Big Data Research and Use Cases for Location Based Service using Mobile Radio Access Networks

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Abstract

Location-based services (LBS) provide the ability to find the geographical location of a mobile device and then provide services based on that location. Researches in using Location Based Services using Mobile data have been well established (). Most of these researches are discuss the LBS based on Global Positioning System(GPS) enabled mobile devices (), where people often raised concerns on the data privacy () on the personal information level. This paper is to identify the gap that research in LBS between using GPS data and using Radio Access Networks(RAN) data. Furthermore, discuss use cases and future works for Big Data analytics in LBS using RAN data.

Keywords: Big Data, Mobile, RAN, LBS

1 Introduction

1.1 Big Data

Big Data refers to datasets that grow so large that it is difficult to capture, store, manage, share, analyze and visualize using the typical database software tools (). Gartner's definition of the 3Vs is still widely used, and in agreement with a consensual definition that states that "Big Data represents the Information assets characterized by such a High Volume, Velocity and Variety to require specific Technology and Analytical Methods for its transformation into Value" (). Typical Big Data sources include Web Data, Event Logs, Censors Data, Social Network Data, Machine Generated etc.

1.1.1 Characteristics

- Huge

- Distributed Dispersed over many servers

- Dynamic Items add/deleted/modified continuously

- Heterogeneous Many agents access/update data

- Noisy

- Inherent

- Unintentional/Malicious

- Unstructured/semi-structured

- No database schema

- Complex interrelationships

1.1.2 Architecture Framework and Use Cases

- Offline Analytics

- Near Realtime Analytics

- Realtime Analytics

1.2 Location Based Services

Based on Localization-Based Systems LBS can be broadly divided:

Network-based techniques utilize the service provider's network infrastructure to identify the location of the handset. The advantage of network-based techniques - from a mobile operator's point of view - is that they can be implemented non-intrusively, without affecting the handsets.

- 3G Network

- 4G Network

Handset-based technology requires installing client software on the handset to determine its location. This technique determines the location of the handset by computing its location by cell identification, signal strengths of the home and neighbouring cells, which is continuously sent to the carrier. In addition, if the handset is also equipped with GPS then significantly more precise location information is sent from the handset to the carrier.

By using the SIM in GSM and UMTS handsets, it is possible to obtain raw radio measurements from the handset. The measurements that are available can include the serving Cell ID, round trip time and signal strength. The type of information obtained via the SIM can differ from what is available from the handset. For example, it may not
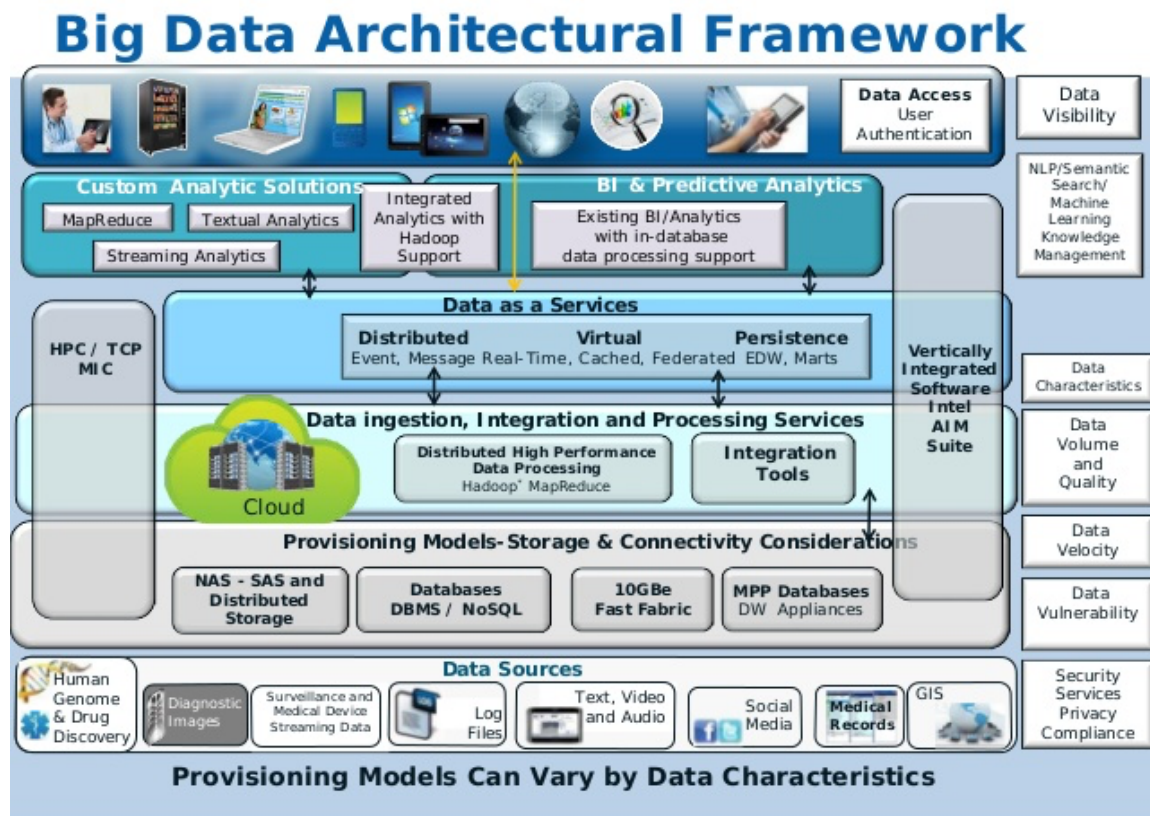
Figure 1: Big Data Architecture Framework

be possible to obtain any raw measurements from the handset directly, yet still obtain measurements via the SIM.

Hybrid positioning systems use a combination of network-based and handset-based technologies for location determination. One example would be some modes of Assisted GPS, which can both use GPS and network information to compute the location. Both types of data are thus used by the telephone to make the location more accurate (i.e. A-GPS). Alternatively tracking with both systems can also occur by having the phone attain his GPS-location directly from the satellites, and then having the information sent via the network to the person that is trying to locate the telephone. Google Latitude, for instance, allows such mobile phone tracking.

1.2.1 Metrics

- Accuracy

- Reliability

- Availability

- Frequency

2 Related Work

Apache Hadoop Ecosystem is a framework of various types of complex and evolving tools see Figure **??** and components from Apache Foundation which have proficient advantage in solving big Data and Business Intelligence(BI) problems. In (Mehta & Mehta, n.d.), the Hadoop tools set had been labeled as Data Management, Data Access, Data Process and Data Storage.

To understand Hadoop Ecosystem and what problem it can solve, in the follow subsections we will explain Hadoop Core system, HDFS and MapReduce, and Hadoop extension tools that make Hadoop core system even powerful and easy of use and maintain.

3 Discussion

4 Summary and Future Research

References

Mehta, S., & Mehta, V. (n.d.). Hadoop ecosystem: An introduction.