Ultra Low Bandwidth Image Surveillance System

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***Abstract*—For a video surveillance system, image transfer over a low bandwidth channel has always been challenging task. Specially, if image is taken from a live camera and it has to be transmitted over a wireless delay tolerant network, then the task is twisted a bit more.Complexity increases further, if we need to build a viable low cost system with a low power solution. Such solution is only possible if we extract only relevant information from the video frame and transmit it over the network.This work is an attempt to frame such a low data rate image pipeline.We are stripping down each moving object to few pixel, mainly the skeleton endpoints and then also try to recognize moving object based on these information.We have also analyzed feasibility of such a low data rate image pipeline for a low cost embedded system.**

I. Introduction

Image based surveillance systems are ubiquitous, still number of such nodes are increasing everyday. Most of them transmit compressed video frames to a base station, where it is monitored by a person or a group of person. But such an arrangement can not be full proof. So, any attempt in the direction of its automation can be of great use in application areas, such as traffic monitoring, elderly care, security and assembly line inspection etc.

There had been lot of advancement with low power wireless home network eg. ZigBee, DASH-7 etc which are used in smart home technologies. Video surveillance system can be integrated with existing home network, but it will be very important to achieve, reduction in amount of data to be transmitted due to lack of end to end connectivity.A low data rate node will also allow the system to remain in sleep mode for longer duration and hence to have longer battery life.

For surveillance data, entire image need not be transmitted. Only a few segments of image need to be transmitted(the fast changing scenes).Transmitting only significant features pre-extracted locally from the image can reduce transmission requirement significantly.Extraction of such image information is possible if end node is intelligent. Semantic information transfer can reduce data rate further. But, we also need to ensure that this minimization of content allows us to reconstruct the image with relevant details at the other end.

Automatic analysis of scene and then to infer desired information out of it can be lot complex because of the complexity of the scene, specially when application is targeted for outdoor monitoring. Sometime background of the scene can be moving, while in some other scene ambient light can be different. Similarly can be many other hurdles in the process of automation. But if an efficient background detection algorithm is chosen then, these issued can be addressed up to a lot extent. Care must be taken in selecting algorithm, so that it allows information extraction almost in real time. With latest research in computer vision, it seems that such task could be viable with low cost embedded system.

This works has been done by choosing one of best background subtraction algorithm. Skeletonization and further information about selected object ontology has been used as the recognition method. Once key information has been identified, they are sent to a server where original scene is recreated.

Organization of the paper is as follows: In the next section we provide a survey of related work done in recent past. After this, we have provided our proposed framework, followed by result and conclusion. At the end, we have also provided future work to be done in this line.

II. Related Work

Various research have been done to extract useful information from a moving image. The toughest part of this implementation is to find an efficient background estimation algorithm so that moving scene can be extracted. Features such as Gradient histogram, Gray Scale (Haar), color, texture, self-similarity and motion have been used by different researchers.

[1] and many other have used color information as the feature for estimation. But only color as feature might not be sufficient [2] in surveillance applications where image resolution is very low. Adding motion along with image intensities gives better result in moving bodies estimation. When background color is same as foreground color then texture features represented by local binary pattern [3] provides interestingly nice result. Further, features computed at a single scale can be used to approximate feature at nearby scale. Such implementations [4] accelerates the execution for practical applications. There is one implementation [5] which decides about pixel that whether it belongs to foreground or background dynamically.

III. Proposed Framework

IV. Results

V. Conclusion

VI. Future Work

VII. Conclusion

The conclusion goes here.

References

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