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Design of a Home Surveillance System Based on the Android Platform

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ABSTRACT

Background subtraction methods are widely exploited for moving object detection in videos in many applications, such as traffic monitoring, human motion capture and video surveillance. How to correctly and efficiently model and update the background model and how to deal with shadows are two of the most distinguishing and challenging aspects of such approaches. This work proposes a general-purpose method which combines statistical assumptions with the object-level knowledge of moving objects, apparent objects (ghosts) and shadows acquired in the processing of the previous frames. Pixels belonging to moving objects, ghosts and shadows are processed differently in order to supply an object-based selective update. The proposed approach exploits gray color information for both background subtraction to improve object segmentation. The approach proves fast, flexible and precise in terms of pixel accuracy. The implementation of the background subtraction algorithm is done in two domains code is written in Matlab, then using Simulink blocks sets.

Keywords: Motion detection, Background subtraction algorithm, real time, Matlab/ Simulink, Xilinx.

I. INTRODUCTION

This Project we will design and implements a video surveillance system based on the smart Android terminal equipment. This system consists of two parts, including the server and the client. The server is responsible for the video acquisition and the H.264 video encoding. The video transmission uses RTP protocol. The client is responsible for receiving data, and completing the decoding and playback. Because of the limited storage capacity of mobile devices, the server implements the face detection function, which only stores the critical information. This monitoring system is applied to Android phones which are used for the elderly. Customers can get information about the old people at home by using this monitoring system. It can provide emergency alert about emergency situations. This system has a good mobile performance and transmission stability. It is intelligent, convenient and practical.

Motivation:

Our country is a populous country. According to statistics, in 2013, our elderly population (60 years and older) is more than two hundred million. With the arrival of the aging population of our society, the demand for home monitoring products is more and more urgent. Therefore, in this article, we will implement the application of home monitoring on the platform of Android mobile phone. This system is divided into two parts, including the server-side and the client-side. It uses the wireless network to transmit data. This system has better mobility, and it responds to emergency situations more timely.

Problem Definition

The traditional video surveillance is usually based on PC to implement the monitoring system. However the mobility of PC is poor. It needs someone to guard in front of the monitoring equipment, which often brings a lot inconvenience to the monitoring. In order to meet the demand of market, mobile, high definition, and intelligent will be the future development trend of the surveillance technology. With the enhancement of the performance of intelligent machines, as well as the rapid development of Wi-Fi technology, the boom of mobile Internet has arrived. The video surveillance technology encounters a new development opportunity.

Objectives

- To Stream Video using android device

- Video should be encoded before Sending to network
- Video Decoding requires authorization
- Face Detection
- Motion Detection.

The organization of this document is as follows. In Section 2 gives literature survey, Section 3 gives details of system architecture. In Section 4 presents research findings and your analysis of those findings. Section 5 concludes the paper.

II. LITERATURE SURVEY

The video surveillance has long been in use for monitoring security sensitive areas for examples banks, department stores, traffic monitoring on highway, public places which are crowded. Due to the advanced technology the large capability of storage devices are available.

The motion detection methods are classified according to the method of finding moving object [1]. Different motion detection methods are described as follows:

1) Temporal differencing: The Frame differencing method uses the two or three adjacent frame based on time series image to subtract and gets difference images, its working is very similar to background subtraction after the subtraction of image it gives moving target information through the threshold value. This method is [3,4] simple and easy to implement, and also it is similar to the background subtraction. But this method is highly adaptive to dynamic scene changes , however, it generally fails in detecting whole relevant pixels of some types of moving objects. Additional methods need to be adopted in order to detect stopped objects for the success of higher level are computationally complex and cannot be used real-time without specialized hardware.

2) Background subtraction: it is particularly a commonly used technique for motion segmentation in static images. It will detect moving regions by subtracting the current image pixel-by-pixel from a reference background image that is created by averaging images over time in an initialization period. The basic idea of background subtraction method is to initialize a background firstly, and then by subtracting current frame in which the moving object present that current frame is subtracted with background frame to detect moving object. This method is simple and easy to realize, and accurately extracts the characteristics of target data, but it is sensitive to the change of external environment, so it is applicable to the condition that the background is known[4].

3) Optical flow: The optical flow method uses the motion target of the vector characteristics which changed with time to detect motion area in image sequences. It gives better performance under the moving camera, but this algorithm is very complex and complicated computation and also it needs special hardware support, so it is difficult to meet the requirements of real-time video processing [7].

III. PROPOSED SYSTEM

A. System Architecture

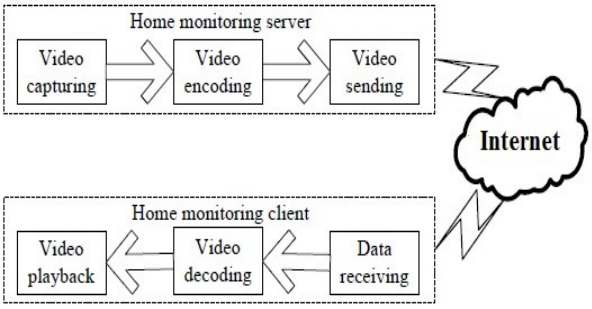

Figure 1. Block Diagram of System

- Video Capture: A client device in home will be in video recording mode.
- Video Encoding: After a video is recorded it will be encoded using H.264 video encoding technique.
- Video Sending: As limited storage capacity of mobile devices, Video will be stored on server in encoded format.
- Server Functionality: Due to resource limitation on client side face detection or motion detection will be carried out on server side
- Data Receiving: A Tracker client device will receive data from server
- Video Decoding: A Tracker client device will decode the receive data from server
- Video Playback: A Tracker client device will play a decoded video.

B. Models of Project

1. Client and Device registration Module (Figure 2)

- Input: User Details eg. Name, email, sim no, tracker no.
- Output: All the data will registered to web server and user successful registration message will appear.

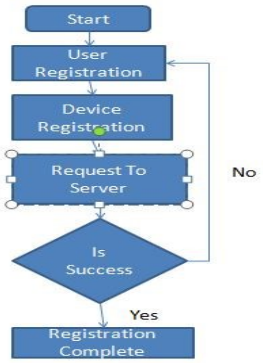

Figure 2. Client and Device registration Module

2. Video Capture Module(Figure 3)

Input: Recording Video

- Output: Recorded Video

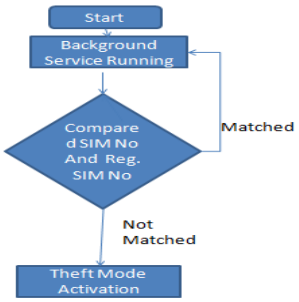

Figure 3. Video Capture Module

3. Video Encoding Module(Figure 4.)

- Input: Recorded Video
- Output: H.264 Encoded Video.

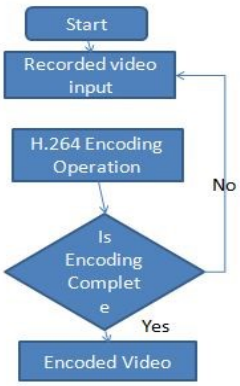

Figure 4. Video Encoding Module

4. Video Sending Module (Figure 5)

- Input: Encoded Video
- Output: Video Registered at server

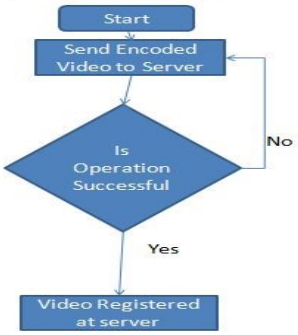

Figure 5. Video Sending Model

5. Face Detection and Motion Detection Module. (Figure 6)

- Input: Recorded video at server side
- Output: Alert if face or motion detected

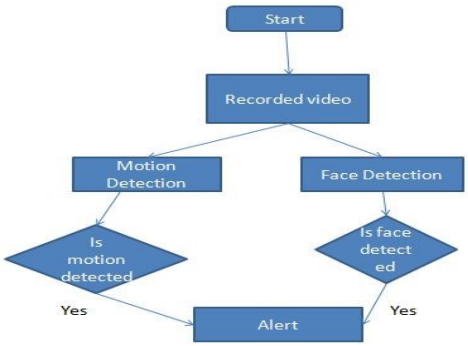

Figure 6. Face Detection and Motion Detection Module

6. Tracker Video Receiving Module (Figure 7)

- Input: Receive Command from tracker to server
- Output: Encoded Video Received

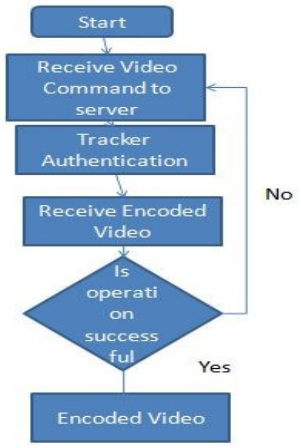

Figure 7. Tracker Video Receiving Module

7. Tracker Video Decoding and playback Module. (Figure 8.)

- Input: Received encoded video
- Output: Decoded Video

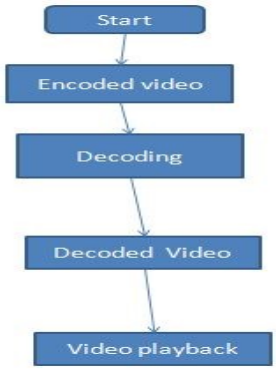

Figure 8. Tracker Video Decoding and playback Module

IV. RESULTS

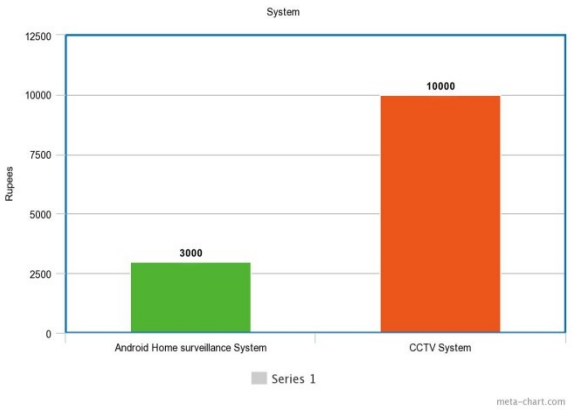

Figure 9. Costing Comparison

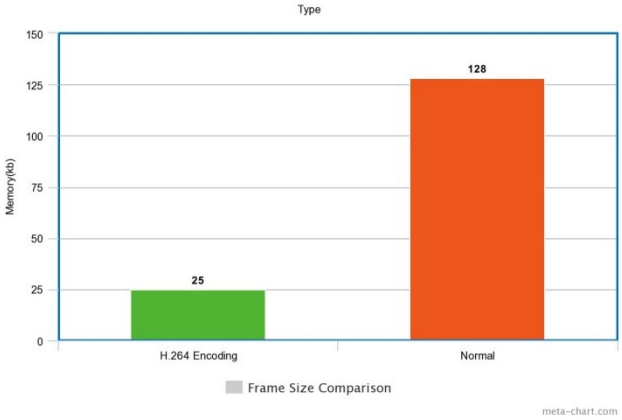

Figure 10. Frame Size Comparison

V. CONCLUSION

With the aid of the Android mobile devices, the user can know the old man at home timely and dynamically at a remote place. The system can also provide emergency early warning. This system is of good performance and stable transmission. Simultaneously, it has a bit of intelligent ability. It is convenient and practical as well. What we have studied can provide certain reference for solving the problem of the elderly care. The video surveillance is of great value in use and vast potential for future development. A home monitoring system based on the Android mobile terminal is convenient, flexible and can provide more help for people's daily lives. In the future it can be added more function on this basis.

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