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EFFECTIVE AUDIO STORING AND RETRIEVAL IN INFRASTRUCTURE LESS ENVIRONMENT OVER WIRELESS SENSOR NETWORKS

Ms.S.Devi Assistant Professor, K.Sruthi Student, R.Vani Sri Student
BE-CSE,DHANALAKSHMI COLLEGE OF
ENGINEERING,MANIMANGALAM,CHENNAI,TAMIL NADU

ABSTRACT

Audio represent one of the most appealing yet least exploited modalities in wireless sensor networks, due to the potentialy extremely large data volume and limited wireless capacity. Therefore how to effectively collect audio sensing information remains a challenging problem.In sink free environment targeting for disaster management where audio chunks are stored inside the network for retrieval.The difficulty is to guarantee high search success rate without infrastructure support.To solve the problem we design a novel replication algorithm that deploys an optimal number of replicas across the sensor networks. We prove the optimality of the energy consumption of the algorithm. We implement a sink-free audio on demand wsn system and conduct extensive simulation to evaluate the performance and efficiency of our design. The experimental result show that our design can provide satisfactory quality of audio on demand service with short startup latency and slight playback jitter.Extensive simulation result show that this design achieves a search success rate of 98% while reducing the search energy consumption by an order of magnitude compared with existing scheme.

INTRODUCTION

The wireless sensor networks (WSN) is the way of collecting information from the physical world. It has large variety of applications such as environment monitoring, scientific observation, under-water surveillance, and structural health monitoring. Audio represents one of the least exploited modalities in wireless sensor networks, due to limited wireless collect audio sensing information remains a challenging problem. We propose a new paradigm of audio information collection based on the concept of audio-on demand

We propose a new concept of audio services, such as audio-on-demand, in wireless sensor networks. We consider a sink (infrastructure less) free environment targeting for natural disaster management scenario, where any base station could be damaged during the disaster at that time we use (SAoD) Sink Free Audio-on-Demand WSN system. When disaster occurs, recording and storing sounds and providing an on-demand services which is used to retrieve the sound later Since individual sensors are in specific acoustic range, networks of acoustic sensors are needed to cover a disaster area. The requirements of audio- on-demand service are threefold: (1) Acoustic events should be recorded and stored inside the network because existing infrastructure if any may be destroyed in ruinous environmental conditions (2)It is difficult to locate the acoustics event if the basestation or other infrastructure is not present (3) The non-disruptive on-demand playback of the audio anywhere in the network requires parallel data transferring and efficient buffer pre-fetching mechanism due to the limited bandwidth capacity of WSNs.

With the recent advances in NAND flash memory new remote prototype are now available. NAND flash memory has become the preffered format for storing large quantities of data.Higher density,lower cost and faster with fundamental element.

A sensor network is typically composed of large number of sensor node equipped with data processing and sensing.The sensor node usually operate in unattended manner and are battery powered.However replacing the battery is not only costly but also impossible in many situations.There has been significant research on energy

conserving object tracking sensor network.Most of the studies aimed at reducing the number of sensor node activated for tracking an object and or reducing the location update traffic in providing accurate answers to location queries[2].

So we implemented a EnviroMic using Micaz motes equipped with MTS300 sensor board. Micaz motes are compatible with new large NAND flash extension. Due to the lack of availability of large number of off-the-shield Micaz motes with NAND flash, we used an older readily available version with a 0.5mb flash. However the research challenges we address on this prototype are not unique to the hardware platform chosen. The target application of EnviroMic is long term acoustic monitoring, which involves high frequency sampling and high volume data storage. The primary concern is too fully utilize the effective storage capacity of a sensor netework, maximizing the amount of data a scientist can collect about the environment in a single experiment.The network is assumed to be disconnected from the outside world.Hence there is need for improving storage utilization.With that design goal in mind we employs mechanism in EnviriMic to reduce storage redundancy and improve balancing of data storage in the network when energy permits[3].

EXISTING SYSTEM

In Infrastructure oriented environment all the sensors are connected to Base station. The base station is control to the all the sensor. If the sensors sensing audios are stored in Base station. So if you need to retrieve the sensing audio chunks through the base station. In infrastructure less environment only investigate how to store an sensing audio chunks in wireless sensor networks.The drawback of infrastructure oriented environment is that the base station should be damaged al the sensing information are destroyed

PROPOSED SYSTEM

In this paper we proposed Effective audio storing and retrieval in infrastructure less environment. We use the cooperative recording technique the chunks of an acoustic event file can naturally be collected by different sensor nodes and stored in a distributed way. Such a design greatly reduces the redundancy of sampling and storage. It also effectively achieves a better load balance. To find a network size to replicate a metadata. We use the Bloom filter to encode the metadata of the chunks and replicating the metadata and also replicate the audio chunks to the neighbors   to greatly reduce the communication cost. During retrieval time query to the any sensor to particular time sensing audio. The sensor checks the Bloom filter. If that time any audio should be sensed the Bloom filter return to which nodes have the sensed audio. Then that node to return the sensed audio to user. In case of the sensor should be damaged or destroyed due to some problem the sensed audio should be retrieve from an alternative node.

RELATED WORK

Most of the existing work on audio sensor network focuses on how to efficiently transfer the sensory date back to a base station by either using online stream compression or a customizing high bandwidth sensor prototype
Scientist monitor volcanoes for two non exclusive reason (1)to monitor hazard via accessing the level of volcanic unrest (2)to understand physical process occurring within the volcano such as magma migration and eruption mechanism.Microphone are sometimes employed to record infrasound.The type of instrumentation used to study volcanoes depends on the science goal of the deployment.We are focused on the use of wireless sensor of temporary field deployment involving dozens of sensor station deployed around an expected earthquake source region.Geophysicist often use standalone data logger that record signal from seismometers and microphone to a flash drive.The data logger are large and power hungary typically powered by car batteries charged by solar panel.The existing telemetry equipment is very bulky and is limited radio bandwidth is a problem for collecting continous data from multiple channel[4].
We address the problem of supporting voice streaming over wireless sensor networks.The major challenge is to satisfy stringend audio quality of service requirement although nodes only have limited communication and processing capabilities.We desgn and implement of Quality-aware Voice Streaming (QVS)for WSN.QVS is built upon SenEar a new sensor hardware platform we developed for high bandwidth wireless audio communication.The primary design objective of QVS is to provide robust voice quality for concurrent voice streaming in dynamic environment.QVS employs an empirical voice model to automatically evaluate the current voice quality of streams and provide feedback for audio compression/duplication adaption.Thismechanism can achieve robust voice streaming in the face of dynamic variation in link quality and network topology.To

support multiple concurrent voice stream transfers. QVS adopts a distributed admission control algorithm that assign stream data rate based on available network capacity measured by each node locally[5].
To the best of our knowledge, we are the first to design and implement an audio-on-demand system over WSNs. The proposed retrieval scheme based on replication is different from existing flooding and a geographic hash

table (GHT) [6].Flooding does not guarantee the success rate without exhaustively searching all the sensor nodes. The GHT partitions the name space over the nodes and has good success rate for key-value search, while it suf- fers from the problem of exact match. Furthermore, although the problem of node failure for a key in GHT can be alleviated by using more than one node for a key, GHT cannot survive the catastrophic failure. However, the case that a large number of nodes may be destroyed is norm rather than the exception in the target application in this work.

SYSTEM DESIGN

In this section,we present the design of SAoD. We first briefly describe how the audio events are recorded and stored. Then, we introduce how SAoD replicates the meta- data of audio chunks in the compressed form. Finally, we describe the replicating and chunk discovery scheme.

COOPERATIVE RECORDING

Cooperative recording[3] refers to the act of splitting the task of recording an acoustic event among multiple sensor.An inherent assumption is the average acoustic event of interest will be heard by more than one node.In our protocol when multiple node sense the same acoustic event simultaneously they form a group.Group members coordinate to elect a reader who assign recording task to individual node that can hear the event.When the acoustic source is the mobile object group membership may change around the object as it moves.A leader hand of mechanism is employed to preserve the continuity of recording.

When an acoustic event occurs if multiple node senses the event within the same locality they complete to elect a local leader who will ensure that only one copy is recorded.Our design choice is not to guarantee complete elimination of redundancy.This is a compremise between algorithm complexity and performance.Once a group is formed the leader is responsible for assigning recording task to its group members.While an event last node that can hear the event periodically broadcast a SENSING message to notify the awareness of the event.The leader maintains a list such as nodes and select one that is more suitable for recording task.

METADATA ENCODING

Instead of replicating the raw audio chunks, we use Bloom filters [7] to encode the metadata of the chunks residing on a node. By replicating the metadata in a space-efficient way, SAoD greatly reduces the communication cost The following procedure builds an m-bits bloom filter, corresponding to a set A and using h1,h2 ….hk hash function

Procedure Bloom Filter(set A,hash_func,integer m)
returns filter
filter=allocate m bits initialized to 0
for each ai in A;
for each hash func hj;
filter[hj(ai)]=1
end foreach
end foreach
return filter

Some application that use bloom filter need to communicate these filter across the network.By inserting all the identifiers of the chunks in the flash memory into the Bloom filter, a node in SAoD achieves a space-efficient bit vector for representing its chunks, which supports membership queries. The size of the Bloom filter can be determined by the number of hash functions used in the Bloom filter and v is the maximum number of chunks limited by the capacity of the flash memory

NETWORK SIZE ESTIMATION

The main challenge[8] in designing algorithm for distributed computation of aggregation in sensor network is to keep the resource utilization to the minimum by reducing the coomunication among nodes and computation performed.The only hope is to significantly reduce the resource utilization for aggregate computation in network aggregation depending on how/if the in network aggregation is performed.There are three main techniques published in the literature(1)centralized processing-It transmit the value collected at each sensor node directly to a centralized processing unit.(2)Tree aggregation-The root of the tree is the node where the query is injected and

where the aggregation result is retrieved.(3)Gossip based aggregation-in each round each node contact some of its neighbour and exchange information with these nodes.

REPLICA DEPLOYMENT

[9]In wireless sensor networks, multicast is a fundamental routing service for efficient data dissemination resquired for activities such as code updates, task assignment and targeted queries In particular, efficient multicast for sensor networks is particularly critical due to the limited energy availability in uch networks. Multicast protocols that exploit location information available from GPS or localization algorithms are more efficient and robust than other stateful protocols. Since localization is typically already required for sensing applications, this location information can simply be reused for optimizing multicast performance at no extra cost. Several location-based multicast protocols for wireless networks (not specifically sensor networks) have been proposed which neither assume any unicast routing scheme nor build any distributed multicast routing structure. These protocols build multicast trees using location information and use geographic forwarding to forward packets down the multicast trees. These protocols are stateless, as they carry encoded membership and location as well as tree information in each packet, so that the multicast membership and routing state do not have to be distributed as in traditional multicast protocols such as MAODV, ADMR and ODMRP.Stateless protocols are more robust and potentially more efficient than stateful protocols as they avoid the difficulty of maintaining distributed state in the presence of frequent topology changes due to node failure or mobility.

Algorithm 1 Metadata Replication
Require: EstimatedNetworkSize =n is achieved
1: create an empty bit vector with m bits for node p, BFp;
2: **for all** chunks in the local flash memory of node p do
3: insert the identifiers of the chunks into BFp by setting the hashing functions $\{hj(.),1\leq j\leq k\}$;
4: **end for**
5: compute r, the optimal number of replicas using the gathered statistics n;
6: multicast BFp attached with locationp, the location of node p, through the minimal spanning tree   formed with the nodes nearest to the number of n0 sampled locations; 7: return

QUERY EVALUATION

In many applications of sensor networks including environmental monitoring and surveillance, a large volume of sensed data generated by sensors needs to be either collected at the base station or aggregated within the network to respond to user queries. However, due to the unreliable wireless communication, robust query processing in such networks becomes a great challenge in the design of query evaluation algorithms for some mission-critical tasks. In this paper we propose an adaptive, localized algorithm for robust top-k query processing in sensor networks, which trades off between the energy consumption and the accuracy of query results. In the proposed algorithm, whether a sensor is to forward the collected data to the base station is determined in accordance with the calculation of a proposed local function, which is the estimation of the probability of transmitting the data successfully. We also conduct extensive experiments by simulations on real datasets to evaluate the performance of the proposed algorithm. The experimental results demonstrate that the proposed algorithm is energy-efficient while achieving the specified accuracy of the query results.

Algorithm 2 Query Evaluation
1: $R\leftarrow\theta$;
2: **for all** BFs replicated in a node do
3: **for all** desired chunk t in the query Q do
4: if ⊎ (j)(1≤j≤k)s.t.B.Fp[jj(t)]=1 then
5: $R\leftarrow R\cup\{(locationp,t)\}$;
6: **end if**
7:**end for**
8:**end for**
9**:** return R

ARCHITECTURE DIAGRAM
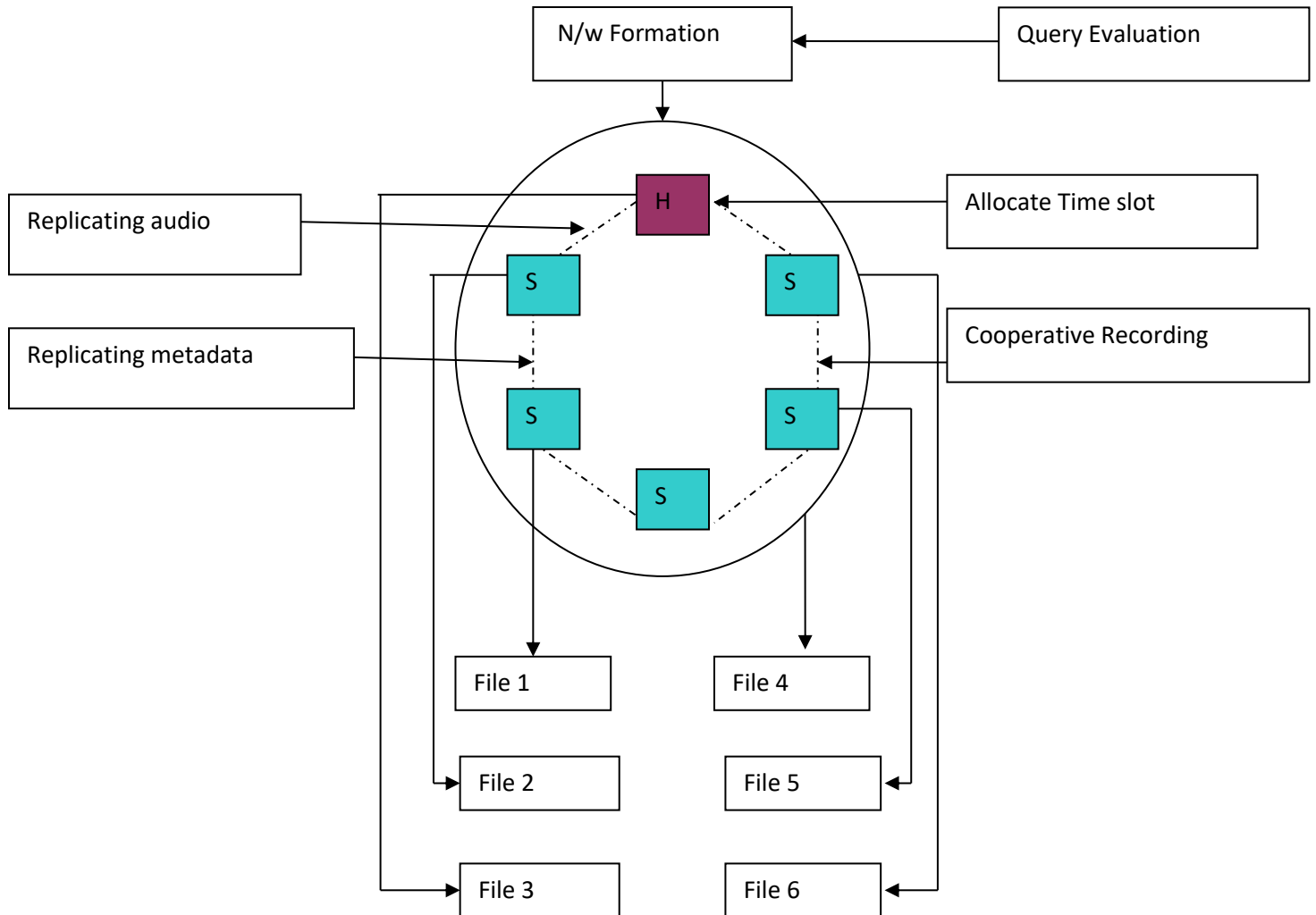
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