Gait Recognition Using SVM and BPNN

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ABSTRACT
In this paper present an intelligent human identification system to handle gait analysis on modeling dynamic human behaviors. Here propose to find out recognize illegitimate human through their gait behaviors. Since human behavior belong to a dynamic biometrical feature which is very complicated and difficult to imitate compared with static features such as passwords and fingerprints; we find that this novel idea of utilizing human dynamic features for enhanced security application is more effective. This paper: first describe our experimental platform for collecting and modeling human behaviors. Then compare Back propagation neural network for data preprocessing. To Use machine learning method of support vector machine (SVM), derive the individual behavior model and we then demonstrate the procedure for recognizing different human by analyzing the corresponding models. Therefore experimental results of learning algorithms and evaluation are described.

INTRODUCTION

Recognition of any individual is a task to identify people. The human recognition methods such as face; fingerprints; and iris generally require a cooperative subject, physical contact or close proximity. These techniques are not able to recognize an individual at a distance therefore recognition using gait is relatively new biometric technique without these disadvantages. Thus Human identification using Gait is method to identify an individual by the way he walk or manner of moving on foot. Therefore Gait recognition is a type of biometric recognition and related to the behavioural characteristics of biometric recognition. And Gait offers ability of distance recognition or at low resolution.

This project aims to recognize an individual using his gait features. Many different parameters are used such as distance between head and pelvis; distance between feet and one another additional parameter used by us is distance between hands. Therefore the majority of current approaches are model free which is simple and fast but we will use model based approach for feature extraction and for matching of parameters with database sequences. After matching of parameters CCR (Correct Classification Rate) will be obtained using BPNN (back propagation neural network) and SVM technique. Some experimental results will show the effectiveness of proposed s

Biometric systems for human identification at distance have ever been an increasing demand in various significant applications. More biometric resources for instance iris, fingerprint, palm print, hand geometry have been systematically studied and employed in much system. In spite of their widespread applications; these resources suffer from two main disadvantages:

1) Failure to match in low resolution images; pictures taken at a distance and
2) Necessitates user cooperation for accurate results.

For these reasons, innovative biometric recognition methods for human identification at a distance have been an urgent need for surveillance applications and gained immense attention among the computer vision community researchers

in recent years. To this modern era; the integration of human motion analysis and biometrics has fascinated several security-sensitive environments such as military, banks, parks and airports etc and has turned out to be a popular research direction.

Human gait recognition works from the observation that an individual's walking style is unique and can be used for human identification. To recognize individual's walking

characteristics, gait recognition includes visual cue extraction as well as classification. But the major issue here is the representation of the gait features in an efficient manner.

The SVM classifier is widely used in bioinformatics (and other disciplines) due to its highly accurate; able to calculate and process the high-dimensional data such as gene expression, and exibility in modeling diverse sources of data .SVMs belong to the general category of kernel methods. And a kernel method is an algorithm that depends on the data only through dot-products. This is the case; the dot product can be replaced by a kernel function which computes a dot product in some possibly high dimensional feature space. It has two advantages: The First; the ability to generate non-linear decision boundaries using methods designed for linear classifiers. And the second; the use of kernel functions allows the user to apply a classifier to data that have no obvious fixed-dimensional vector space representation. Then prime example of such data in bioinformatics are sequence; either DNA or protein; and protein structure. Using SVMs effectively requires an understanding of how they work. When training an SVM the practitioner needs to make a number of decisions: how to preprocess the data, what kernel to use; and finally; setting the parameters of the SVM and the kernel [1]. Uninformed choices may result in severely reduced performance. Aim to provide the user with an intuitive understanding of these choices and provide general usage guidelines. The examples shown were generated using the PyML machine learning environmental; which focuses on kernel methods and SVMs.

We highlight the following aspects of our system in this paper: Thus First; live biometrical features in dynamic human behaviors are adopted in the system; which brings the enhanced security to the proposed security system. Second, since we collect the parameters directly from human gait analysis, which include length of the arms, length of feets etc we do not utilize other dynamics and environmental variables. Therefore, no complicated sensor is required, which brings to the system robust and efficient performance in real time. No complicated requirements means little space and time needed for system installation. Finally, we develop a methodology to capture and analyze the characteristics of human behaviors into computational representations. It is easily scalable for other applications.

II. Proposed Work System
2.1 Support vector machine (SVM)
Support vector machine (SVM) has recently become popular in the machine learning. The SVM is a new learning-by-example paradigm spanning a broad range of classification; regression; and density estimation problems. And this systematic approach motivated by statistical learning theory combines ideas from

various scientific branches such as mathematical programming; exploiting the quadratic programming for convex optimization; functional analysis; indicating adequate methods for kernel representations; and machine learning theory; exploring the large maximum classifiers concept. It was first introduced by Vapnik and co-workers and is described in more detail in. The roots of this approach, the so-called support vector (SV) methods of constructing the optimal separating hyperplane for pattern recognition; were already presented and had been used in machine learning in. The SV technique was generalized for nonlinear separating surfaces in, and was further extended for constructing decision rules in the nonseparable case. The training task involves optimization of a convex cost function conveying to a technique without local minima.

SVM has been applied to many areas; such as pattern recognition; regression, equalization. It is adopted in applications such as dynamic robot control, space robot control, image classification, human dynamic gait recognition; and so on.

In this paper, we focus on the research of utilizing dynamic human behavior models for application. A methodology of modeling dynamic human behaviors is proposed. By learning from performances; the intelligent classifier can be embedded into the proposed system, through which the identification system can identify valid parameters based on the ways the human behave.

Step length, Stride length, Cadence and Velocity are considered as temporal components. Step length and stride lengths are computed by finding the number of frames in a step and stride which is shown in Fig. 4. Cadence is number of steps /minute and velocity is calculated by the equation given below.

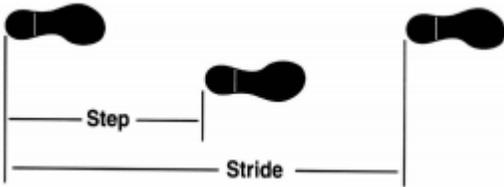Velocity = thstrideleng × 5.0 cadence

Fig. 1: Step and Stride length

2.2 Back propagation Neural Network (BPNN)

Back propagation networks are necessarily multilayer perceptrons (usually with one input; one hidden; and one output layer). To order for the hidden layer to serve any useful function; multilayer networks must have non-linear activation functions for the multiple layers: a multilayer network using only linear activation functions is equivalent to some single layer; linear network. The Non-linear activation functions that are commonly used include the logistic function; the softmax function, and the Gaussian function.

Then back propagation algorithm for calculating a gradient has been rediscovered a number of times, and is a special case of a more general technique called automatic differentiation in the reverse accumulation mode.
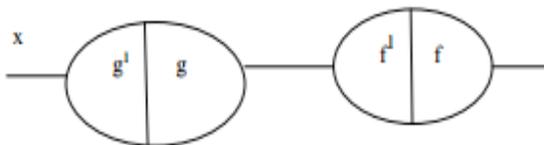

Fig. 2: Network for the composition of two functions.

The B-diagram of Figure 2 contains only two nodes. In the feed-forward step, incoming information into a unit is used as the argument for the evaluation of the node's primitive function and its derivative. In this step the network computes the composition of the functions f and g.
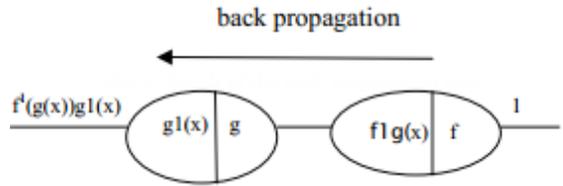

Figure 3 shows the final result of the back propagation step,

which is f0(g(x))g0(x), i.e., the derivative of the function composition f(g(x)) implemented by this network. The back propagation step provides an implementation of the chain rule. The sequence of function compositions can be evaluated in this way and its derivative can be obtained in the back propagation step. We can think of the network as being used backwards with the input 1, whereby at each node the product with the value stored in the left side is computed.

The back propagation algorithm is used to find a local minimum of the error function. Then network is initialized with randomly chosen weights. Therefore gradient of the error function is computed and used to correct the initial weights.

2.3 CCR:

This is used to estimate the accuracy of classification. Adopt the definition of correct classification rate (CCR) provided by as follows:

$$ccr = \sum_{i=1}^{c} p(c_i) \frac{n_i}{N_i} \qquad (1)$$

Where n_i is the number of samples correctly classified to the ith class via the classifier, N_i is the total number of samples in the ith class, $p(c_i)$ is the prior probability that an observed data falls in class c_i

III. Result Discussion

In this section , discuss our result with following figures:
Here work on MATLAB 2012b GUI version.

Fig. 4: Basic layout of the proposed system
Figure 4 outlay of starting of GUI with two button start and exit.

Fig. 5: To load the input video
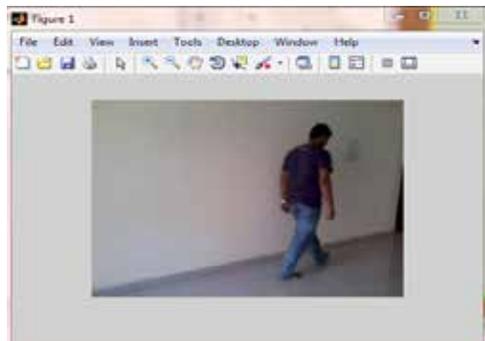In figure 5, upload the video for gait recognition, after clicking start button.

Fig. 6: The frames are been extracted from the input video
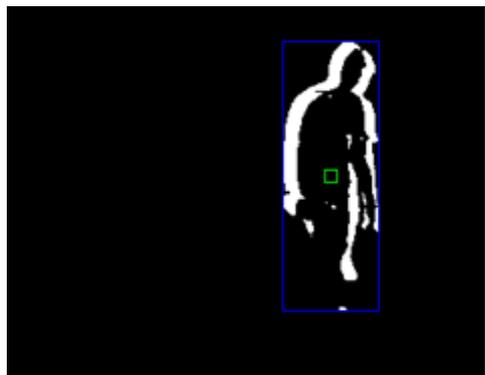In figure 6, show the video which is uploaded.

Fig. 7: The parameters are been calculated.
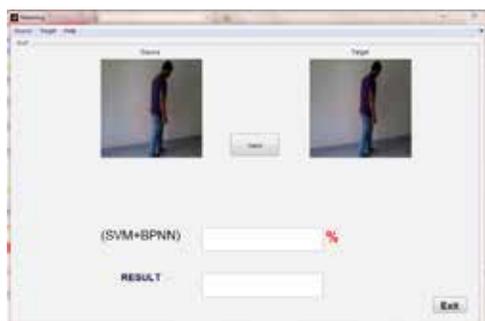Figure 7 shows the centroid of uploading video from its framing.

Fig. 8: The matching is carried out.
This figure 8 GUI layout shows the percentage of Gait recognition after applying SVM and BPNN. Here also have exit button to return out from the process.
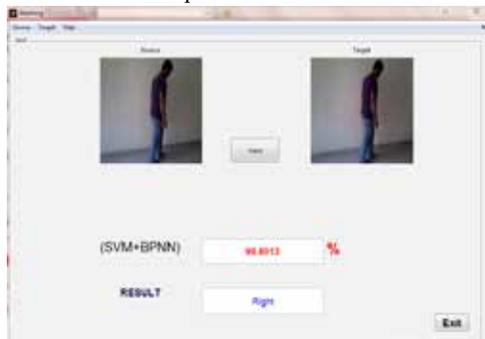

Fig. 9: The outcome of the proposed system.
This figure 9 shows the final result; here CCR percentage of matching of Gait Recognition is 99.8013, which is much better than the previous result.
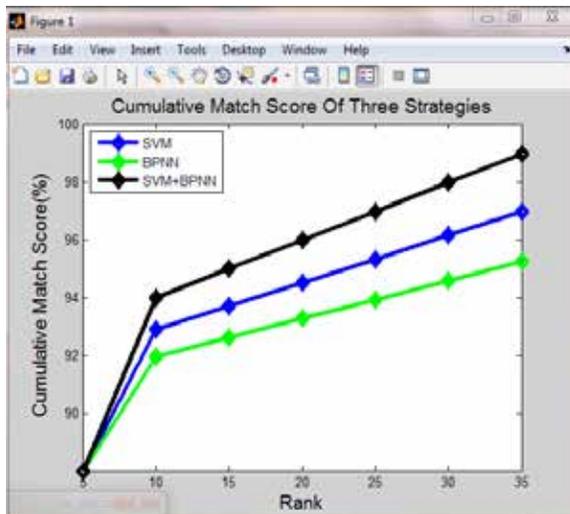

Fig. 10: The graphical representation between the SVM, BPNN and SVM+BPNN.

In figure 10, compare the SVM+BPNN technique with previous techniques. Here find out SVM+BPNN technique is much better than all previous techniques using Gait Recognitions.

IV. Conclusion
This paper gives idea of various systems develop and existing techniques for human recognition based on picture processing. In this paper; basically provide much method of recognition and as to find out best accuracy.

It is shown that the described technique contributes to image based human recognition and classification. Present an overview of the work-package and project partner.

Thereby, input video can be recognised and separated. Further research will be carried out to improve the recognition result and speed.

Therefore the results are very good when considering the time costs with the neural network.

Then implementation to a real system ensures the following important points:

a) Therefore Recognition rate is close to 100 percent.
b) This is a low cost system.
c) Recognition time is very less.

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