Cartaxo M. Souza, Dalton M. Valeriano, Maria Isabel S. Escada, "Mining Patterns of Change in Remote Sensing Image Databases", proceeding of 5th IEEE International Conference on Data Mining, 27-30 Nov. 2005.

[8] W. D. Ross, A. M. Waxman, W. W. Streilein, M. Aguilar, J. Verly, F. Liu, M. I. Braun, P. Harmon, and S. Rak, "Multi-Sensor 3D Image Fusion and Interactive Search", proceeding of ISIF02000, 2000, p.10–17.

[9] Balaji Sivasubramanian and Malur K. Sundareshan, "Management of end-to-end Security in Collaborative IP Network Environments", Management of End-To-End Security, p. 639 – 655.

[10] Mike Myung-Ok Lee and Chil-Woo Lee, Remote Recordable Security Web-based Camera Server System using Index Search Algorithm, 2001, p. 250 – 252.

[11] K. Hornik, M. Stinchcombe, and H. White, "Multilayer feedforward networks are universal approximators," Neural Networks, vol. 2, pp.359–366, 1989.

[12] E. J. Hartman, J. D. Keeler, and J. M. Kowalsky, "Layered neural networks with Gaussian hidden units as universal approximators," Neural Comput., vol. 2, pp. 210–215, 1990.

[13] F.Girosi and T.Poggio,"Networks&best approximation property",Biol.Cybern.,vol.63,pp.169–176,1990.

T. Poggio and F. Girosi, "Networks for approximation and learning," Proc. IEEE, vol. 78, no. 9, pp. 1481–1497, 1990.