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# K-Anonymous Privacy Preserving Technique for Participatory Sensing With Multimedia Data Over Cloud Computing

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**Abstract:** Nowadays distinctions of sensing facilities equipped with mobile wireless devices. Likewise, different service provider named participatory sensing system made available which gives outstanding life experience to users. Nevertheless, there are many challenges like privacy and multimedia data quality. There is no any earlier system that can resolve problems of confidentiality and quality, preserving participatory sensing system with multimedia data. Slicer is a K-anonymous privacy preservation scheme for participatory sensing with multimedia data over cloud framework. It combines data coding methods and message transfer strategies. To get the secure protection of user's high data quality and also maintains privacy. Minimal Cost Transfer and Transfer On Meet-up, these are two data transfer strategies. For Minimal Cost Transfer, two parallel algorithms used. i.e., approximation algorithm and Heuristic algorithm. Slicer provides data quality with low communication.

**Keywords:** Cloud mobile sensing, privacy preservation, anonymity, data aggregation

## 1. Introduction

The wide use of versatile correspondence types of gear and the quick progress of detecting innovations have prompted the wide accessibility of secretly held, low cost, propelled handling, and enormous storage mobile remote devices, that are furnished with various installed sensors (e.g., receiver, camera, accelerometer, gyrator, and GPS). On one hand, present day remote correspondence advances (e.g., 2G/3G/4G, Wi-Fi, and Bluetooth) make the correspondence between cell phones and base, and also between mobile devices themselves, helpful and quick.

In today's world, different sensing abilities equipped with mobile wireless devices. Also, new service provider named participatory sensing system made available which gives excellent life experience to users. However, there are many challenges like privacy and multimedia data quality. There is no any previous system that can solve problems of confidentiality and quality preserving participatory sensing system with multimedia data. SLICER is a K-anonymous privacy preservation scheme for participatory sensing with multimedia data. It combines data coding methods and message transfer strategies. To get the firm protection of user's high data quality and also maintain privacy. Minimal Cost Transfer and Transfer On Meet-up these are two data transfer strategies. For Minimal Cost Transfer, two parallel algorithms used Approximation algorithm and Heuristic algorithm. Slicer provides data quality with low communication.

Nowadays, for participatory sensing system, the number of privacy preserving techniques has been proposed by many researchers to address the privacy of data sources identity, user location, sensing data and user trajectory. The technique can be divided into four categories as follows –

1) Randomization-based techniques
2) Generalization
3) Cloaking techniques
4) Cryptography based solutions.

The sensing record which sends to the service provider always attached with spatiotemporal tags indicating the time information and location of the data collected. We present Slicer which is working on the application layer, for participatory sensing with multimedia data. Spontaneously, k-anonymity is the service provider which cannot recognise the contributor of each sensing record. As well we proposed Slicer for participatory sensing, to achieve both anonymity privacy preservation with, low communication and computation overhead.

As we proposed two kinds of strategies for slice transfer. The first strategy is to transfer on meetup which transfers slices upon meeting another participant. Then delivers the slice to the service provider. The second is having two complementary strategies to transfer the slices to a set of participants that can be met within a required time, to minimise the total cost while assuring that the sensing record can deliver to the service provider with guaranteed high probability. The cost difference can calculate from the wireless communication free available bandwidth, battery power and so on.

## 2. Literature Survey

***A. A Framework for Composition and Enforcement of Privacy-Aware and Context-Driven Authorization Mechanism for Multimedia Big Data (2015)***

The system provides a multimedia big data sharing mechanism with privacy and security policies Secure User Data Repository System (SUDRS) and Intelligent Privacy Manager (iPM) models are used to provide safety and confidentiality for multimedia data Policy and context-based security scheme. Owner to view all multimedia data elements held by the SURDS along with sharing options provided by the Asset Manager. All multimedia data elements divided into categories and types of files. Additional data elements can be uploaded by select „Open file manager‟ on the top proprietor/donor to manage multimedia data elements held in the form of records by the File Manager. File Manager allows an owner/contributor to manipulate their data regarding uploading new multimedia content. The disadvantages of this paper are redistribution access control is not provided.

***B. Cloud-Based Multimedia Content Protection System (2015)***

The system is used to protect different multimedia content types under the cloud environment 3-D Video Signatures Scheme and Distributed Matching Engine are used to provide multimedia data access with security. It supports creating amalgamated signatures that consist of one or more of the following elements: 1.Visual mark: Created based on the optical parts in multimedia objects and how they change with time; 2.Audio mark: Created based on the audio signals in multimedia objects; 3. Depth mark: If multimedia objects are 3-D videos, signatures from their depth signals are created; 4.Meta data: Created from information associated with multimedia items such as their names, tags, descriptions, layout types, and IP addresses of their uploaders. The disadvantages of this paper are Computational complexity is high in online redistribution verification process.

***C. Privacy and Quality Preserving Multimedia Data Aggregation for Participatory Sensing Systems (2015)***

The system supports privacy and quality preserving participatory sensing with multimedia data SLICER scheme integrates a data coding technique and message transfer strategies to achieve strong protection of participants‟ privacy. The domestic attack may come from both the participants and the service provider. We differentiate two cases: Protection against participants‟ attack. Each contributor may accept some slices, when it is preferred as a slice deliver for participants met. Similar with the peripheral attacker, the participant cannot decrypt the slice for delivering shield against service provider‟s attack. Given that the service provider has full access to the sensing records contributed by the participants, it can easily infer secret information about the participants, if proper privacypreserving design is not provided. Still, SLICER can achieve the k-anonymity and protect participants‟ privacy information against the service provider. Therefore, we can draw the following theorem. The disadvantages of this paper are Privacy on query processing is not supported.

## 3. Participatory Sensing: Applications and Architecture:

Participatory sensing is the process whereby individuals and communities use evermore-capable mobile phones and cloud services to collect and analyze systematic data for use in discovery. The convergence of technology and analytical innovation with a citizenry that is increasingly comfortable using mobile phones and online social networking sets the stage for this technology to dramatically impact many aspects of our daily lives. Applications and Usage Models One application of participatory sensing is as a tool for health and wellness.

 

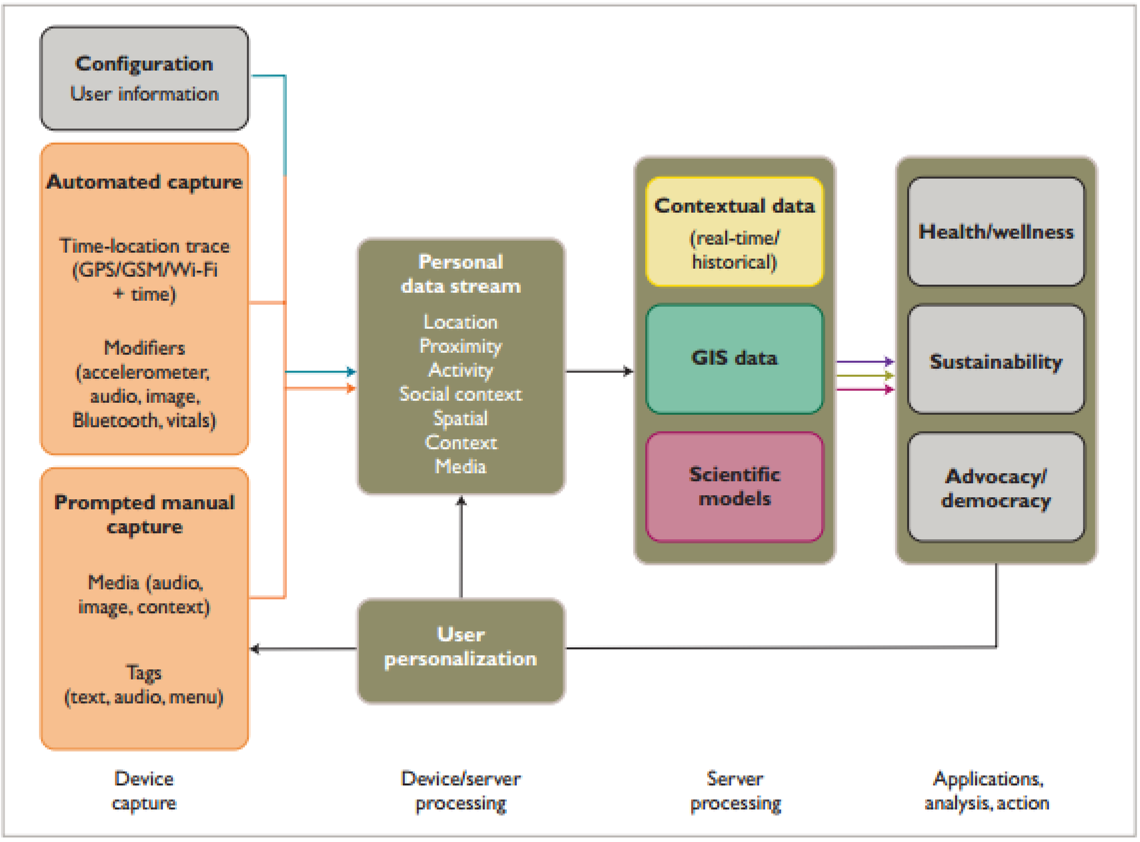


Fig1. Common architectural components for participatory-sensing applications, including mobile device data capture, personal data stream storage, and leveraged data processing [11]

Fig 1. Source from: *Participatory Sensing: Applications and Architecture Deborah Estrin University of California, Los Angeles*

For example, individuals can self-monitor to observe and adjust their medication, physical activity, nutrition, and interactions. Potential contexts include chronic-disease management and health behaviour change. Communities and health professionals can also use participatory approaches to better understand the development and effective treatment of disease. For some real-world examples, visit www.projecthealthdesign.org and http://your.flowingdata.com. The same systems can be used as tools for sustainability. For example, individuals and communities can explore their transportation and consumption habits, and corporations can promote more sustainable practices among employees. For examples, visit http://peir.cens.ucla.edu and http://biketastic.com.

In addition, participatory sensing offers a powerful "make a case" technique to support advocacy and civic engagement. It can provide a framework in which citizens can bring to light a civic bottleneck, hazard, personal-safety concern, cultural asset, or other data relevant to urban and natural-resources planning and services, all using data that are systematic and can be validated. For an example, visit http://whatsinvasive.com. These different applications imply several different usage models. These models range from public contribution, in which individuals collect data in response to inquiries defined by others, to personal use and reflection, in which individuals log information about themselves and use the results for personal analysis and behaviour change. Yet across these varied applications and usage models, a common workflow is emerging, as Figure 1 illustrates.

## 4. System Architecture

Our proposed method describes following elements
1) Design Rationale
2) Coding
3) Transferring
4) Reconstructing
5) Analysis

 

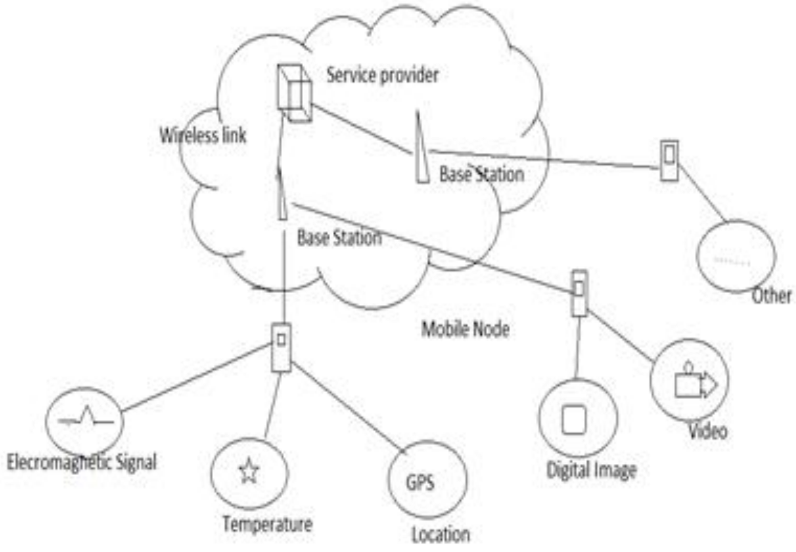


Fig2. The architecture of cloud-based participatory sensing

We observed a cloud-based participatory sensing as shown in Fig. 2, in which there are a service provider and some mobile nodes participants equipped with different kinds of sensors. The service provider gathers, classifies, and stores are sensing records. A mobile node/participant is a user carrying a portable and wireless enabled device.
In this paper, we use mobile node and Participants which can use their sensing devices to collect environmental information as geographical location, temperature, an electromagnetic signal, and so on. In most of the existing work, it focuses on tiny sensor readings. Participatory sensing system adapts to multimedia information, and we assume that the participants can directly report sensing records.

Given a sensing record < t, l, d >from participant ai ∈ N.
The original record can reconstruct from any k out of m encoded slices, where m > k.
Coding Rate = k/m
We have tagged the slices to indicate which slices belong to the same record. Since tagging a slice with its generator's ID and a sequence number will reveal the identity, privacy of the generator to the service provider,
we adopt a cryptographic hash function to create the tag:

tag =H(i, nonce),

where H(・, ・) is a cryptographic hash function and nonce is an arbitrary no.

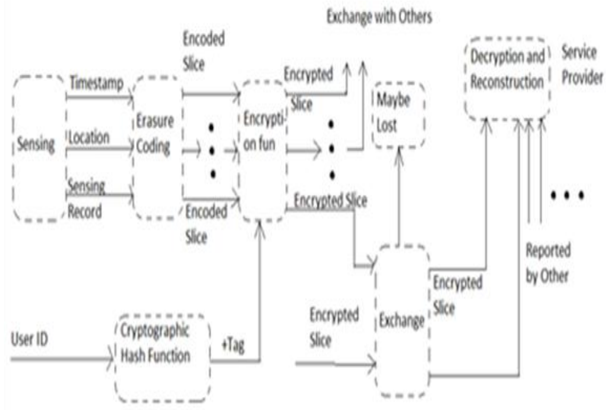


Fig3.Working of SLICER

***Privacy Model:*** Albeit participatory detecting gives another administration worldview, its usefulness depends on the commitment of members. Existing work demonstrate that contributed data might be abused to uncover the members' security. Most clients are not willing to join participatory detecting applications, unless their touchy data is all around shielded from both administration suppliers.

## 5. Conclusion and Future Work

We implemented slicer which is K-Anonymous privacy preserving technique for participatory sensing with multimedia data over cloud framework. Slicer combines techniques of erasure coding and slices, transfer strategies to achieve better protection of participant's personal information as well as high data quality. We study two methods of slicer transfer, namely transfer on meet up and minimum cost transfer. Transfer on meet-up is simple and straightforward. SLICER achieves high data quality. Minimum cost transfer contains two algorithms, which are approximation algorithm and heuristic algorithm. In future work, we can study the problem of privacy preservation in the query process which is imperative. It provide low communication and computation overhead

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