

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

Gait Recognition Using Deep Learning

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ABSTRACT: Detection of moving gait in video streams is the first relevant step of information extraction in many computer vision applications. Aside from the intrinsic usefulness of being able to segment video streams into moving and background components, detecting moving gait provides a focus of attention for recognition, classification, and activity analysis, making these later steps more efficient. We propose an approach based on self organization through artificial neural networks, widely applied in human image processing systems and more generally in cognitive science. The proposed approach can handle scenes containing moving backgrounds, gradual illumination variations and camouflage, has no bootstrapping limitations, can include into the background model shadows cast by moving gait, and achieves robust detection for different types of videos taken with stationary cameras. We compare our method with other modelling techniques and report experimental results, both in terms of detection accuracy and in terms of processing speed, for color video sequences that represent typical situations critical for video surveillance systems.

I. INTRODUCTION

The identification of objects in an image. This process would probably start with image processing techniques such as noise removal, followed by (low-level) feature extraction to locate lines, regions and possibly areas with certain textures. The clever bit is to interpret collections of these shapes as single objects, e.g. cars on a road, boxes on a conveyor belt or cancerous cells on a microscope slide. One reason this is an AI problem is that an object can appear very different when viewed from different angles or under different lighting. Another problem is deciding what feature belong to what object and which are background or shadows etc. The human visual system performs these tasks mostly unconsciously but a computer requires skillful programming and lots of processing power to approach human performance. Manipulating data in the form of an image through several possible techniques. An image is usually interpreted as a two-dimensional array of brightness values, and is most familiarly represented by such patterns as those of a photographic print, slide, television screen, or movie screen. An image can be processed optically or digitally with a computer.

II. EXISTING SYSTEM

In the first part of this overview a number of the most popular commercial intelligent surveillance systems are described. Main solutions which were identified in extensive research of the market as well as systems developed by ADDPRIV Partners in the past are included. Subsequently, several so called smart surveillance cameras with integrated visual processing modules are presented. This description is followed by an introduction to similar security related projects. The specifications which are discussed in the following sections contain a number of quotations from producer technical specifications, advertising materials and other descriptions. To improve clarity of this document, the quotation marks were omitted, thus the paragraphs containing a significant number of citations are shaded with grey background.

III. PROPOSED SYSTEM

Intelligent video surveillance systems deal with the real-time monitoring of persistent and transient gait within a specific environment. A low-cost intelligent wireless security and monitoring solution using moving object

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recognition technology is presented in this project. The subtraction of the current captured image and the background reaches a certain threshold, a moving.

IV. ALGORITHM USED

Background subtraction

BLOCK DIAGRAM

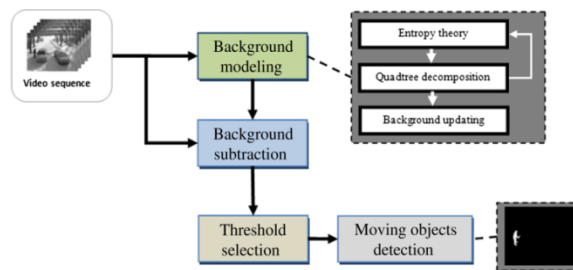


Fig: Block Diagram 1

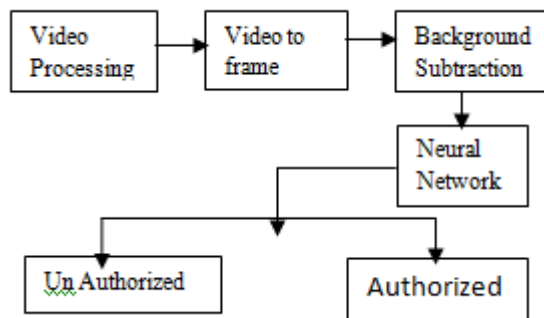


Fig:Block Diagram 2

Video processing:-

In electronics engineering, video processing is a particular case of signal processing, in particular image processing, which often employs video filters and where input & output signals are video files or video streams. Video processing techniques are used in televisionsets, VCRs, DVDs, videocodec's, video players, video scalars and other devices. For example—common only design and video processing is different in TV sets of different manufactures.

Frame separation:-

An Input Video (.avi files) are converted into still images for processing it and detect the moving objects. These sequence of images gathered from video files by finding the information about it through 'aviinfo' command. These frames are converted into images with help of the command 'frame2im' Create the name to each images and this process will be continued for all the video frames.

Background Subtraction:-

Background subtraction is a major preprocessing step in many vision-based applications. For example, consider

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the case of a visitor counter where a static camera takes the number of visitors entering or leaving the room, or a traffic camera extracting information about the vehicles etc. In all these cases, first you need to extract the person or vehicles alone. Technically, you need to extract the moving foreground from static background. If you have an image of background alone, like an image of the room without visitors, image of the road without vehicles etc, it is an easy job. Just subtract the new image from the background. You get the foreground objects alone. But in most of the cases, you may not have such an image, so we need to extract the background from whatever images we have. It becomes more complicated when there are shadows of the vehicles. Since shadows also move, simple subtraction will mark that also as foreground. It complicates things.

Background Subtraction

- As the name suggests, background subtraction is the process of separating out foreground objects from the background in a sequence of video frames.

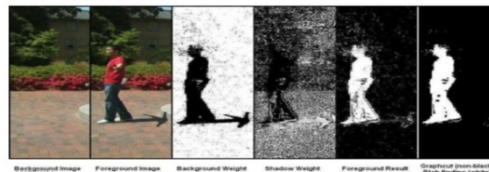


Fig:Background Subtraction

Neural Network:

Neural networks are predictive models loosely based on the action of biological neurons. The selection of the name “neural network” was one of the great PR successes of the Twentieth Century. It certainly sounds more exciting than a technical description such as “A network of weighted, additive values with nonlinear transfer functions”. However, despite the name, neural networks are far from “thinking machines” or “artificial Leafs”. A typical artificial neural network might have a hundred neurons. In comparison, the human nervous system is believed to have about 3×10^{10} neurons. We are still light years from “Data”. The original “Perceptron” model was developed by Frank Rosenblatt in 1958. Rosenblatt’s model consisted of three layers, (1) a “retina” that distributed inputs to the second layer, (2) “association units” that combine the inputs with weights and trigger a threshold step function which feeds to the output layer, (3) the output layer which combines the values. Unfortunately, the use of a step function in the neurons made the perceptions difficult or impossible to train. A critical analysis of perceptrons published in 1969 by Marvin Minsky and Seymour Papert pointed out a number of critical weaknesses of perceptrons, and, for a period of time, interest in perceptrons waned. Interest in neural networks was revived in 1986 when David Rumelhart, Geoffrey Hinton and Ronald Williams published “Learning Internal Representations by Error Propagation”. They proposed a multilayer neural network with nonlinear but differentiable transfer functions that avoided the pitfalls of the original perceptron’s step functions. They also provided a reasonably effective training algorithm for neural networks.

Types of Neural Networks:

Artificial Neural Network

- 1) Back propagation networks
- 2) General Regression Neural Networks

DTREG implements the most widely used types of neural networks: a) Multilayer Perceptron Networks (also known as multilayer feed-forward network), b) Cascade Correlation Neural Networks, c) Back propagation networks (BPN) d) General Regression Neural Networks (GRNN). This network has an **input layer** (on the left) with three neurons, one **hidden layer** (in the middle) with three neurons and an **output layer** (on the right) with three neurons. There is one neuron in the input layer for each predictor variable. In the case of categorical variables, $N-1$ neurons are used to represent the N categories of the variable.

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V. BACK PROPAGATION ALGORITHM

Consider a network with a single real input x and network function F . The derivative $F'(x)$ is computed in two phases: **Feed-forward**: the input x is fed into the network. The primitive functions at the nodes and their derivatives are evaluated at each node. The derivatives are stored. **Back propagation**: The constant 1 is fed into the output unit and the network is run backwards. Incoming information to a node is added and the result is multiplied by the value stored in the left part of the unit. The result is transmitted to the left of the unit. The result collected at the input unit is the derivative of the network function with respect to x .

VI. STEPS OF THE ALGORITHM

The back propagation algorithm is used to compute the necessary corrections, after choosing the weights of the network randomly. The algorithm can be decomposed in the following four steps: i) Feed-forward computation ii) Back propagation to the output layer iii) Back propagation to the hidden layer iv) Weight updates. The algorithm is stopped when the value of the error function has become sufficiently small. The following figure is the notation for three layered network, Although the implementation is very different, back propagation networks are conceptually similar to *K-Nearest Neighbor* (k-NN) models. The basic idea is that a predicted target value of an item is likely to be about the same as other items that have close values of the predictor variables. Consider this figure:

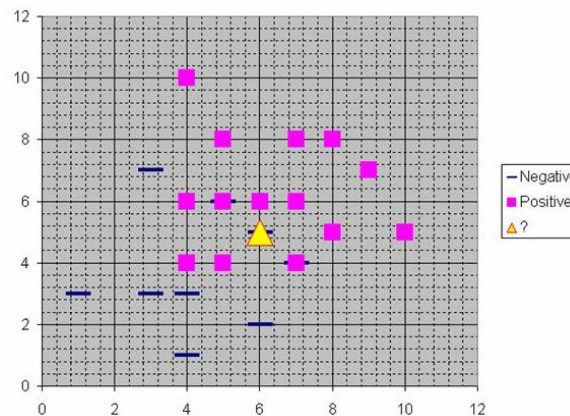


Fig: Three Layered Network

Assume that each case in the training set has two predictor variables, x and y . The cases are plotted using their x, y coordinates as shown in the figure. Also assume that the target variable has two categories, *positive* which is denoted by a square and *negative* which is denoted by a dash. Now, suppose we are trying to predict the value of a new case represented by the triangle with predictor values $x=6, y=5.1$. Should we predict the target as positive or negative? Notice that the triangle is position almost exactly on top of a dash representing a negative value. But that dash is in a fairly unusual position compared to the other dashes which are clustered below the squares and left of center. So it could be that the underlying negative value is an odd case. The nearest neighbor classification performed for this example depends on how many neighboring points are considered. If 1-NN is used and only the closest point is considered, then clearly the new point should be classified as negative since it is on top of a known negative point. On the other hand, if 9-NN classification is used and the closest 9 points are considered, then the effect of the surrounding 8 positive points may overbalance the close negative point. The further some other point is from the new point, and it has less influence.

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