Available online at www.ijarbest.com

International Journal of Advanced Research in Biology, Ecology, Science and Technology (IJARBEST)
Vol. 1, Issue 1, April 2015

Reconstruction of Objects with VSN

M.Priscilla[1], B.Nandhini[2], S.Manju[3], S.Shafiqa Shalaysha[4], Christo Ananth[5]

U.G.Scholars, Department of ECE, Francis Xavier Engineering College, Tirunelveli[1,2,3,4]

Assistant Professor, Department of ECE, Francis Xavier Engineering College, Tirunelveli [5]

***Abstract*— By this object reconstruction with feature distribution scheme, efficient processing has to be done on the images received from nodes to reconstruct the image and respond to user query. Object matching methods form the foundation of many state- of-the-art algorithms. Therefore, this feature distribution scheme can be directly applied to several state-of- the-art matching methods with little or no adaptation. The future challenge lies in mapping state-of-the-art matching and reconstruction methods to such a distributed framework. The reconstructed scenes can be converted into a video file format to be displayed as a video, when the user submits the query. This work can be brought into real time by implementing the code on the server side/mobile phone and communicate with several nodes to collect images/objects. This work can be tested in real time with user query results.**

***Index Terms*— Computer vision, Object Reconstruction, Visual Sensor Networks.**

I. INTRODUCTION

Visual sensor networks are envisioned as distributed and autonomous systems, where cameras collaborate and, based on exchanged information, reason autonomously about the captured event and decide how to proceed. Through collaboration, the cameras relate the events captured in the images, and they enhance their understanding of the environment. Similar to wireless sensor networks, visual sensor networks should be data-centric, where captured events are described by their names and attributes. Communication between cameras should be based on some uniform ontology for the description of the event and interpretation of the scene dynamics. The main goals of coverage optimization algorithms are to preserve coverage in case of sensor failure and to save energy by putting redundant sensor nodes to sleep. Choosing which nodes to put in sleeping or active mode should be done carefully to prolong the network lifetime, preserve coverage and connectivity, and perform the task at hand. However, when camera sensors are involved, three-dimensional coverage of space is required, which increases the complexity of the coverage issue. Coverage of networked cameras can be simplified by assuming that the cameras have a fixed focal length lens, are mounted on the same plane, and are monitoring a parallel plane.

Visual data collected by camera nodes should be processed and all or relevant data streamed to the BS. It is largely agreed that streaming all the data is impractical due to the severe energy and bandwidth constraints of WSNs. And since processing costs are significantly lower than communication costs, it makes sense to reduce the size of data before sending it to the BS. However, visual data processing can be computationally expensive.

Reliable data transmission is an issue that is more crucial for VSNs than for conventional scalar sensor networks. While scalar sensor networks can rely on redundant sensor readings through spatial redundancy in the deployment of sensor nodes to compensate for occasional losses of sensor measurements, this solution is impractical for VSNs, which are characterized by higher cost and larger data traffic. Moreover, most reliable transmission protocols proposed for conventional scalar data WSNs are based on link layer acknowledgment messages and retransmissions. They are therefore not suitable for visual data transmission due to their stringent bandwidth and delay requirements.

In redundantly deployed visual sensor networks a subset of cameras can perform continuous monitoring and provide information with a desired quality. This subset of active cameras can be changed over time, which enables balancing of the cameras' energy consumption, while spreading the monitoring task among the cameras. In such a scenario the decision about the camera nodes' activity and the duration of their activity is based on sensor management policies. Sensor management policies define the selection and scheduling of the camera nodes' activity in such a way that the visual information from selected cameras satisfies the application-specified requirements while the use of camera resources is minimized.

In visual sensor networks, sensor management policies are needed to assure balance between the oftentimes opposite requirements imposed by the wireless networking and vision processing tasks. While reducing energy consumption by limiting data transmissions is the primary challenge of energy-constrained visual sensor networks, the quality of the image data and application QoS improve as the network provides more data. In such an environment, the optimization methods for sensor management developed for wireless sensor networks are oftentimes hard to directly apply to visual sensor networks. Such sensor management policies usually do not consider the event- driven nature of visual sensor networks, nor do they consider the unpredictability of data traffic caused by event detection.

The main objective of [1] is Hierarchical feature distribution scheme for object recognition. This paper focuses on the principle that each individual node in the network hold only a small amount of information about objects seen by the network, this small amount is sufficient to efficiently route queries through network.In computer vision algorithm, large amount of data has to be processed, stored or transmitted. It requires enormous amount of network resources. Due to restrictions in memory resources of the nodes and high cost of data transmission there is a need to distribute visual data in a more efficient way.

The methodology used in this paper is hierarchical feature distribution scheme. This scheme has to fulfill some additional requirements regarding feature abstraction, feature storage space, measure of similarity and convergence. The visual sensor that originally sees the unknown object retains complete information about the object. The Hierarchical feature distribution scheme, results lower total network traffic load and it does not affect performance of tested computer vision methods and the cons of this is, computer vision methods operate on large amount of data, which can overload communication constrained over distributed network.

The objective of [2] is to study the classical problem of object recognition in low-power, low-bandwidth distributed camera networks. In this paper an effective framework is proposed to perform distributed object recognition using smart cameras and computer at the base station. Base station uses multiple decoding schemes to recover multiple view object features based on distributed compressive sensing theory. Object recognition has been a well studied problem in computer vision. Distributed object recognition has been mainly focused on two directions. First, when multiple images share a set of common visual features, correspondence can be established across camera views. Second, when the camera sensors do not have sufficient communication resources to streamline the high-dimensional visual features among camera views and perform feature matching, distributed data compression can be utilized to encode and transmit the features.

The methodology used here is random projection, in which a projection function is used to encode histogram vectors in a lower-dimensional space. The multiple decoding schemes are used to recover multiple view object features based on distributed compressive sensing theory. A distributed object recognition system is suitable for band-limited camera sensor networks. Random projection has gained much publicity in application where the prior information of the source data and the computational power of the sensor modalities.In this paper reduction function is used to compress high dimensional histogram. The main disadvantage is that, it will recognize the nearest object and it does not recognize distant objects.

In [3], the authors had proposed a high-resolution image reconstruction algorithm considering inaccurate subpixel registration. Use multichannel image reconstruction algorithm for application with multiframe environments. The proposed algorithm is robust against registration error noise and do not require any prior information about original image. An iterative reconstruction algorithm is adopted to determine the regularization parameter and to reconstruct the image. Ill-posedness problem will occur from inaccurate pixel registration. The quality of image resolution is limited by physical constraints. Subpixel level motion estimation is a very difficult problem. Multichannel image convolution approaches are particularly well suited for application with multiframe environments. The problem of estimating a high-resolution image from low resolution images is ill-posed, since a number of solutions satisfy the constraints of the observation model. A well-posed problem will be formulated using the regularized multichannel image deconvolution technique. In this a set of theoretical approach is used to obtain solution. A prior knowledge about the image is assumed which restricts the solution. The significant increase in the high-frequency detailed information of the reconstructed image, especially when compared with the results of the bicubic interpolation and conventional approach.

The proposed algorithm is robust and insensitive to registration error noise, and they do not require any prior information about the original image or the registrationerror process.

The objective of [4] is to capture a short video sequence, scanning a certain object and utilize information from multiple frames to improve the chance of a successful match in the database. Object instance matching is a cornerstone component in application such as image search, augmented reality and unsupervised tagging. The common flow in this application is to take an input image and match it against a database of previously enrolled image of objects of interest. Capturing image corresponding to an object already present in the database especially in case of 3D object is difficult.The methodology used in this paper is object matching algorithm. In this algorithm two types of matching techniques have been used. They are (1) Object Instance Matching (2) Keypoint Filtering. Object instance matching is used to incorporate previous frame keypoints upto the maximum time window, for matching. In keypoint filtering two filtering schemes are used. The first is to select and to propagate the keypoint from the previous frame and the next is to compare the matching image with respect to highest matching image according to threshold on the database matching score.

By using this object matching algorithm object instance identification for exploiting time sequence information in matching objects that are captured in a video and stored to a database of images can be improved. The drawbacks of this paper are performance is affected with larger sets and, space and computational complexity will occur.

The main objective of [5] is to reconstruct the complete object trajectories across the field-of-views of multiple semi-overlapping cameras. The reconstruction of global trajectories across the multiple fields of view requires the fusion of multiple simultaneous views of the same object as well as the linkage of trajectory fragments captured by individual sensors.

In this paper global trajectory reconstruction algorithm is used. This approach uses segments of trajectories generated by individual cameras and performs trajectory association and fusion on a common ground plane. The association and fusion identifies fragments of transformed trajectories generated by each object. These fragments are fused and connected across the fields of view using temporal consistency and object identity. The proposed approach does not require any inter-camera handoff procedure when objects enter or exit the fields-of-view of each individual sensor. Local trajectory segments are extracted from each sensor and those corresponding to the same object are first associated and then fused. Then, a spatiotemporal linkage procedure is applied to connect the fused segments in order to obtain the global complete trajectories across the distributed setup.

The results of trajectory association shows that the matching performance is related to the segment length which in turn is related to tracking performance and ground plane transformation as it can affect the accuracy of objects' attributes. The main drawbacks of this paper are tracking failure, transformation errors and the trajectory metadata from individual sensors may be corrupted by errors and inaccuracies caused by noise, objects re-entrances and occlusions.

II. Proposed System

So inorder to overcome the inefficient behaviour of the existing method, in this paper a method has been proposed which uses hierarchical feature distribution scheme for object matching. In this, the information is distributed hierarchically in such a way that each individual node maintains only a small amount of information about the objects seen by the network. This amount is sufficient to efficiently route queries through the network without any degradation of the matching performance. A set of requirements that have to be fulfilled by the object-matching method to be used in such a framework is defined. Four requirements (abstraction, storage, existence of a metric, convergence) are defined for the matching method and thus provide an algorithm for the efficient routing of the network queries during the matching. The object matching and reconstruction is performed in the base station. The proposed method is implemented in C++ and QT and it works on linux environment. Object Reconstruction can be used in mobile applications and is open source. In mobile applications, this method is used to view the reconstructed object through mobile at any time. electronically for review.

In this project, a framework of feature distribution scheme is proposed for object matching. Each individual node maintains only a small amount of information about the objects seen by the network. Nevertheless, this amount is sufficient to efficiently route queries through the network without any degradation of the matching performance. Efficient processing has to be done on the images received from nodes to reconstruct the image and respond to user query. The proposed feature distribution scheme results in far lower network traffic load. To achieve the maximum performance as with the full distribution of feature vectors, a set of requirements regarding abstraction, storage space, similarity metric and convergence has to be proposed to implement this work in C++.

III. Results and Discussion

At first all the background images are collected and stored in a folder. The co- ordinates (X1,X2,Y1,Y2) are noted for all the background images stored in that folder. During file processing the filename of the background image is processed and find out the node number of that background and stored it in the database. Fig.1. shows the sample background image.

Fig.1.Background Image

A. RECEIVE FOREGROUND OBJECT

The separated foreground objects from the background images are collected and stored it in a folder which does not have the background images. The co-ordinates (X1,X2,Y1,Y2) are noted for all the foreground objects stored in that folder. During file processing the filename of the foreground object is processed and find out the node number and frame number of that foreground and stored it in the database. Fig.2. shows the processed foreground object.

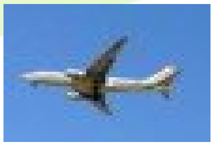

Fig.2. Foreground Object

B. IMAGE STITCHING

The node number, frame number and the co-ordinates of the foreground objects in the background image have to be found in the database. The objects which are not stitched with the background in the database are taken first and then find out the corresponding node number of that object. Then the node's corresponding background

International Journal of Advanced Research in Biology, Ecology, Science and Technology (IJARBEST)
Vol. 1, Issue 1, April 2015

image is taken and stitches it with the foreground object and is stored in the database. Fig.3. shows the stitched foreground object in the background image.

Fig.3. Image Stitching

C. USER QUERY PROCESSING

When a user wants to know about the foreground objects that is present during a time, then the user enters the starting date that is from date and to date and also he enters the node number that is from which node, the user wants the foreground object to be seen. The server retrieves the correct background and foreground objects from the database and displays it to the user. Fig.4. shows the result of user query which retrieves the stitched image from the database and shown it to the user.

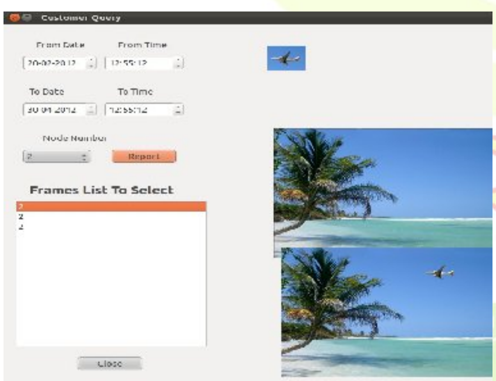

Fig.4.User Query

IV. CONCLUSION

By this object reconstruction with feature distribution scheme, efficient processing has to be done on the images received from nodes to reconstruct the image and respond to user query. Object matching methods form the foundation of many state- of-the-art algorithms. Therefore, this feature distribution scheme can be directly applied to several state-of- the-art matching methods with little or no adaptation. The future challenge lies in mapping state-of-the-art matching and reconstruction methods to such a distributed framework. The reconstructed scenes can be converted into a video file format to be displayed as a video, when the user submits the query. This work can be brought into real time by implementing the code on the server side/mobile phone and communicate with several nodes to collect images/objects. This work can be tested in real time with user query results.

REFERENCES

[1] Baumberg, "Reliable feature matching across widely separated views," in IEEE Intl. Conf Comp. Vision, and Patter Recog., 2000.

[2] Byrne, "Iterative image reconstruction algorithms based on cross-entropy minimization," IEEE Trans. Image Process., vol. 2, no. 1, pp.96–103, Jan. 1993.

[3] Cand`es and Tao. Near optimal signal recovery from random projections: Universal encoding strategies? IEEE Trans. Information Theory, 52(12):5406– 5425, 2006.

[4] Cand`es, Romberg, and Tao, T. Robust uncertainty principles: Exact signal reconstruction from highly incomplete frequency information. IEEE Transactions on Information Theory, **52**, 2 (Feb.2006), 489—509.

[5] Chen, Defrise, and Deconinck, "Symmetric phase-only matched filtering of Fourier-Mellin transforms for image registration and recognition," IEEE Trans. Pattern Anal. Mach. Intell., vol. 16, no.12, pp. 1156–1168, Dec. 1994.

[6] Chen, Varshney, and Arora, "Performance of mutual information similarity measure for registration of multitemporal remote sensing images," IEEE Trans. Geosci. Remote Sens., vol. 41, no. 11, pp. 2445–2454, Nov. 2003.