IOT ANS WSN: A CRITICAL REVIEW

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ABSTRACT

The Internet of Things (IoT) is committed to providing cutting-edge technology to allow a number of new services connected to healthcare, manufacturing, intelligent cities and other everyday human activities. A huge number of smart, self-powered devices gather real-world data and interact with the other and the cloud over a wireless connection in a typical IoT setup to share information and perform certain services. The considerable energy consumption connected with the wireless transmission, however, restricts the performance of these IoT-supplied devices in terms of calculation and battery life. Therefore, alternative methods such as cooperative transmission, multi-hop network designs and advanced compaction algorithms must be studied to maximise data transfer. For the latter, CS is a highly appealing paradigm that may be included in the design of IoT systems. CS is a unique signal acquisition and compression theory which uses the sparsity nature of most naturally occurring signals and IoT designs to provide powerful, real-time platforms that provide efficient IoT applications. This study examines the existing literature targeted at using CS in IoT applications. The study also highlights new trends and proposes numerous ways for future CS-based IoT research.

KEYWORDS: IOT, WSN, Sensors, Hardware

INTRODUCTION

The Internet of Things (IoT) refers to a broad array of smart, internet-connected gadgets providing customised services to fulfil the requirements of customers. IoT illustrates the move from connecting end-user devices to the Internet to utilising the Internet itself to link intelligent things (also known as IoT) and interact with one other or people to provide a broad variety of applications and services.

IoT systems commonly employ a wide range of smart items, including wearable sensors, actuators and RFID devices, to remotely monitor diverse physical, environmental and physiological characteristics to enhance end users' daily activities. Indeed, IoT devices frequently function in a long-term mode and wirelessly connect with one other and to provide a range of remote monitoring platforms. Overall,
battery-powered remote sensing devices are thus prone to a limited battery life that leads both to poor integration and user adherence. In order to overcome these limits, the data gathered must first be compressed and then transported over efficient pathways to the Fusion Center to reduce the energy consumption. However, modern data compression and transmission mechanisms may potentially require substantial energy onboard. The proposed compression methodology must thus support long-term, effective monitoring and optimum electricity use.

Compressed sensing (CS) is a new signal processing paradigm which focuses at acquiring immediately a compressed form of signals with sparse behaviour during sensing and allows for high recipient quality reconstruction. CS gives an alternate paradigm to the classic acquisition basics, which states that the number of samples measured in the original signal should be at least equivalent for the number of samples to enable an accurate recovery. However, these requirements do not take the signal structure into account. If the interest signal is sparse, i.e. the signal can be represented by a smaller number of coefficient non-null than its original dimension, CS claims that taking only a few random linear measures (projects) of the sparse signal is sufficient for the outstanding information in the signal to provide an acceptable reconstruction quality. CS is to move the complexity from resource-restricted and self-powering sensors to the receiver side, generally deployed with eased limits on calculation platforms.

In most real-world situations, a sparse or compressible representation for interest signals can always be found by means of the suitable transformation. As a result, CS is used in a variety of applications including radar, image processing, bio-signal compression, wireless communication etc.

**IOT**

IOT is a global infrastructure for the information society, the international telecommunications union (ITU), allowing improved services via the interconnection (physical and virtual) of current and emerging interoperable ICT technology.

The IoT comprises of an interaction network of sensors, actuators, wireless communication protocols and data processing technologies for a given application. IoT is generally characterised by many highly dynamic heterogeneous devices with various and limited communications and computing resources. In software/ Hardware, this heterogeneity demands a new level of networking/communication protocols as well as adaptability mechanisms. Furthermore, various additional concerns, including scalability, information interchange, power consumption, interoperability, and system adaptability, have to be addressed both in the integration and administration of these devices. In addition, IoT has moved applications from a single device to enormous in-house, real-time deployments of embedded cross-platform and cloud technologies. Therefore, numerous study groups and standards agencies have investigated and dealt with these questions from different perspectives in order to bring everything together.
SENSORS

A highly intriguing hypothesis, dubbed CS, was recently put up in order to overcome the problem of accumulating a vast number of redundant samples. CS demonstrates that the classic sampling theory limit for a certain kind of structured signal may be overcome by decreasing the sample rate without substantial data losses. The authors reasoned that if the signal's data rate is smaller than its bandwidth rate, i.e. the signal is either sparse or compressible, all the information may then be collected without loss with less samples than the theorem statistic from Nyquist–Shannon. Consequently, CS allows for a potentially considerable decrease in the sampling and processing costs for sparse or compressible signal sensing.

CS is notably different from state-of-the-art compression algorithms. Whilst the latter has a two-stage architecture, first of all the signal is sampled to get an N-length signal with regard to the bandwidth rate following the high Nyquist sampling frequency fs. Secondly, data compression is done by filtering, coding and extracting the signal's most important properties to lower the signal dimension from N to M. (M N). CS, on the other hand, is a one-stage framework that aims at simultaneously acquiring and compressing a compressed signal form directly. To this purpose, CS rely on the fact that most real-world signals show a scarce behaviour in the proper way (this basis can be either a fixed transform such DCT and DWT or it can be formed by means of dictionary learning techniques).

IOT BASE APPLICATIONS

Intelligent devices that construct the sensing layer are the core of every IoT platform. Data collection is carried out utilising many smart IoT devices, which are installed at various places to gather different data kinds for a long duration depending on the application being targeted. The data gathered are often big and include some duplicated data. Consequently, data will initially be sent to a local processing unit with enough storage and computing capabilities to carry out various pre-processing procedures on samples to extract distinct information and functions. The processing unit is also the gateway to only pass important information into the cloud instead of sending the whole gathered data, therefore the network capacity may be reduced considerably. In IoT applications, provides a highly promising paradigm. A three-level CS-based IoT framework may be constructed. First, at the sensor level where data collecting and transfer processes create a challenge in terms of energy consumption, the latter being minimised is the essential problem to address. CS may thus be used efficiently as a compression method to construct an energy-efficient data capture and transmission system. Secondly, CS may be used on the embedded system on a Local Processing Unit to produce the "CS-based Edge Computing Platform" for aggregating, storing and rebuilding compressed data from sensors to extract key information and features for sending to the cloud that host the application level.
CONCLUSION

In order to collect the most information to permit various sorts of services, IoT applications demand an enormous number of heterogeneous smart gadgets to feel, communicate and cooperate. A huge number of sensors provide enormous redundant data which will result in superfluous network traffic, hence reducing overall system performance. Exploring CS may thereby lower the amount of data gathered and lessen the burden on wireless communications. The study offers a short introduction of CS theory from the fundamental models of signal acquisition through the requirements to be fulfilled while creating the sensing matrix, as well as identifying some of the most often recognised reconstruction techniques in the literature. In addition, this study examines the remaining work given in the literature on integrating CS approaches into the IoT systems. To this goal, the IoT Platform will be separated into three levels, and the corresponding CS investigations for each layer will be carefully explored.

REFERENCES


of open platform-based in-home healthcare terminals towards the internet-of-things. 
*International Conference on Advanced Communication Technology, ICACT*, 529–534. 
https://www.scopus.com/inward/record.uri?eid=2-s2.0-84876220797&partnerID=40&md5=1aa069a3afe6682e3d07702e9f6fb009


https://doi.org/10.1109/ICSEMR.2014.7043542