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The Population Density of Early Warning System Based On Video Image

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ABSTRACT:- In the large-scale activities held venues, it is very difficult to effectively detect due to the lack of a fixed camera .Four rotor aircraft has been used to test the big activity due to its stability and flexibility. The present stage simply use aerial device for video surveillance. This article will use the image processing technology of aerial shoot video for further analysis of data. Because the camera is shooting from top to bottom, the person's head will be saw .The contour feature can be used as the head of the obvious characteristics of human.In this paper,using the gradient direction histogram features as feature detection and using training support vector machines to detect .

Keywords:-*The number, Population, Machine learning, Four rotor, HOG*

I. INTRODUCTION

With the development of computer technology, the number of method that rely on the artificial cannot meet the contemporary needs. That using computer technology to raise the level of skill the intelligent video surveillance system and reduce the participation of people is the development direction of video surveillance system .It has the extremely important significance via the video monitoring system to precise number. Demographic data video monitoring technology has become a hot and difficult in the field of computer vision.

Now there are many detection methods, most of them are detection method based on machine learning. This detection method has two parts: character description operator; Classification learning algorithm. Character description operator has: haar – like[1]- mainly reflects the image gray level , gradient direction histogram [2] that mainly describes the shape feature, local binary pattern [3]that mainly describes the color feature and edge feature [4]. According to the above, this article uses the HOG description operator and the head contour[5].

In some large places, fixed surveillance camera is not good to all-round monitoring of the crowd. With the development of technology, the aerial device can effectively detect the crowd in a large place.
In this paper, we use the detection method based on the machine learning[6-7].Using the computer image processing technology to shoot video offline which is taken of unmanned aerial vehicle in order to get the crowd density and monitor the situation.

I. THE CROWD DENSITY DETECTION SYSTEM

In this paper, the design of the crowd density detection system has two parts: image acquisition; the image processing. In this article, four rotor aerial apparatus will be used as a source of video image capture. Unmanned aerial vehicles is a new kind of aircraft platform, especially the four rotor unmanned aerial vehicle. With the maturity of the technology in recent years, it has been applied in many fields' meteorological sounding, disaster monitoring and environmental remote sensing. Four rotor unmanned aerial vehicle has low cost, less operation and flexible characteristics [8].
In this paper, the design of system's basic structure is shown in the figure below:

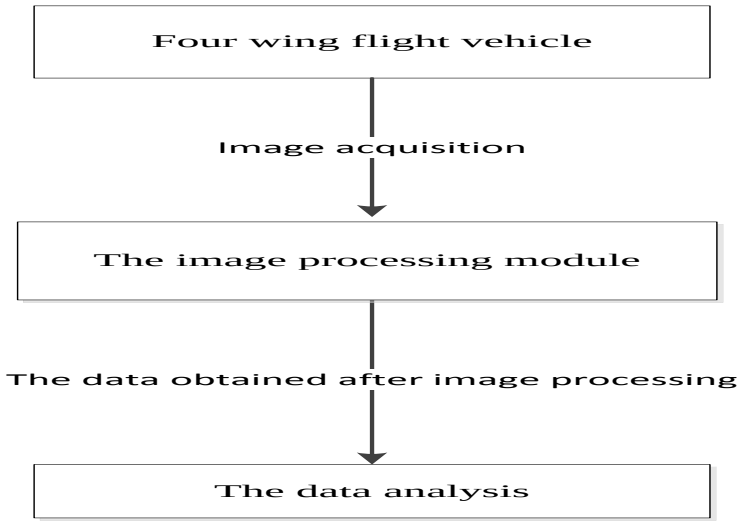

Fig. 1 population density detection system basic structure

THE IMAGE CHARACTERISTICS AND EXTRACTION METHOD

In this paper, the design system is used to solve the problem how to count the number of the people. In order to solve the problem, choosing the pedestrian detection based on machine learning method and choosing the HOG feature and support vector machine (SVM) classification training method for counting for pedestrians. Choosing the right characteristics is the very important to improve the detection accuracy and speed. The following will introduce some related features and extraction method.

A. ***The Image Characteristics***

Image features kinds roughly is divided into three types: color features; texture feature; shape features. Color features is the basic characteristics of the image. It can represent the image of the important information. At the same time, because the color feature belongs the stability and simple calculation, the color feature is one of the most widely used features.

Texture feature represents the information of the structure of the image on the space. It is used to describe the image features such as roughness, smoothness and regularity. It is a kind of local characteristics of image.

Shape feature is a global feature of image. Most of the different objects have the different shapes, so it can distinguish between different targets.

B. HOG Characteristic Features And Extraction Method

In this article, the video resources come from the aerial apparatus. The obvious features of the human body is the head contour, so shape features will be chose when choosing features.

This paper, by using gradient direction histogram feature of pedestrian detection method, it was studied by Dalal[9].It is the similar with the local descriptor of SIFT features and it is the feature extraction method based on image edge information. HOG implementation process[10-12] : HOG feature extraction method is the one you want to detect the target or scan window:

1) Gray scale (see image as an x, y, z (gray) 3 d image).
2)The Gamma correction method is adopted to the standardization of the input image color space (normalized) .It is used to adjust the contrast of image, reduce the image local changes caused by the shadow and light and restrain the interference of noise at the same time;
3) Calculating each pixel of image gradient (including size and direction) is in order to capture the contour information, at the same time, further weaken the interference of light.
4) The image was divided into small cells;
5) Statistics of each cell of the gradient histogram (the number of different gradient), then the descriptor of each cell is formed;
6) Each of several cell make up the block, all within a block of cell feature descriptor together and get the HOG feature descriptor of the block.

7) All the images in the image block of HOG feature descriptor together can get the HOG feature descriptor of the image. This is final for the classification of feature vector.

SUPPORT VECTOR MACHINE ALGORITHM

Support vector machine (SVM) is a kind of classification algorithm. It improves the generalization ability and learning machine, minimizing empirical risk and confidence limit by seeking structured minimum. It can obtain good statistical law under the condition that the statistical sample size is less. It is a kind of second class classification basic model that is defined as the feature space interval on the maximum linear classifier. The support vector machine (SVM) learning strategies is the maximum interval, finally it can be converted into a convex quadratic programming problem to solve.

A. SVM Training Process

Selecting multiple times square polynomial kernel function. The training samples is mapped to high-dimensional feature space. Using the SVM in the feature space to find optimal separating hyper plane that is formed of all kinds of features sample, on behalf of all the sample characteristics of support vector set, and them forming determine the characteristics of the categories of discriminant function..

B. The SVM Decision Process

To make role map in the feature space by be as input of discriminant function. Finally using classification decision function to reach the results that can ban divided into second class.

C. The Role The Kernel Function

Converting the input to discriminant function that is form of each sample transformation the of support vector set. Finally, we can classify the data.

. **THE REALIZATION OF THE SYSTEM**

A. General Overview

HOG feature and support vector machine (SVM) is introduced in detail above related theory and this section will introduce a HOG feature and support vector machine (SVM) based pedestrian detection algorithm. Pedestrian detection algorithms are divided into two parts: training and testing. Training is to find enough positive and negative samples to train a binary classifiers. The main task of the detection is to scan the image intensively and use the classifier to make decisions. Specific algorithm process is shown in the figure below:

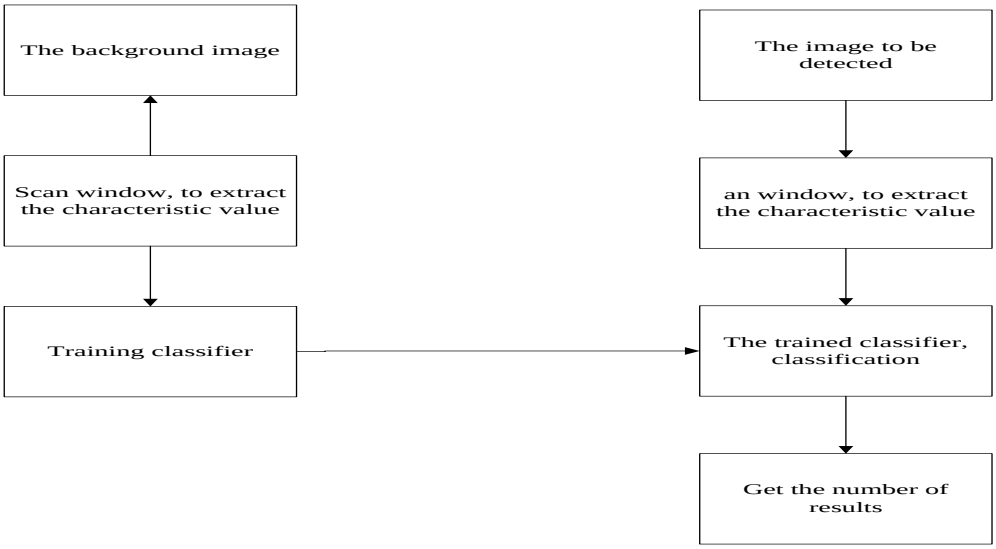

Fig. 1 Detection algorithm process

B. The training of the classifier

When classifier is trained, sample library needs to be build. Interception of positive samples contain only the shoulder part of the pedestrian.

There're a total of 500 samples in this sample library, some samples are shown in the figure below:

Fig.3 Positive samples

In this article the negative sample library of all samples mainly come from landscapes, animals, cars and pedestrians. There are a total of 500 samples, some samples as shown in the figure below:

Fig.4 Negative samples

After receiving the above samples library, the following is to calculate the positive and negative samples HOG feature vectors.Using support vector machine (SVM) to get HOG feature set for training. SVM classifier training process includes two stages: the first stage is to train initial classifier. The second stage is to use the initial classifier to negative sample for inspection. Using the samples of these difficulties and the original samples trains initial classifier .The flow chart is shown in the figure below:

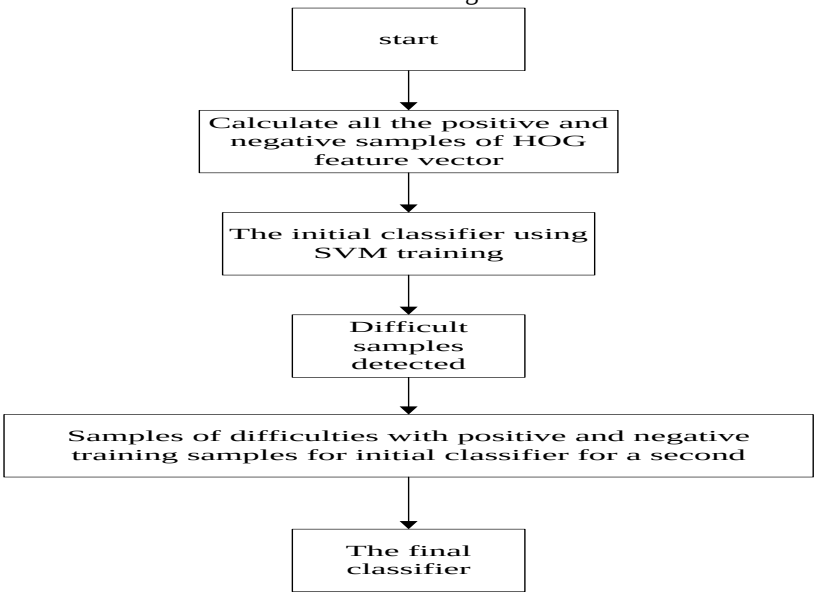

Fig.5 Train flow diagram

C. ***The experimental results***

Loading a picture in the written application and to test it, the picture is as follows:

Fig.6 Test images

To run the program, the result is shown in the figure below:

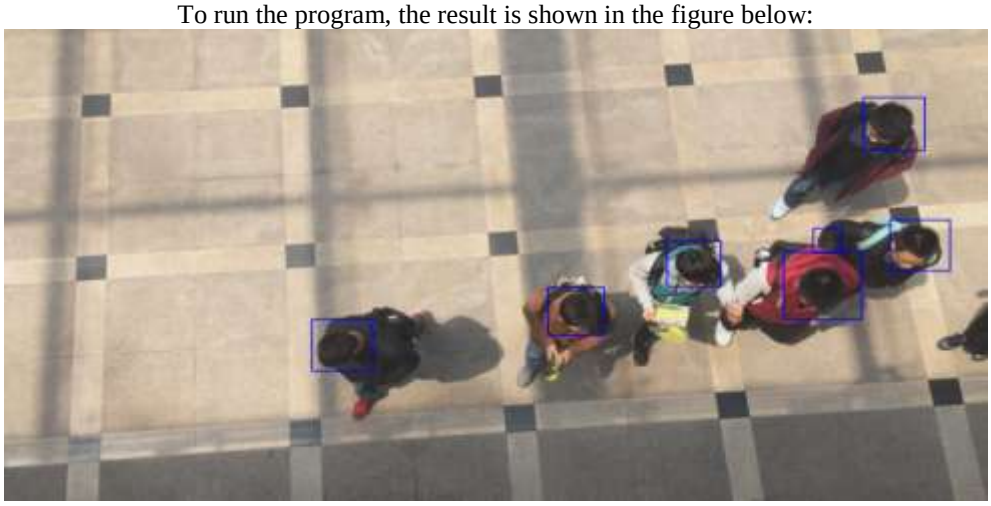

Fig.7 Test results

The result the picture of the test is seven, but in fact the number of people is only six, with 86% accuracy. By analyzing the image, the reason is that the people of the bent arm is similar to circle is identified. The problem can be solved by increasing the number of samples to solve the problem.

II. CONCLUSION

In this paper, HOG features is more suitable because of the video shoot by vehicle. Algorithm of support vector machine is chose due to that the algorithm has high classification efficiency. This paper introduces the number of test methods based on the HOG head contour of the human body. Using the feature extracted in the samples can train the SVM. The target image can be identified by the SVM that has been trained .The number of experiments show that this method can be taken of aerial video effectively the count of the number, there are more effective recognition effect.

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