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The Research Application Situation And Outlook Of Moving Target Detection And Tracking Technology

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ABSTRACT:With the rapid development of information technology and the increasing importance of security te chnology, the design and realization of the intelligent monitoring system has become particularly important. Tar get tracking is a key part of video surveillance system, which is the foundation of pattern recognition, behavior a nalysis and other advanced signal processing. Therefore, the target detection and tracking is an important researc h project. At present, aimed at one or more target tracking has already had many kinds of algorithm methods. T his article mainly briefly outline the characters and development situations of different methods and give a brief introduction to the situation of application of target tracking technology. For related personnel reference.

KEYWORDS: *-Target detection,Target tracking,Analysis of behavior,particle filter*

I. INTRODUCTION

In recent years, due to the improved computer property, more and more scholars began to study related projects based on machine vision technology, using the computer simulation of human vision to implement the intelligent of the contemporary life. Among them, moving target detection and tracking based on machine vision technology is an important aspect of computer vision technology application[1-5].

Target detection and target tracking mainly aim to accurately detect the moving object in video, reasonably and accurately track the target feature so that target location, size, rotation angle posture and movement information are obtained, classified and identified, considering the real-time operability of algorithm as well.

The authors found that there's almost no literature summarizing the existing methods. This paper introduces the application situation and research status of the target detection and tracking technology and forecasts the outlook of this technology

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II. THE APPLICATION OF TARGET DETECTIONAND TRACKING TECHNOLOGY

Target tracking technology has been widely used in many fields, such as intelligent video surveillance, intelligent human-computer interaction, robot visual navigation, precision guidance system[6-9], etc

In the intelligent monitoring system, using image processing techniques for moving object in video sequences, such as people, vehicle and so on carries on the real-time detection, tracking, and analyze its behavior, determine whether the behavior is unusual. If any abnormal behavior, timely alarm and inform the relevant staff to deal with abnormal behavior. In the process, target tracking technology at the core, only to accurately in real time tracking moving target, better for subsequent processing, and for the analysis of abnormal behavior.

In the field of target tracking, intelligent human-computer interaction is a hot topic innovation direction. With the development of the society and the improvement of people living spirit. More and more people have not satisfied with the traditional way of human-computer interaction, but look forward to more freedom, more natural and humane way to interact with the computer. At present, in the aspect of intelligent human-computer interaction has a lot of achievements. A British science and technology team is looking at " Portable sign language translation " , Microsoft launched the " Phantosys " and IVR system of call center, voice dialing in the intelligent mobile terminal, and voice navigation system, etc. In the field of tracking, mainly by tracking the head or hand, and analyze its behavior, the computer can carry out the intelligence to perform actions.

Intelligent video surveillance system is to use image processing, pattern recognition, computer vision technology, through the common video monitoring system, intelligent video analysis module is added to the using the computer a powerful data processing ability automatically ignore irrelevant information, identify different goals, to obtain useful information in the video, fast accurate positioning accidents, judging the

abnormal behavior of monitoring, alarm or trigger other actions, and effective early warning, beforehand matter processing, intelligent video later forensics system.

In the intelligent video, surveillance system without human intervention automatically deal with video, including like motion detection and tracking, and abnormal behavior detection and gesture recognition and other activities. Relying on long- time manpower for video monitoring is high costs, high investments and unrealistic. Intelligent video monitoring system of automatic motion detection effect is far better than human's attention. The realization of the function of intelligent video surveillance system is mainly composed of the following three parts: target detection, target tracking, behavior analysis. Target detection is separated from the static background and a moving target. It is the first step in video analysis and the most basic step. Target tracking method in the target in the first frame of target detection is required or is in each frame of video target detection. Behavior analysis is the premise of the system can accurately detect moving targets. So the stand or fall of target detection effect is directly related to the follow-up of the effect of tracking and behavior analysis, in the intelligent monitoring system plays a vital role.

III. TARGET DETECTION AND TRACKING ALGORITHMRESEARCH METHODS AND THE PRESENT SITUATION

Target tracking[10-14] mainly divided into two aspects: Single target tracking and multi-target tracking. In single target tracking, mainly interest in target tracking, positioning, and analyzes its behavior. At present, many scholars have devoted to the study of the single target tracking, the Particle Filter can solve the problem of nonlinear non-gaussian, for there is no limit to the noise, is very widely used algorithm. But the Particle Filter also has many shortcomings, such as real-time, particle degradation problems, so the study of the Particle Filter is also a hotspot in the research of the current. In multi-target tracking data association algorithm is a very important part, how to detect and track target goals, as well as the associated accuracy has great influence on the results of tracking. In data association algorithm, joint probability data association through calculating the probability of possible events, tracking target can be obtained with the probability of detection target , is currently accepted good data association algorithm. In addition, multiple target tracking in the target block each other, be background and frequent appearance and disappearance of target are more research hot spot and the difficulty in the target tracking.

The earliest Kalman Filter[15-20] is a kind of filter methods extensively apply, it has the characteristics of unbiased and optimal. However, Kalman Filter needs to assume that the noise is linear, gaussian distribution, for the nonlinear and non-gaussian system, its estimation performance is poor. In view of the nonlinear system, many excellent filtering algorithms have emerged such as extended kalman filtering, no trace of kalman filtering, etc. But extended kalman filter can only solve the problem of weakly nonlinear. Unscented Kalman Filter will occur matrix of positive definite problems in the process of no trace of transform.

Particle Filter method by Gordon is successfully applied in nonlinear and non-gaussian system, and is one of the algorithm which has been widely applied at present. Traditional particle filter algorithm using single information of target tracking, may appear the problem that in the process of tracking character description is not accurate, leading to target lost phenomenon. At present, many algorithms use the information fusion method to improve the accuracy of tracking, but most are characteristics of the right of using the fixed value method.

In 2003, Spengler put forward such as adaptive multiple information fusion tracking method; In 2007, Zhang Bo proposed use Democratic integration strategy to democratically adaptive fusion of multiple information, good results have been achieved; These methods are improved to a great extent based on single target tracking information. In addition, the particles in the process of iteration constantly update, there will be a particle degradation phenomenon, lead to the reduction of diversity of particles. The common method to solve particle degradation phenomenon is Resampling technique.

Data association in multiple target tracking method is an important link. There are a lot of data association methods commonly used in target tracking , one of the most simple is nearest neighbor NN data correlation method, the algorithm will track the target that is associated with adjacent recent detection target, applies only to simple and target less number of scenarios. Probability data association methods only consider the PDA to track the target echo wave gate, other echo is clutter or noise, therefore, the algorithm for moving target is intensive monitoring scenario, correct association is low.Joint probability data association method of JPDA is, for the promotion of probabilistic data association algorithm can calculate the goal of each trace is the result of all the detection probability of target size. MHT algorithm integrated the nearest neighbor data association and the advantages of the joint probability data association, under the condition of the moving target density is higher still have higher accuracy, but the large computational complexity limits its application.

In the process of target tracking, often appears occlusion condition, now needs to estimate target motion state in order to continue to track the target. At present, the commonly used prediction tracking algorithms are Kalman optimal estimation filter, extended Kalman algorithm, no trace of Kalman filter and Mean Shift tracking algorithm, etc. These algorithms based on the current target motion state, the target is

obtained by the motion equation of state of prediction, and then based on the system observation location update for the forecast of the target, and the final state of target is obtained.

IV. CONCLUSION

With the development of computer science and technology, human demand for the accuracy of target tracking and other performance will become more and more demanding. The whole process of target tracking in essence, in fact is a solution for scientists at the location of the object in video sequences, width, speed and the rotation Angle of the state of the problem. In decades of scientific research, although scientists have achieved a lot of technical difficulties breakthrough, however, due to the complexity of the practical emergency scenarios and frequently, make science and technology in the real application of all kinds of unexpected situation, there are many factors that affect tracking performance, so in terms of target tracking, will still have a lot of problems need people continue to study and solve. It is because of the above difficulties, still need to find an ideal tracking algorithm domestic and foreign scholars to study and improve continuously.

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