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A Survey on Cloud Based Privacy Health Report Monitor via Compressive Sensing

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ABSTRACT: Motivated by the privacy issues, curbing the adoption of electronic healthcare systems and the wild success of cloud service models, we propose to build privacy into mobile healthcare systems with the help of the private cloud. Our system offers salient features including efficient key management, privacy-preserving data storage, and retrieval, especially for retrieval at emergencies, and audit ability for misusing health data. Specifically, we propose to integrate key management from pseudorandom number generator for unlink ability, a secure indexing method for privacy preserving keyword search which hides both search and access patterns based on redundancy, and integrate the concept of attribute based encryption with threshold signing for providing role-based access control with audit ability to prevent potential misbehavior, in both normal and emergency cases.

KEYWORDS: Cloud Computing, Compressive Sensing, E Health care systems.

I. INTRODUCTION

Cloud computing provides a low-cost, scalable, location-independent infrastructure for data management and storage. Owing to the population of cloud service and the increasing of data volume, more and more people pay attention to economize the capacity of cloud storage than before. Therefore how to utilize the cloud storage capacity well becomes an important issue nowadays. Cloud service providers offer highly available storage space and massively parallel computing resources at relatively low costs. The advent of Cloud Storage motivates enterprises and organizations to outsource data storage to third party cloud providers. An increasing amount of data is being stored in the cloud and shared by users with specified privileges, which define the access rights of the stored data. Gmail is an example of cloud storage which is used by most of us regularly.

Driven by technology which advances in low-power networked systems and medical sensors, we have witnessed in recent years the emergence of wireless sensor networks (WSNs) in healthcare. These WSNs carry the promise of drastically improving and expanding the quality of care across a wide variety of settings and for different segments of the population. Embedded in a variety of medical instruments for use at hospitals, clinics, and homes, sensors provide patients and their healthcare providers insight into physiological and physical health states that are critical to the detection, diagnosis, treatment, and management of ailments. Driven by advances in information technology, medical sensors have become increasingly interconnected with other devices. Early medical sensors were largely isolated with integrated user interfaces for displaying their measurements. Subsequently, sensors became capable of interfacing to external devices via wired interfaces such as RS 232, USB, and Ethernet. More recently, medical sensors have incorporated wireless connections.

In low-power sensing systems, communication constraints play a critical role; *e.g.*, biomedical devices often acquire physiological signals from distributed sources and/or wireless implants. Compressive sensing enables sub-Nyquist sampling for low-energy data reduction on such nodes. The reconstruction cost, however, is severe, typically pushing signal analysis to a base station. CS relies on two principles: sparsity, which pertains to the signals of interest, and incoherence, which pertains to the sensing modality.

■ sparsely expresses the idea that the “information rate” of a continuous time signal may be much smaller than suggested by its bandwidth, or that a discrete-time signal depends on a number of degrees of freedom which is



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comparably much smaller than its (finite) length. More precisely, CS exploits the fact that many natural signals are sparse or compressible in the sense that they have concise representations when expressed in the proper basis.

■ Incoherence extends the duality between time and frequency and expresses the idea that objects having a sparse representation in must be spread out in the domain in which they are acquired, just as a Dirac or a spike in the time domain is spread out in the frequency domain.

Healthcare applications impose strict requirements on end-to-end system reliability and data delivery. We term the combination of data delivery and quality properties the trustworthiness of the system and claim that medical sensing applications require high levels of trustworthiness. The impact of obstacles and interference is exacerbated by the fact that most wireless sensor network systems use low power radios to achieve long system lifetimes. Wireless sensor networks in healthcare are used to determine the activities of daily living (ADL) and provide data for longitudinal studies. It is then easy to see that such WSNs also pose opportunities to violate privacy. The first privacy challenge encountered is the vague specification of privacy. Nevertheless, privacy specification languages have been developed to specify privacy policies for a system in a formal way. Once the privacy specifications are specified, healthcare systems must enforce this privacy and also be able to express users' requests for data access and the system's policies.

II. LITERATURE SURVEY

What is privacy? It is an almost customary feature of any analysis of privacy to begin with a disclaimer about the inherent difficulty of defining exactly what 'privacy' is and disaggregating its various dimensions. According to Bennett and Raba (2003), in Western culture, the modern claim to privacy and the contemporary justification for information privacy as a public policy goal was derived from a notion of a boundary between the individual and other individuals, and between the individual and the state. This concept of privacy rests on a construct of society as comprising relatively autonomous individuals and on notions of differences between the privacy claims and interests of different individuals. According to John Stuart Mill (as cited in Bennett & Raba, 2003), there should be certain 'self-regarding' activities of private concern, contrasted with 'other-regarding' activities to community interest and regulation. Shills (as cited in Bennett & Raba, 2003) argued that privacy is essential for the strength of American pluralistic democracy because it bolsters the boundaries between competing and countervailing centers of power. Dr Alan Westin, a leading academic (whose book *Privacy and Freedom* has shaped virtually all current thinking about privacy as a public issue), reinforced the importance of privacy for liberal democratic societies – in contrast to totalitarian regimes.

E-healthcare systems are increasingly popular, a large amount of personal data for medical purpose are involved, and people start to realize that they would completely lose control over their personal information once it enters the cyberspace. According to the government website, around 8 million patients' health information was leaked in the past two years. There are good reasons for keeping medical data private and limiting the access. An employer may decide not to hire someone with certain diseases. An insurance company may refuse to provide life insurance knowing the disease history of a patient.

Wireless sensors are being increasingly used to monitor/collect information in healthcare medical systems. For resource-efficient data acquisition, one major trend today is to utilize compressive sensing, for it unifies traditional data sampling and compression. Wireless sensor networks enable observation and retrieval of information from the ambient in a versatile manner. The coalescence of self-coordinating micro sensor nodes has enabled low-power, ultra-mobile body sensor networks. As sensor nodes are known to be resource-constrained great amount of research efforts have been invested on how to reduce the signal acquisition complexity on these sensing systems and how to enhance the energy efficiency of data communication. Human activity recognition using wearable body sensors is playing a significant role in ubiquitous and mobile computing. One of the issues related to this wearable technology is that the captured activity signals are highly dependent on the location where the sensors are worn on the human body. Existing research work either extracts location information from certain activity signals or takes advantage of the sensor location information as a priori to achieve better activity recognition performance.

The ever-growing healthcare data and simultaneously protect data privacy, while maintaining low overhead at sensors, remains challenging. To address the problem we make use of compressive sensing. Conventional approaches to sampling signals or images follow Shannon's celebrated theorem: the sampling rate must be at least twice the maximum frequency present in the signal (the so-called Nyquist rate). In fact, this principle underlies nearly all signal



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acquisition protocols used in consumer audio and visual electronics, medical imaging devices, radio receivers, and so on. CS theory asserts that one can recover certain signals and images from far fewer samples or measurements than traditional methods use. Compressed sensing is a ground-breaking signal processing theorem developed in recent years. It has been widely applied in many research domains such as communication, image processing and computer graphics due to its capability of accurate signal reconstruction with lower sampling rate claimed by Nyquist-Shannon sampling theorem. A compressed sensing-based approach is also used to co-recognize human activity and sensor location in a single framework. In compressive sensing, an N -sample signal is multiplied by an $M \times N$ projection matrix Φ to create an M -sample signal (with $M \ll N$) [1]. This approach for data compression is possible under the following conditions: (1) the N -sample signal is sparse in a secondary basis Ψ , and (2) $\Phi\Psi$ are incoherent with each other and satisfy the restricted isometric property. Compressive sensing enables sub-Nyquist sampling for low-energy data reduction on such nodes. The reconstruction cost, however, is severe, typically pushing signal analysis to a base station. One important application of compressed sensing is pattern recognition and classification. In recent years, it has been applied successfully to many pattern recognition problems including face recognition, speech recognition, and iris recognition.

III. PROPOSED ARCHITECTURE

First the data or images taken as input and sent to the compressive sensing area where the data is compressed to the minimum size using compression algorithm. Once the data is compressed we encrypt it using AES encryption algorithm. After the data is encrypted it is uploaded to the cloud. From the cloud the wireless sensors detect the necessary data and update it to the user as well as the doctor. Sensors can depict data in the encrypted form only. Next step where the physician is requesting for the document. the request is sent to the cloud. He need to enter the public key in order to send the request. From cloud the document is sent and it is decrypted using AES algorithm and finally the document is visible to the physician. This project is used to maintain the sensitive data of the celebrities, politicians and many people also. Here this project also helps in removing the noise from the image and make it clearly visible to the user and doctor. In order to achieve this we are using fully homomorphism algorithm to achieve our task.

A. System architecture:

Our proposed cloud assisted healthcare monitoring design can be illustrated in Figure 1: Wireless sensors are used to continuously monitor and collect raw data under various healthcare contexts. In order to maintain a huge amount of data the wireless sensors will transfer the data to the cloud. Cloud with its abundant resources is responsible to provide various privacy-assured data services for receivers, such as on-demand data recovery, data retrieval, and others. Here the receiver might be a healthcare workstation operated by a physician in a hospital. In our architecture we are using medical image which is reconstructed from compressed samples. Then it is encrypted and uploaded into the cloud. Later the image can be viewed by the physician by requesting to the cloud where the image is decrypted and sent to the physician. Due to the assistance of cloud, the local computational the receiver is expected to be considerably reduced, and the overall image recovery efficiency improved.

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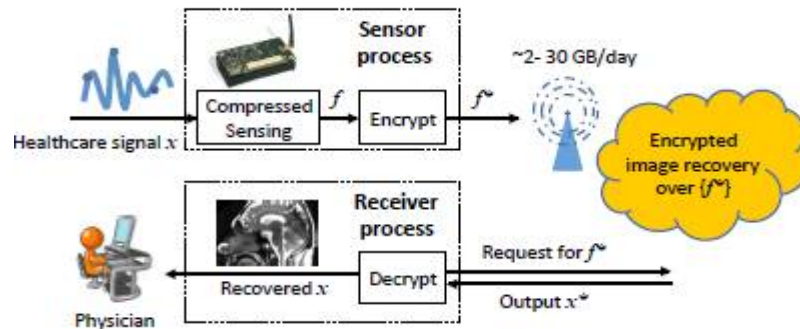


Fig. 1: The proposed system architecture

B. In case of General Data:

In the real world applications we can have the health care data which is not sparse. Then the question arises how can we deal with the data which is non sparse. The proposed architecture can handle the general data by discarding the small co-efficient of sparse data which doesn't cause to lose much information. This method can be applied to any General data via some good s-sparse approximations.

C. The case of Data Corrupted with Noise:

The data collected from the sensors are sometimes tampered with noise and some errors in transmission channel etc. Our proposed system can handle the data corrupted with noise. This is achieved via linear programming, and the other is via non-linear optimization, specifically regularization. In this work, we renew ourselves to the linear programming recovery and continue to explore the tradeoffs between robustness and efficiency of our privacy-aware system design.

IV. CONCLUSION AND FUTURE WORK

The idea of compressive sensing was proposed to effectively process the ever-growing healthcare data and simultaneously protect data privacy, while maintaining low overhead at sensors. The design exploits techniques from different domains, and achieves the following novel benefits. In our architecture, the sensor can utilize the framework of compressive sensing to consolidate the sampling and compression via only linear measurements. The random mapping based protection ensures no sensitive samples would leave the sensor in unprotected form. On the receiver side, the cloud-assisted image recovery over encrypted samples provides great computational savings, yet without revealing either the received compressed samples, or the content of the recovered underlying image. We can show that our proposed design is able to achieve robustness and effectiveness in handling image recovery in cases of sparse data, general data, and even data samples corrupted with noise.

REFERENCES

1. J. Ko, C. Lu, M. Srivastava, J. Stankovic, A. Terzis, and M. Welsh, "Wireless sensor networks for healthcare," Proceedings of the IEEE, vol. 98, no. 11, pp. 1947–1960, 2010.
2. M. Shoaib and H. Garudadri, "Digital pacer detection in diagnostic grade eeg," in Proc. of IEEE Conf. E-health, Networking, Appl. and Services, pp. 326–33, 2011.
3. M. Shoaib and N. Jha and N. Verma, "A compressed-domain processor for seizure detection to simultaneously reduce computation and communication energy," in Proc. of IEEE Custom Integrated Circuits Conf., pp. 1–4, 2012.
4. J. Ko, J. Lim, Y. Chen, R. Musaloiu-E., A. Terzis, G. Masson, T. Gao, W. Destler, L. Selavo, and R. Dutton, "BMEDiSN: Medical emergency detection in sensor networks," ACM Trans. Embedded Comput. Syst., vol. 10, no. 1, pp. 11:1–11:29, 2010.
5. W. Xu and M. Zhang and A. Sawchuk and M. Sarrafzadeh, "Corecognition of human activity and sensor location via compressed sensing in wearable body sensor networks," in Proc. of IEEE Conf. Body Sensor Networks, pp. 124–129, 2012.



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6. D. Donoho, "Compressed sensing," IEEE Trans. Inf. Theory, vol. 52, no. 4, pp. 1289–1306, 2006.
7. E. Candès and T. Tao, "Near-optimal signal recovery from random projections: Universal encoding strategies?" IEEE Trans. Inf. Theory, vol. 52, no. 12, pp. 5406–5425, 2006.
8. E. Candès, J. Romberg, and T. Tao, "Robust uncertainty principles: Exact signal reconstruction from highly incomplete frequency information," IEEE Trans. Inf. Theory, vol. 52, no. 2, pp. 489–509, 2006.
9. R. Gennaro, C. Gentry, and B. Parno, "Non-interactive verifiable computing: Outsourcing computation to untrusted workers," in Proc. of CRYPTO, pp. 465–48, 2010.

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