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VISION-BASED INTELLIGENT SURVEILLENCE SYSTEM

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Abstract: - Vision-based human detection can be applied in large open spaces for human detection, which has been achieved with camera surveillance systems. The motion estimator exploits some motion features such as color, shape and texture that are used to recognize. The first step of the detection process is to detect an object which is in motion. Object detection could be performed using background subtraction, optical flow and spatio-temporal filtering techniques. Once detected, a moving object could be classified as a human being using shape-based, texture-based or motion-based features. A comprehensive review with comparisons on available techniques for detecting human beings in surveillance videos is presented in this paper. Finally the coding is loaded via serial port to the USB. Now in the hardware part we get an input from camera via serial port then the input signal is send to microcontroller. Once human will be detected buzzer system will get activated. And the information message and call will be send to the authorized person through mobile.

Introduction

In bank sector PIR sensor is still used, due to that the target is at a far distance, its projected image is usually very small with low contrast and does not have adequate structure information for detecting ,which makes the detection is difficult. In recent years, Support Vector Machine (SVM) properties, such as motion features like color, shape and texture that are used to recognize. In these algorithms can improve image contrast and then improve the detection rate. In this letter human detecting algorithm based on SVM is proposed. This method can be reliably in used for surveillance areas like banks, jewellery shops, and financial areas etc.., in this paper image processing technique is used for human detection.

1. Image processing

SVM *contrast mechanism* means that it is the contrast but not the brightness which occupies the most important part in the streams of our visual system. This fact is true in the whole detection process, which will benefit finding the target from the whole IR image with a high detection rate. The DoG filter [15], which is based on HVS *contrast mechanism* and has been used widely in the target detection field, is defined as where $\sigma 1 < \sigma 2$.Generally, the DoG filter is a circularly symmetrical weighted function with positive center and negative surrounding. It can enhance target and suppress background, simultaneously, and then improve detection rate. In addition, $\sigma 1$ and$\sigma 2$ decide the size of the positive center; hence, multi-scale detection can be achieved with variable choices of $\sigma 1$ and $\sigma 2$. In the frequency domain, the DoG filter can be taken as a band pass filter, with $G1$ and $G2$ in (1) specifying the high and low cutoff frequency, respectively. However, DoG is not sensitive to orientation; hence, it cannot distinguish between real targets and complex background edges, which results in a high false alarm rate. However, the DoGb filter may still get nonzero processing results near background edges since it is symmetrical. To better suppress complex background edges, we make some improvements on the DoGb filter: taking the major axis of DoGb(x, y) as boundary, if (i, j) is at the right side of boundary, set DoGb(i, j) to 0 (see Fig. 1, where +A and −A are the sum of all positive and negative weighting coefficients, respectively).

2. Image processing for edge suppression

1) (x, y) and its neighboring pixels are pure background with gray value X .The Processing result will be independent to orientations, and it will be,

$$Iout(x, y) = |AX - AX| = 0.$$

2) (x, y) is near a background edge with smaller gray value X and larger gray value Y at each side the minimum result of

$$Iout(x, y) = |AX - AX| = 0.$$

3) (x, y) is a small target center [see Fig. 2(c)]. The processing Result will be,

$$Iout(x, y) = |AX - \beta AX - (1 - \beta)AY| = (1 - \beta)A|X - Y| > 0 \quad (10)$$

Where β is a coefficient between 0 and 1.

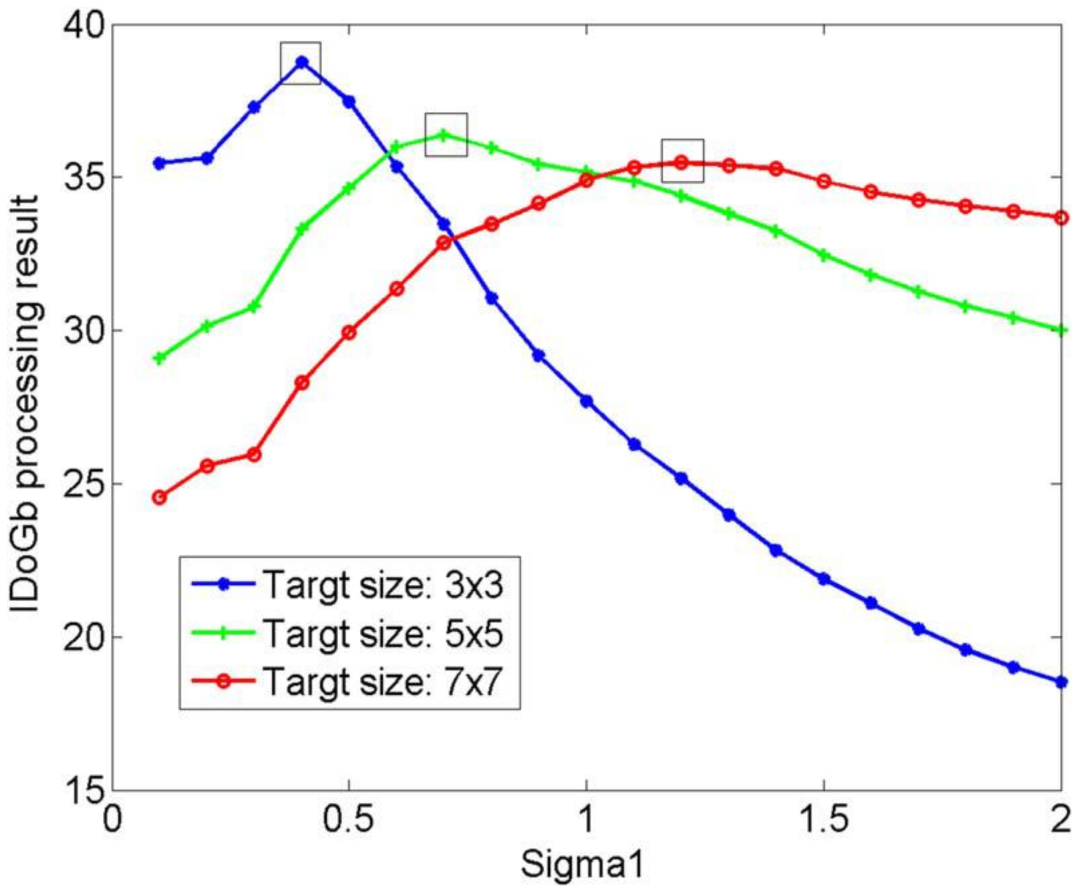


Fig. multi-scale detection using IDoGb filter

1) Calculate the threshold Th of Iout, i.e.,

$$Th = k \text{ maxout} + \text{minout}/k + 1$$

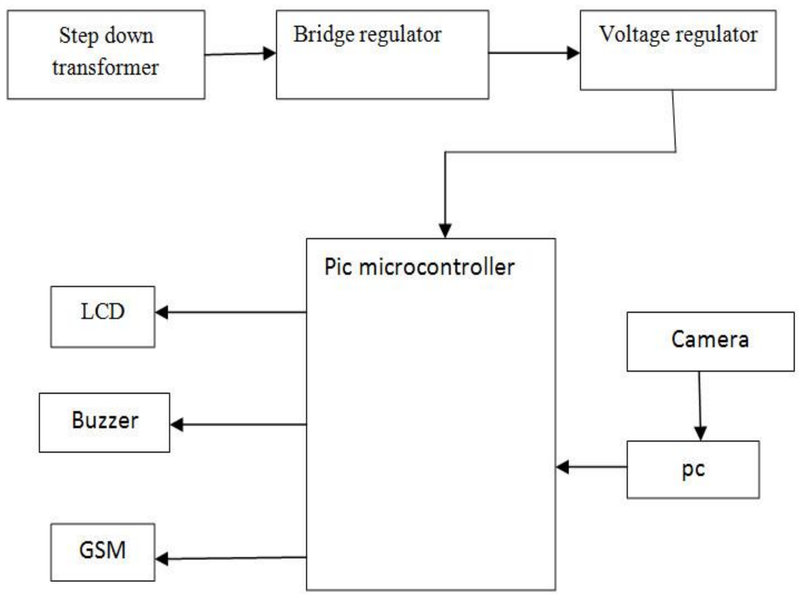
a. Where maxout and minout is the maximum and Iout, respectively, and k is a given parameter. Our experiments show that the optimal range of k is from 10 to 20 for single target detection.

2) Find the maximum value max and its location (i, j) in Iout.
3) If max is larger than Th, output (i, j) as a small target center.
4) Inhibit (i, j) and its neighbor small area with 0, i.e.,

$$I\text{out}(i - r : i + r, j - r : j + r) = 0$$

5) Find the next maximum value max and its location (i, j) in Iout; return to step 3), until max is smaller than Th.

Hardware diagram



3. Comparison with other algorithms

The ROC curve represents the varying relationship of the false positive rate [FPR, defined as (17)] and true positive rate [TPR, defined as (18)]. A better algorithm produces fewer false alarms
At the same detection rate. Thus

FPR =number of detected false targets/number of total pixels in an image

TPR =number of detected true targets/number of total true targets

Conclusion

In this letter, based on SVM, the DoGb filter and its improvement, the IDoGb filter, have been proposed for IR small target detection. The IDoGb filter can improve image contrast, while suppressing background edges. In addition, multi-scale detection can be achieved by different choices of parameters. Experimental results show that the IDoGb filter produces fewer false alarms at the same detection rate, while consuming only about 0.1 s for a single frame. Once human will be detected buzzer system will get activated. And the information message and call will be sending to the authorized person through mobile. This project proposes a new scheme using SVM algorithm. This algorithm produces more accurate results than PIR sensor. Which detect human in more secured places like banks, jewellery shops, financial area etc..

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