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"Big Data" Creates New Opportunities to Close the Healthcare Gap

Suhiar Mohammed Zeki[a*], Dr. Abdul Monem Saleh Rahma[b]

[a]*PhD. Student at Computer Science Department/ University of Technology*
[b]*Computer Science Department / University of Technology/ Baghdad*
[a]*Email: 110121@uotechnology.edu.iq,* [b]*Email: monem.rahma@yahoo.com*

Abstract

As a result of progress in the digital world at the present time, Led to the use of modern techniques in the field of health care for Al best health and medical practices. If this has become a new digital system that combines a lot of Information (big data) In the medical field through the use of modern digital devices and medical technology so that there be a comprehensive understanding of these massive data in the field of virtual changes. The use of massive data in the medical field is important at the present time so there became practical problems must work to resolve them (such as data privacy, speed, real-time, ownership of the data and finally the risks of use). This study aims to use technology in the huge medical data analysis and specified in detail how the architectural class to use this technique to ensure the analysis of these data in real time and full exploitation of the potential of this technology.

Keywords: Big Data; Healthcare Gap.

1. Introduction

The main objective of the massive data analysis is to help in making decisions that are more accurate and exploitation of data, all and it used many ways to analyze large data but always there are problems facing these methods and techniques such as operations to update the data as well as data that are huge and real-time data applications that are smart devices.

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* Corresponding author.

There were many techniques and methods in the analysis of the massive data such as (Hadoop, Hive, Pig, and NOSQL) and so on. For this in this study it is to focus on the massive data in the health sector which is made up by (medical records, medical equipment, medicines, medical x-ray images, Web applications, and smart devices) and other health sector through massive data gathering sources [1]. This study resorted to the use of technology to analyze this huge health data through transforming healthcare through health big data and reduce costs, improve quality and provide health care safer by (collection, storage, analysis, reporting and secure the assets of the huge data). Access to health care data analysis strategy to achieve high quality and cost effective care. Huge amount of big data= request data+clinlcal data clinical decision support system+insurance+medision+ electronic health records+Physicians' documemts+twitter feeds+facebook+social media and other stand.

2. Traditional Managing and Analyze Big Data [3]

- Analytic RDBMS
  - Canned Hardware and Software Appliances
  - Only Software Platforms
- Non-Relational Systems
  - Map Reduce
  - Column guide Databases
  - Key-Value wed Databases

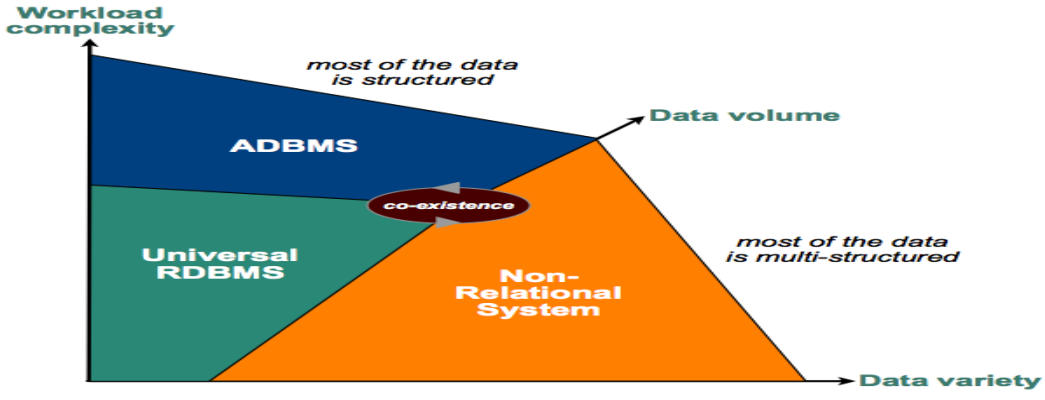


Figure 1

So Big data means several things for different industries. The definition also varies within an organization, across departments and management layers within IT and business [4].

big data is a “term applied to massive data objects that are variety in nature – structured, unstructured or a semi-structured, inclusive sources internal or outward to an organization, and formed at a high degree of velocity with an suspicion pattern, that does not fit neatly into traditional, structured, narrative data stores and ask strong sophisticated information biological community with high performance computing platform and analytical capability to hold , process, transform, find out and derive business prudence and amount within a sensible elapsed(of time) .” [4].

3. A terse pedigree of Big Data in Healthcare [1]

In 2001, Doug Laney, now at Gartner, other analytic have struggle this is too simplistic, and there are further things to reason about when understand big data. They propose more V’s such as Variability and Veracity; we’ll rush with the simpler 3 V’s forward for this segment.

In the field of medical and health care, there is a large amount of data received since the EMRs alone is a huge amount of data In general, not the size and speed of large data sufficient to handle the massive data in real time and as quickly as possible .

As for ATUL GAWANDE He talked about the communication process and systems thinking in how to deal with huge data in the field of health care.

Lastly, technology projects, for example data warehousing/business intelligence projects, often fail (across industries) not because of algorithmic complexity but rather as a result of two principal factors: (1) data complexity (i.e. semantic challenges upholding a single source of truth); and (2) the multiplicity of interfaces between applications requiring integration. In healthcare, these two factors are critical for supporting effective patient care. So why are the blind leading the blind? Because neither vendors nor providers collectively share the same vision or agenda that powers the end game – Effective Patient Engagement.

There is surely set in the data, but most systems rise very similar data objects with an casual nip to the model. That said, new use cases supporting genomics will surely ask a big data path.

Big data is perfect for medical banner, but potentially perilous for the patient. By collect and analyzing huge amount of digital information from doubled sources, inclusive an emerging category of wearable devices and Smartphone apps, medical professionals will be well armed to re solve main health problems and caution people of emerging menace like the Ebola virus. That's the target, in any case. But big data's turn in healthcare may be prevent by government privacy assizes such the Iraqi Health Insurance Portability and liability Act (HIPAA) Privacy, Security, and Breach Notification Rules, which check the security and revelation of personal health information by health insurer , medical care supplier , and other structure [2].

4. BIG DATA application in Health Sector

Data detection +patterns fatal analysis equipment data +explore data warehouse +patient management pharmacology +decision support disease prevention.

Figure 2

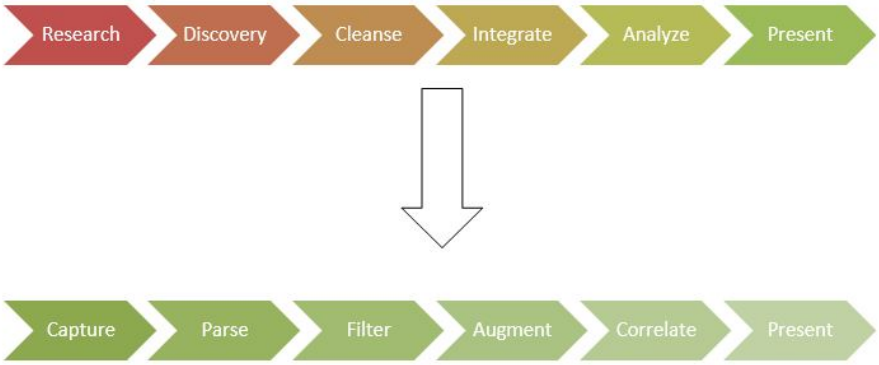


Figure 3

The image above shows the huge data that are in the health system, such as medical images and medical data Apparatuses, medicine, radiology, medical records included diagnosis files that belong to the patient's admission and records, database and other sources sources.

5. The reason for the big data in healthcare

The development of the medical and health field has accumulated a huge database known massive health data, therefore there must be management and recruitment and analysis of these data at the lowest cost and highest speed in record time (real time).

More recently other sources of health data emerged which provided some devices such as watches and medical bracelets linked to the internet and through which the participation of physical and nursing activities and patient follow-up through the World Wide Web. So we are going to analyze the health and medical information and provide services for patients process without the patient visited the health center.

6. Get about Data Warehousing to Big Data

Big Data and Data Warehousing, the architecture graph from both of those different disciplines, they look very similar. But the reality is there are some significant variation between them [5]. Established the fourth generation of the databases, which led to significant challenges in how to shift data from the storage rules and to search data stores, which derive knowledge to assist in the decision-making process, with some difficulties in its application, where it takes a long time Created. With the widespread use of information technology information size swelled significantly, as well as with the widespread use of the Internet, this has become a means of communication and exchange of information. The emergence of social networks that combine information and data around the clock as well as lower store this data heavily and smooth the costs and the emergence of Internet technology, where things allows each devices to communicate with each other and bonding techniques online so have large production data. Big data, however, is built around a paradigm called the three Vs. The first one is Volume, where we essentially have an infinite number of sources and capacity, because of this new generation of technology that we're using. The second V is Velocity. Whereas in data warehousing we bring our data in a batch manner, even if it's daily, or even several times a day, with big data we can incorporate new data quickly. Not only from our existing data sources in real time. Data warehouse and big data environments can turn up together in an inserted and very integral way. In this scenario, the Hadoop system can carry out quickly. For instance, a high-tech company might resolve to drug data from its social networking site and fall it with data from the data warehouse to crush a customer's social network circle of friends. The environment force also use Hadoop to quickly "score" that person's social effect [8].

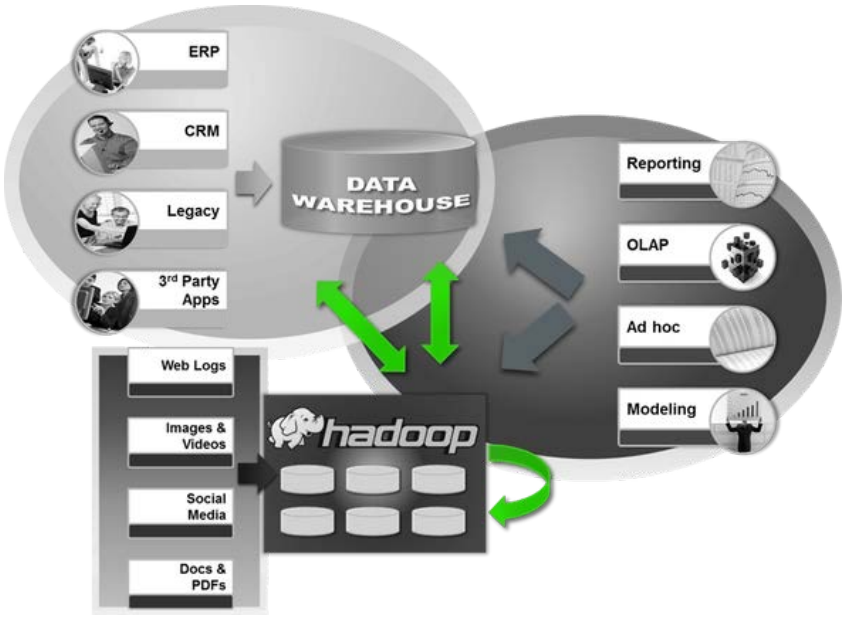


Figure 4

7. Using new approach (lambda) to good manage of healthcare big data

Lambda architecture is a data-processing architecture designed to handle huge amount of data by occupation merit of both batch- and stream-processing methods. This path to architecture effort to balance latency,

throughput, and fault-tolerance by using batch processing to provide comprehensive and accurate views of batch data, while altogether using real-time stream processing to supply views of online data [2].

Lambda ⟶ **Good management**

Lambda ⟶ **New Big Data**

The Lambda Architecture It is a technology to solve computing problems as well as random functions in real time, through the analysis of the problem into three layers (batch Layer + Serving Layer + Speed Layer).

So the lambda architecture common purpose of the application of a full-purpose working in passing data set and include feedback and be outcomes in record time.

Data and architectural structure is a new architecture for data prepared to accommodate the huge (Operations and questions in such a building).

(Process question)+ Genetic (batch) data

Lambda architecture= speed layer+ serving layer +batch layer

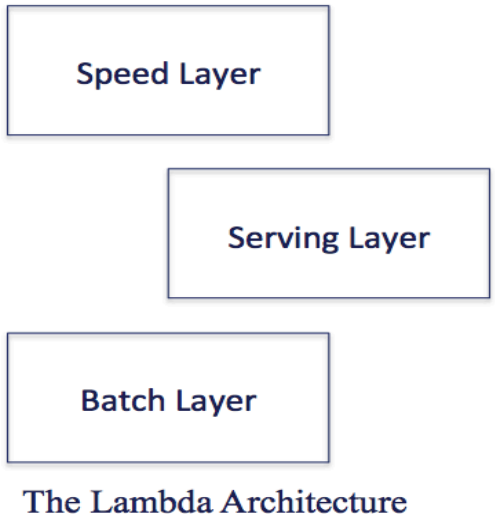


Figure 5

Batch layer: Is the amount of data words (Lake Data) such as Hadoop system and this in spite of being a data warehouse to generate analytics.This warehouse is used like a (historic archive) where this archive is used to contain and link all the data collected earlier.The batch layer backing batch query, batch processing used to generate analytic.

Lambda ⟹ **Batch layer**

The speed layer is known as a set of queuing it is considered a store of data and operational life, in lambda architecture (speed layer) is like (batch layer) so They calculated the same analytic The difference is these analyzes are in real time And the latest data .Speed layer responsibility to calculate these analyzes in real time based on the speed of data traffic.Therefore, it is possible to use these characteristics to technology Lambda to earn good administration in the field of big data in the field of health care, using the three layers.

Lambda ⟹ **Speed layer**

Serving layer is the produce from the batch and speed layers are stored in the serving layer, which responds to ad-hoc queries by back views or building views from the treat data.

Lambda ⟹ **serving layer**

Now it has become a vision of an integrated analytics by collecting between analyzes of (batch layer) and (speed layer), It means historical and fresh data.

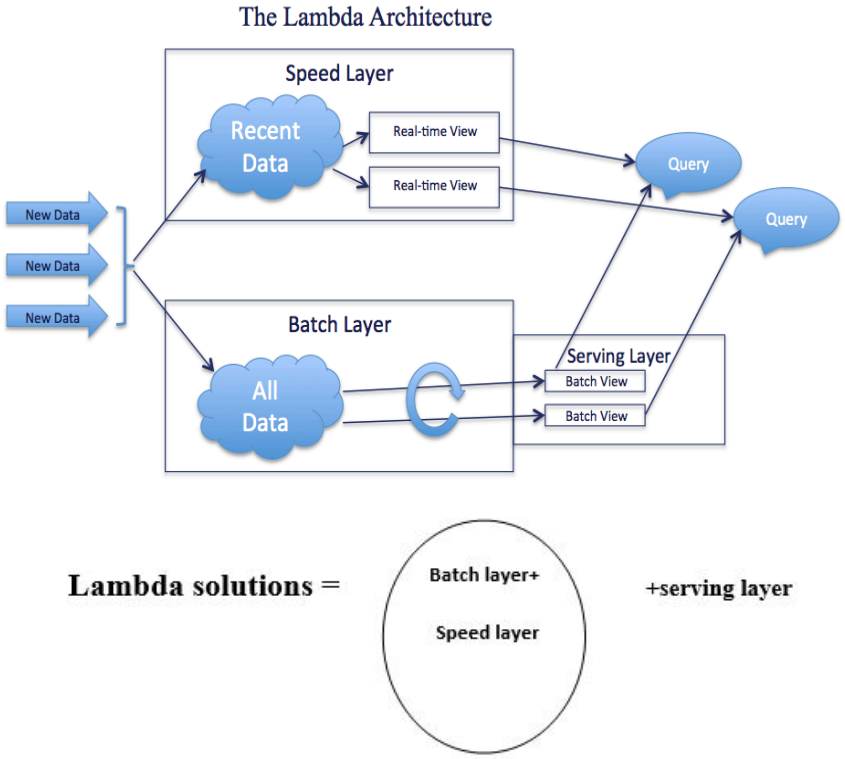
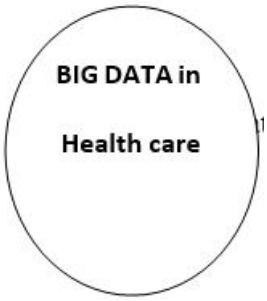


Figure 6

The third layer (layer services) employ up results with the help of (speed layer) + (batch layer).



Are: structured data +coded data + semi UN structured data unstructured data +electronic image +scanned image +audio and video

+ User behavior +patient generated data+ events.

8. Lambda solutions in healthcare strip

The healthcare sector is try huge growth and is under push to do more within compulsory budgets.healthcare professionals act in high-over work ambience , where lives depend on them own the most up-to-date information. Lambda Solutions has labor with leading healthcare supplier across Health firm to cope cast, competency management, and accreditation can play a big role when you are cooperation with organizational increase and change, then the good management of our big data must be good goodness' by improve patient outcomes and events .

So:

Good lambda =Good management

Good management=Good solutions

Good solutions = Good decision support system

Good decision= Good quality management

9. Future-proofing Lambda using in health bid data

Through the use of architectural lambda Will be in action sequence comes first data collection and queries on all fast data and historical data (read-only) So the data is fixed and never change.

Data comes into the system within certain standards and streams (real-time and real date) are accounted for, processing and preservation of restructuring.

Foreign systems are the use of technology lambda that depend on the environment and the type of query analysis and then used these analyzes in large health data management. Another feature of this system or technical analysis is that in the (speed layer) Differs from the analysis in (batch layer) commonly used (data lake) to extract the query and specifications through exploratory inquiries this information and inquiries are out feeding (speed layer) and it works as an input to the decisions in each case.

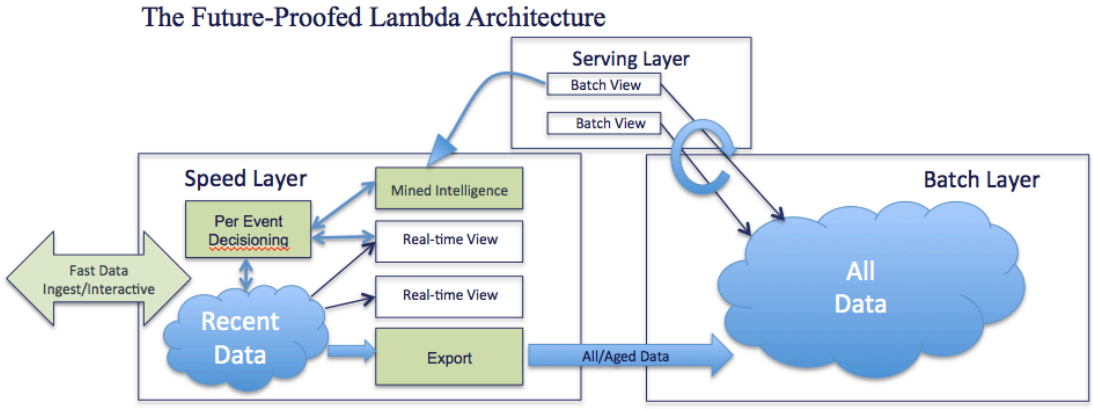


Figure 7

In this diagram can see the additions to the architecture:

1. Data access at high average and is insinuate, it is promptly emit to batch layer (data lakelet).
2. Historic intellect mined from (data lake) , so the candid "intellect" can transport to (speed layer) in to per-(event+ decision real time) for example to define which to offer for a segmented/categorized web browser/user).
3. Rapid data is any passively realize, or restraint to calculate by new layer, utilize both (real time)+(historical "mined")

Health big data ⟶ lambda solutions ⟶ good data management

Good big data management ⟶ good decision support system

10. Five big data challenges [10]

1- Meet the poverty of speed

2- Harmony the data

3- Handling data quality

4- Offer meaningful

5- Dealing with boundary

11. Big data come in healthcare challenges [9]

1- privacy and security are essential

2- improved of electronic health record

3- goodness of the data

4- unequal of data fineness (large fraction of data + increasing reliance on technology)

5- ticklish clinical data (symptoms, physical mark , orders, and progress outline)

6- natural language processing (NLP)

7- Shatter of data

8- enormous and rousing

12. Conclusions

In this proposed method in the analysis of the massive data in the health systems in addition to simplify the structure of the big data generated in the health care.

Lambda method it is a way to give a good future to deal with huge data where it can take advantage of the structure of this method through the use of the three classes in it.

Where it is merging the first and second layers together and then adding the third tier for the analysis and management of results.

This gives us the ability of executing transactions and decisions and massive data quickly and ensuring that it reaches too instead of data flow in one direction and processed parts (batch).

So can ensure the rapid analysis of health data in real-time and gain the support of a good decision and ensure the quality of the administration without any loss of data or face the risk of what.

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SUHIAR M.ZEKI was born in Baghdad, Iraq, she obtained B.SC. (1994), MSC (2005) in computer science from Iraqi commission for computers informatics, informatics institute for postgraduate studies, she teaches undergraduate courses in computer science department / University of technology /Iraq/Baghdad , and currently she is a PH.D student at the technology university /Baghdad , her research interests are: healthcare systems, data warehouse, data management , data security ,artificial intelligent .She has a certificate for practitioner (self-developing messages project) from creativity horizons for training, human development &administrative improvement (chthai) /Iraq/2014.

Prof. Abdul Monem S. Rahma Ph.D Awarded his M.Sc. from Brunel University and his Ph.D. from Loughborough University of technology United Kingdom in 1982, 1984 respectively. He taught at Baghdad university Department of Computer Science and the Military Collage of Engineering, Computer Engineering Department from 1986 till 2003. From 2004 to 2012 he holds the position of Dean Asst. and from 2013 to 2015 he holds the position of Dean of the Computer Science Department at the University of Technology. He published 130 Papers, 4 Books in the field of computer science, supervised 31 Ph.D. and 63 M.Sc. students. His research interests include Computer Graphics Image Processing, Biometrics and Computer Security