Scientific Journal of Impact Factor (SJIF): 5.71
e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 5, Issue 06, June -2018

SWARM INTELLIGENCE FOR DETECTING INTERESTING EVENTS IN CROWDED ENVIRONMENTS

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Abstract—*This paper focuses on detecting and localizing abnormal events in videos of crowded scenes, i.e. divergences from a dominant pattern. Both motion and appearance information are thought-about, so as to robustly distinguish utterly totally different types of anomalies, for a wide range of things.To capture motion we ll use well known technique Histogram Of Gradients.And to capture Appearance we ll use Neural Networks. These appearance and motion options space unit only extracted at intervals spatiotemporal volumes of moving pixels to make sure strength to native noise, increase accuracy in the detection of local, nondominant anomalies, and achieve a lower machine worth.*

Key words: *Anomaly,Histogram of Gradients,Neural Network.*

Introduction: Video Processing for detection or Video Surveillance is the monitoring of the behavior, activities, or other changing information, usually of people for the purpose of influencing, managing, directing, or protecting them. Through CCTV cameras or internet traffic or phone calls the movements are observed. Video Analysis is used for intelligence gathering, the prevention of crime, the protection of a process, person, group or object, or for the investigation of crime. It can also help to reconstruct an incident through the availability of footage for forensics experts. But it has disadvantage of the visibility, complexity, partial destruction of network degrade the performance of system. The above drawbacks are overcome by using neural networks. Neural networks offer a number of advantages, including requiring less formal statistical training, fast computation. Less data requirement ,ability to implicitly detect complex nonlinear relationships between dependent and independent variables, ability to detect all possible interactions between predictor variables. Which have many interesting applications to use.

Background Subtraction

This algorithm is used for background subtraction for moving objects. A weighted average is an average that has multiplying factors to give different weights to data at different positions in the sample window. Mathematically, the moving average is the convolution of the datum points with a fixed weighting function. One application is removing pixelisation from a digital graphical image. In technical analysis, a weighted moving average (WMA) has the specific meaning of weights that decrease in arithmetical progression. In an n-time WMA the latest time has weight n, the second latest $n - 1$, etc., down to one

Karhunen-Loeve Transform (K-L Transform)

The Karhunen-Loeve Transform (KLT) is the linear transformation that accomplishes the representation that requires fewer bits for encoding than the original image. This is possible for images because, in their “raw” form, they contain a high degree of redundant data. Most images are not haphazard collections of arbitrary intensity transitions. Every image we see contains some form of structure. As a result, there is some correlation between neighboring pixels. K.L transform removes the redundancy by decorrelating the data, then an image can be stored more efficiently. The basis vectors of the KLT are the eigen vectors of the image covariance matrix. Its effect is to diagonalize the covariance matrix, removing the correlation of neighboring pixels.

Histogram of Oriented Gradients (HOG) Descriptor

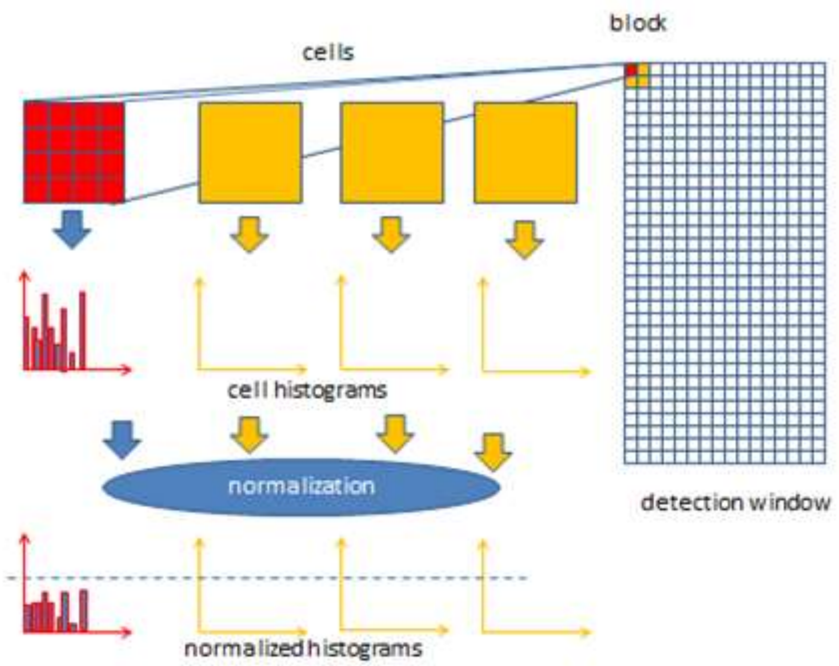
Histogram of oriented gradients (HOG) is a feature descriptor used to detect objects in computer vision and image processing. The HOG descriptor technique counts occurrences of gradient orientation in localized portions of an image - detection window, or region of interest (ROI).

Implementation of the HOG descriptor algorithm is as follows:

- Divide the image into small connected regions called cells, and for each cell compute a histogram of gradient directions or edge orientations for the pixels within the cell.
- Discretize each cell into angular bins according to the gradient orientation.
- Each cell's pixel contributes weighted gradient to its corresponding angular bin.

- Groups of adjacent cells are considered as spatial regions called blocks. The grouping of cells into a block is the basis for grouping and normalization of histograms.
- Normalized group of histograms represents the block histogram. The set of these block histograms represents the descriptor.

The following figure demonstrates the algorithm implementation scheme:



Computation of the HOG descriptor requires the following basic configuration parameters:

A. Masks to compute derivatives and gradients

B. Geometry of splitting an image into cells and grouping cells into a block

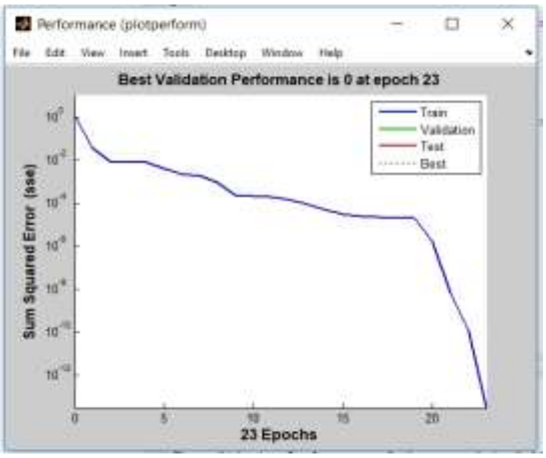
C. Block overlapping

D. Normalization parameters

Neural Networks: Neural neworks are typically organized in layers. Layers are made up of a number of interconnected 'nodes' which contain an 'activation function'. Patterns are presented to the network via the 'input layer', which communicates to one or more 'hidden layers' where the actual processing is done via a system of weighted 'connections'. The hidden layers then link to an 'output layer' where the answer is output as shown in the figure below. Most ANNs contain some form of 'learning rule' which modifies the weights of the connections according to the input patterns that it is presented with.

Backward Propagation errors or Back Propagation in Neural Networks: The backward propagation of errors or backpropagation, may be a common technique of coaching artificial neural networks associate degreed employed in conjunction with an optimisation technique like gradient descent. The algorithmic program repeats a 2 section cycle, propagation and weight update. once associate degree input vector is bestowed to the network, it's propagated forward through the network, layer by layer, till it reaches the output layer. The output of the network is then compared to the required output, employing a loss operate, and a slip price is calculated for every of the neurons within the output layer. The error values area unit then propagated backwards, ranging from the output, till every somatic cell has associate degree associated error price that roughly represents its contribution to the first output. Backpropagation uses these error values to calculate the gradient of the loss operate with reference to the weights within the network. within the second section, this gradient is fed to the optimisation technique, that successively uses it to update the weights, in an endeavor to attenuate the loss operate. The importance of this method is that, because the network is trained, the neurons within the intermediate layers organize themselves in such some way that completely different|the various} neurons learn to acknowledge different characteristics of the whole input house. once coaching, once associate degree impulsive input pattern is gift that contains noise or is incomplete, neurons within the hidden layer of the network can respond with an energetic output if the new input contains a pattern that resembles a feature that the individual neurons have learned to acknowledge throughout their coaching.

Results



(a)

(b)

When program is runned on the MATLAB software it shows above results. In image (a) shows performance of the training of the Neural Network. The multilayer feedforward neural network is the workhorse of the Neural Network Toolbox software. It can be used for both function fitting and pattern recognition problems. With the addition of a tapped delay line, it can also be used for prediction problems.In image (b) it shows Anomaly detected in a video file.

Conclusion

In this work, here propose a novel framework for abnormal event detection in different scenarios, recorded from static surveillance cameras. Video analysis is exploited for the extraction of robust motion characteristics and together, with appearance features, form a descriptor capable of effectively describing each scene. The high detection rate in the UCSD dataset, that greatly outperforms various state-of-the-art approaches, especially on the most challenging pixel level criterion, demonstrates that the proposed algorithm can be effectively used for challenging crowd videos with many occlusions, local noise and local scale variations. This fact in combination with its low computational cost and its effectiveness in different environments, make algorithm very appropriate for a variety of surveillance applications.

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