ISSN: 0975-766X
CODEN: IJPTFI
Available Online through
Research Article
www.ijptonline.com

A NOVEL BIOMEDICAL DATA SOLUTIONS BY USING BIG DATA PLATFORMS FOR BETTER HEALTH CARE SERVICE

Rizwan Patan*[1] and Rajasekhara babu[2]
[1, 2] School of Computing Science and Engineering, VIT University Vellore, Tamil Nadu, India.
Email: patanrizwan.gouse@vit.ac.in

Received on 10-05-2016 *Accepted on 09-06-2016*

Abstract

Big Data is broad term critical passion to apply health care service. Data play's vital role in more fields as well as health care field. Patient current health condition known only progress for further better health care. In This paper present a medical data analysis, transfer, compute, store etc. actions by using big data platforms. Digital devices capture and generate different forms of data to produce different passion to processing area. For faster and deeper data tactics are need to perform on top of medical data sets.

To reducing the time wastage and improving performance overall medical data processing strategy by using various tools storm, spark, and Hadoop etc. all-inclusive hybrid computation model. Theoretical evaluation model are to be designed shown in it. And Experimental prototype setup created a feasible environment for effective medical data processing. Finally, results compared by traditional data processing models analyze up to 30-40 % efficiency shown proposed framework.

Key words: Biomedical Data, Big Data platforms, Pervasive Health, P-Health Model.

Introduction

Background

Big Data Technology(Mohanty, 2015) emerging to spreading all field like business, automobiles, marketing, medical etc. Ever where data place a vital role to processing/managing data only make decision making quickly. Especially in healthcare services medical data gathering patient information is easy tasks now a day's technology and tools. Different type of mixed information is collecting to the patient it is massive, real-time, large volume and vast velocities data. In Figure-1 Shown what type of health care data need to be maintain by what type of big data tools required. In this three

categories are divided Health service information (Hassanalieragh et al., 2015), new health applications, both will be handling six different primary care, Personal Health management (Network, 2016)Aging Society, Clinical Decision Support, Cancer Genomics. Second stage analytics and Visualization SQL-like (Structured Query Language) Query, Machine learning Medical Image analytics Data Processing/ Management Medical record Genome Data Medical Images and Final stage distribution platforms will three categories one storage optimization, security and privacy and imaging Acceleration.

More hospitals are likely than their smaller complements to have big data analytics(Gupta & Tyagi, 2015) setup in place, and are also more likely to be enjoying the fruits of their labors. While 40 % of hospitals with fewer than 200 beds are still in their planning phases, nearly the same number of hospitals with more than 1000 beds are actively implementing new technologies. Different type of hospitality information to be merged big data environment for faster and feasible required result making are to be done for better services. Maintaining all the data processing (Aly et al., 2012)to using advance techniques to quicker processing different forms of data. In our task is to less computation taken place for larger data insights.More than 60 % of organizations have improved 30-day hospital readmissions scores and death rates with the help of some level of analytics.81 % expect to see the same results when they finish crafting their infrastructure, too.

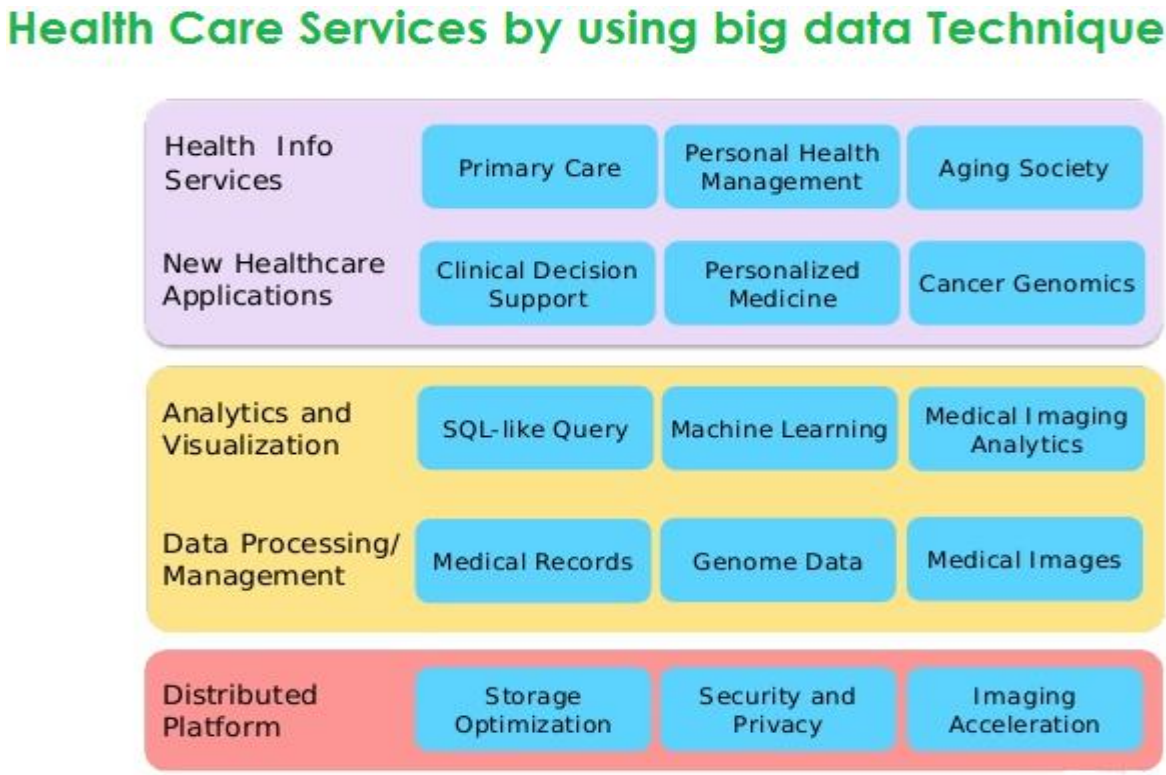

Fig. 1. Required fields of Health Care Data Solutions by using big data Technique's.

Medical Data processing/managing using Big Data Technology

The thought of Big Data is not new, however the way it is described is constantly developing. Various exercises at describing Big Data essentially depict it as an aggregation of data parts whose size, pace, sort, and/or flightiness oblige one to search for, get, and grow new gear and programming frameworks with a particular final objective to adequately store , analyze, besides, the data. Social protection is a prime instance of how the 3Vs of data, rate (pace of period of data), variety, and volume, are an innate part of the data it produces. This information is spread among various human services frameworks, wellbeing guarantors, scientists, government substances, et cetera. Moreover, each of these information archives is inherently and soloed unequipped for giving a stage for worldwide information straight forwardness. To add to the three Vs, the veracity of human services information is additionally basic for its important use towards creating translational exploration.

1.2 Motivation

At present current Bio-Medical healthcare services (Holzinger, 2014) is very less. Not sufficient to serve the peoples in better way especially in India. Every government hospital serves an estimated 61,000 people in India, with one bed for every 1833 people, new official data shows. In undivided Andhra Pradesh, every government hospital serves over 3 lakh patients while in Bihar, there is only one bed for every 8800 people.

Doctor and patient ratio also very low according to Indian survey it is very poor. Now adding the Technology factors to existing situation improve the health care efficiency. Quality of service and easy interaction, easy disease identification etc. To adding big data technology to improve better processing and maintain medical data is improve the quality of service.

1.3 Contributions

A **s**ummarized workflow of the paper as follows:

a. Clear study on present health care description for better understanding for different data sets generated by the different devices in medical field.
b. Difficulty facing for current biomedical data it required to compute larger infrastructure to deal it. In this model reduce computation capability.
c. All kind of medical data to be handled using essential tools/techniques of big data for faster decisions.

d. Theoretical and mathematical relational models for relating to the deeper medical data analysis in what way new system will design.
e. Proposing a low computation with high volume and high velocity data using big data platforms.
f. Big Data lambda architecture using for dealing with both batch tasks and stream (Real-Time, Online) tasks for similar both type of data process at once.
g. Finally sample multiple forms of medical data sets to be submitted in big data platforms.

1.4. Paper arrangement:

In this paper arranged as a following sequence first introduction, second literature review, third problem statement, fourth Mathematical relational, fifth proposed interactive model, sixth results and discussion, and finally seventh Conclusion.

2. Literature review

Big data is a broad term and critical passion to applying overall data. It processing medical data a few papers related to discussion different medium of data to be handled.

In (Elsebakhi et al., 2015) author dealing data, the capacity to manufacture creative prescient displaying classifier in light of EMR (Electronic Medical Record) clinical information to distinguish the likenesses among tumor patients and manage imbalanced and scanty clinical genuine information with high exact right characterization rate and better affectability and AUC (Area Under the Curve). Besides, it could utilize the classifier to decide serious hazard people and streamline their appropriate chemo-treatment. In (Gachet, Buenaga, Puertas, & Villalba, 2015) author deals to handle Bio-signals using big data analytics. In this paper author proceeds concentrated on the principle design depiction with a few insights about sensors and situations to be considered with a specific end goal to show the usefulness of the created engineering. In (Belle et al., 2015) author listed what type of problem facing with big data platform while dealing biomedical datasets. There are numerous open issues for Big Data administration and investigation, specifically in the computational science and medicinal services fields. A few qualities and open issues of these difficulties have been talked about in this paper, for example, engineering angles and the ability of being sufficiently adaptable to gather and break down various sort of data. It is basic to confront the assortment of the data that ought to be overseen by such bases, which ought to be composed in plan less settings, joining both loose consistency and a gigantic ability to process information. In this way, a basic point is that social databases are not suitable for Big Data issues(Wang, 2015). They need flat adaptability, require hard

consistency, and turn out to be extremely perplexing when there is the need to speak to organized connections. Not Only Structured Query Language (NoSQL)(Maske & Prasad, 2015) are the fascinating different option for information stockpiling since they join the versatility and adaptability.

In (Saravanan, 2015) author invent a new system for ambulance 3G Antenna communication system with big data technology. In future 3G/4G web based Ambulance transport can be utilized to transmit biomedical information and pictures to healing facility utilizing 3G/4G web Antenna furthermore decrease exchange defer. This paper prescribes the country healing facilities to execute 3G/4G Internet based telemedicine benefit in Ambulance transport so that crisis treatment can be given inside the Ambulance transport and can maintain a strategic distance from basic demise mischance on street, processing plant, quake and so on.

In (Young, 2014) author trying to predict the Behavioral inside using big data platforms and social media information are rapidly affecting huge information scrutinize and getting to be one of the standard apparatuses utilized as a part of this rising field. Since these advancements give rich mental information and individuals are unreservedly ready to share individual health data on online networking, these advances will keep on being checked and investigated for their potential in anticipating wellbeing related states of mind and practices. Understanding the impediments of social media based enormous information investigate (e.g., legitimacy of information, missing information, observational information, the representativeness of the specimen) and techniques.

3. Problem Statement

To develop an innovative processing solutions by using big data platforms for various forms of medical data solutions. Bio-Medical health care (Soudris et al., 2015)system with adding modern technologies Internet of Things and advance big data Techniques for better patient service. It involves to dealing with high complex data with intelligence Techniques of big data. Unstructured and ununiformed data to getting as input to the digital devices(Paper, 2015). Process type involves the different techniques to classify and compute quickly with small span of time. Check existing statistic data using batch computing.

4. Mathematical Relations:

Medical data sets are critical passion to process compute and store the data is meaning full analyzed information. Applying multiple approaches to solve major task to divide and reduce complexity of computing area. All data must be

consider and managing with divide and concur rule. Different dynamic programing approaches are need to be apply on top of the multiple unstructured medical data sets.

Using, dynamic optimization programs(Babu, M.R., Krishna, P.V.and Khalid, 2013) techniques was introduced by Bellman and the techniques is given.

Bellman dynamic programming the feedback nash equilibrium which can be written as:

$$\lambda E_i(x,t) = \min_{m_1 \dots m_m} \left\{ \sum_{i=1}^{m} \left(\alpha(a_i(t) - b_i(t)) + \beta \left\{ \left[b_i(t) - \overline{b_i(t)} \right]^+ \right\}^2 + E_x(M,x,t)\left(\sum_{i=1}^{m} b_i(t) - \varnothing \times a(t) + N\right) \right\} \right.$$

(1)

Differentiating the right hand side of eq.1 respective to b_i and equating to zero.

$$b_i^* = \overline{b_i(t)} + \frac{1}{2\beta}(\alpha - E_x^1(x,t)) \tag{2}$$

$E_x^1(x,t)$ = Cx+D, and the get that $E_x^1(x,t) = C$

Substitutingb_i^*, $E(M,x,t)$ and $E_x^1(x,t)$ by their values in eq.1 gives

$$\lambda(Cx+D) = \alpha\left(x - \overline{b_i(t)} - \frac{1}{2\beta}(\alpha - C)\right) + \beta\left(\frac{1}{2\beta}(\alpha - C)\right)^2 + C \sum_{j\in[1,m-1], i\neq j} \left[b_j^*(t) + \overline{b_i(t)} - \emptyset x + N \right]$$

$$= \alpha x - \alpha\overline{b_i(t)} - \frac{\alpha}{2\beta}(\alpha - C) + \frac{1}{4\beta}(\alpha - C)^2 + C \sum_{j\in[1,m-1], i\neq j} \left[b_j^*(t) + C\overline{b_i(t)} + \frac{C}{2\beta}(\alpha - C) - C\emptyset x + CN \right]$$

Then will get

$$C = \frac{\alpha}{\lambda + \emptyset} \tag{3}$$

$$D = \frac{1}{\lambda}\left(\frac{\alpha}{\lambda+\emptyset} - \alpha\right)\overline{b_i(t)} + \frac{\alpha}{\lambda(\lambda+\emptyset)} \times \left(\sum_{j\in[1,m-1], i\neq j} b_j^*(t)\right) - \frac{1}{4\lambda\beta}\left(\alpha - \frac{\alpha}{\alpha+\emptyset}\right)^2 + \frac{\alpha N}{\lambda(\lambda+\emptyset)} \tag{4}$$

Then result efficient performance of by using two factors time t, resource x as follows

$$E_i(x,t) = \frac{\alpha x}{\lambda+\emptyset} + \frac{1}{\lambda}\left(\frac{\alpha}{\lambda+\emptyset} - \alpha\right)\overline{b_i(t)} + \frac{\alpha}{\lambda(\lambda+\emptyset)} \times \left(\sum_{j\in[1,m-1], i\neq j} b_j^*(t)\right) - \frac{1}{4\lambda\beta}\left(\alpha - \frac{\alpha}{\alpha+\emptyset}\right)^2 + \frac{\alpha N}{\lambda(\lambda+\emptyset)} \tag{5}$$

The optimal strategy could be written as

$$b_i^* = \overline{b_i(t)} + \frac{1}{2\beta}\left(\alpha - \frac{\alpha}{\lambda+\emptyset}\right), i \in [1,m] \tag{6}$$

The disposed is symmetric, so fix the data boundary condition b_i^*

$$b_i^* = b_j^*, i \neq j, i, j \in m.$$

Then could get the final outcome being efficient and instant way calculate by using below eq. (7)

$$E_i(x,t) = \frac{\alpha x}{\lambda+\emptyset} + \frac{1}{\lambda}\left(\frac{\alpha}{\lambda+\emptyset}\sum_{i=1}^{m}\overline{b_l(t)} - \alpha\overline{b_l(t)}\right) + \frac{\alpha(m-1)}{2\beta\lambda(\lambda+\theta)}\left(\alpha - \frac{\alpha}{(\lambda+\theta)}\right) - \frac{1}{4\lambda\beta)}\left(\alpha - \frac{\alpha}{(\lambda+\theta)}\right)^2 + \frac{\alpha N}{\lambda(\lambda+\theta)} \quad (7)$$

The above all mathematical relations are need to be calculate the efficiency of the task. How to allocate the resources to the task wise. There is no interruption occur in between the real-time task classifying and computing. It produce a better results all kind of medical data sets.

Different type of data sets to be computing using above equations. Getting feasible results sets example datasets consider by GAIT (Glucosamine/chondroitin Arthritis Intervention Trial), ECG (Electro Cardio Gram), and SYN taken for hypothesis testing.

5. Theoretical concepts:

For creating a medical relations to the each industrial aspects it is numerous to be perform for best medical solutions shown in figure 2.Presently there are numerous tele monitoring arrangements in the market, the greater part of them at home environment, in which the estimations performed are gathered by various observing gadgets and application facilitating gadgets, which must be introduced in the patient's home, the patient must have the capacity to deal with those gadgets.

The checking information is gathered regularly in independent databases with its own particular programming application, wellbeing experts need to access to a few stages and additionally their own particular records frameworks for a general photo of the patient's condition. Additionally, if checking results are not institutionalized, this can likewise make it troublesome for wellbeing experts to utilize the gathered information. In view of current circumstance there is still a requirement for a versatile information stockpiling and elite registering framework for proficiently putting away, preparing and sharing of wellbeing sensor information.

In spite of some advanced arrangements when all is said in done, the present condition of p-Health arrangements including interminable patients observing is still restricted by outer components including gadgets and system assets, making part of a framework which is important to indicate, including reasonable utilize cases for portable checking. From the perspective of wellbeing information preparing, current information mining procedures which include observing of patients (Canale, 2013), are in a disturbing early state. Because of this circumstance In this work propose a straightforward, intelligible, tele monitoring arrangement that consider a few variables like utilizing non obtrusive remote

bio-sensors and allows the preparing of high volumes of information originating from them and can to incorporate data from different sources with respect to sample clinical messages; pursuit and recovery of medicinal related data and outlining fitting perception interfaces for every client sort (patients, HealthCare experts, guardians, relatives, and so on) among the usage of security and moral instrument concerning the treatment of restorative data.

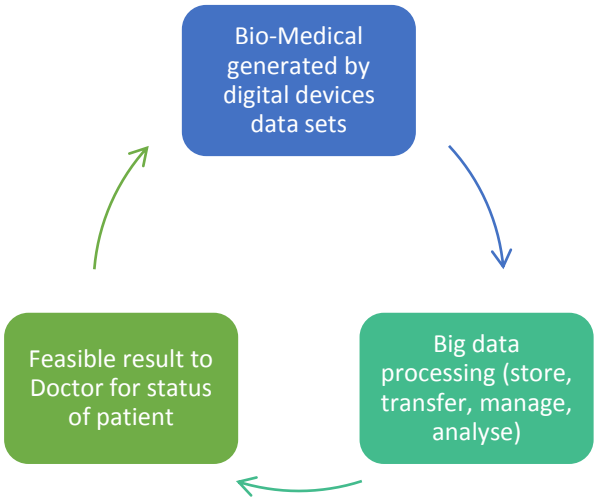

Fig. 2. Block diagram for process invovled stages.

A Novel relational models are shown by the different computation fields to be associated. From the restorative perspective, the engineering will permits the advancement of utilizations suitable for various situations concerning illustration observing a hypertensive patient who has quite recently been analyzed. Controlling treatment adherence and medications impacts utilizing remote pulse screen assume a critical advantage for patients and specialists. frameworks incorporates nonstop accumulation and assessment of a few crucial signs and are associated with the restorative focus utilizing cell telephones. A noteworthy impediment of that frameworks is that as a rule not offer a general design for information preparing and investigation furthermore the approach does not consider significant angles like versatility and information security. This approach is to be better data analysis to produce for a greater results to the different Big data tools/ techniques to be used for processing different types of datasets.

6. Simulation Setup:

For simulation setup created based on the lambda(Kreps, n.d.) Architecture features. Medical data will be collecting to the various unstructured formats. It is real-Time data and un-understandable data. Platform created architecture form shown in the figure 3. Using to solve and compute the batch tasks using the Hadoop with MapReduce and HDFS. And real-Time

and Streaming Data(Bader & Bader, n.d.) Using Storm. And zookeeper 14.0 identifying task type and divide as per processing phase concerns. First data will be batch task means task will not be instant required applying force to store information. Second tasks related to the streaming or real time it means to total process itself completing process. Software requirements are taken for this simulation setup is Hadoop(Singh & Kaur, 2014), Pig, and Hive for batch task solving. Streaming or real-time data(Liu, Iftikhar, & Xie, 2014) computation using Storm("Storm (event processor)," n.d.), Zookeeper. All the software's used latest version for better interaction collaboration with the data. Hardware Requirements Intel i5 processor, 16 GB Ram, 1 TB hard disk Built in with capable motherboard.

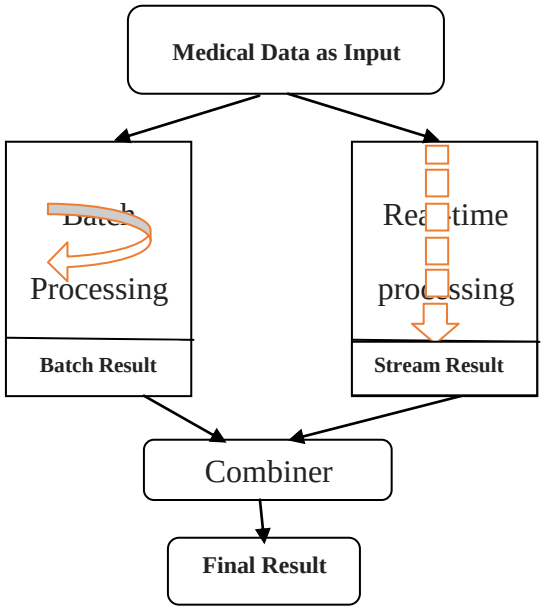

Fig. 3. Lambda Architecture for Heterogeneous Computational model.

The runtime of the Monte Carlo estimate was additionally assessed. This investigation comprised of 50 arbitrary runs utilizing both LSH (Left Shift) and the Monte Carlo guess. Divider clock time (in seconds) is introduced. All analyses were keep running on an Intel(R) Core(TM) i5 CPU 650 processor timed at 3.2 GHz (Soediono, 1989) running Ubuntu 11.10.

The Monte Carlo estimate and LSH were actualized in Python form 2.7 ("Python 2.7.0 Release | Python.org," n.d.) and used a MySQL 5.1.58 database ("MySQL :: MySQL 5.7 Reference Manual," n.d.)for putting away, indexing, and recovering hash values.

Crude time arrangement flag were divided utilizing a sliding window and every exceptional section were recorded. A recorded section in the MySQL database contained a connection to the crude time arrangement motion alongside its area inside of the time arrangement.

A fragment was listed utilizing its hash values created by LSH. Fragments were recovered from the record framework in clumps by sorting portions by their individual host document and area inside of this document.

This is a critical streamlining as document frameworks perform inadequately under arbitrary access. The Execution of LSH in this paper depends on plate stockpiling not at all like that of accepted a database sufficiently little to be put away in memory; nonetheless, the databases utilized by this paper are to a great degree substantial (uncountable cases). Hence, the framework needed to use circle based capacity.

7. Results and Discussion:

The results are test to submitting various medical data sets applying on the rate increment in the quantity of results over standard LSH while differing the randomization standard deviation (σ_r) and the quantity of randomizations (m) is appeared in figure 4.

The outcomes for SYN with fluctuating σ_r are demonstrated independently from the ECG and GAIT datasets as the increment in result size is a few requests of extent bigger. The increment over standard LSH ran from two or three hundred percent to a few thousands. This is normal as standard LSH just returns portions that are fundamentally the same to the question fragment.

The bigger increment by the GAIT dataset while fluctuating m is created by the homogeneity of the dataset (i.e., every progression in the dataset is to a great extent comparable).

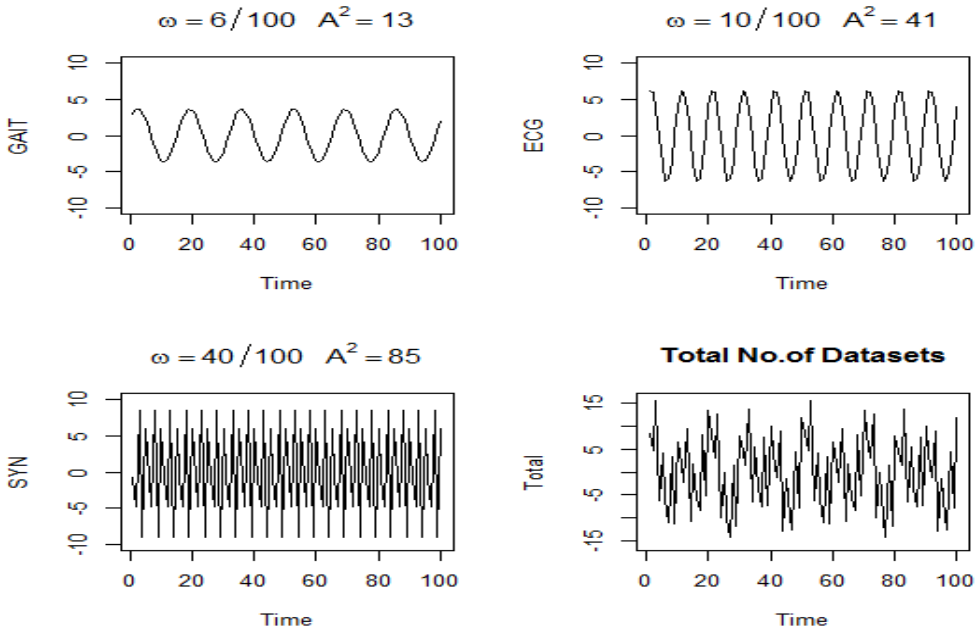

Fig.4. Different dataset generation parts and their ω values of each GAIT, ECG, SYN, and Total datasets.

The randomizations benefit work of extending the hunt space. This is critical as this same wonder would likewise be seen in different datasets as the quantity of filed sections increments. Expanding σ_r displays bigger increments for the SYN dataset over standard LSH. A bigger σ_r models a more noteworthy measure of commotion. The GAIT and ECG datasets are sensibly spotless, and along these lines, don't profit by a biggerσ_r. Truth be told, both the outcomes sets for GAIT and ECG diminished with σ_r> 0.15. Bigger σ_r cause the inquiry space to augment past the area of the question fragment bringing about less matches. The SYN dataset, then again, has a lot of clamor. Subsequently, a bigger σ_r enhances the measure of result sets (as the area is bigger).

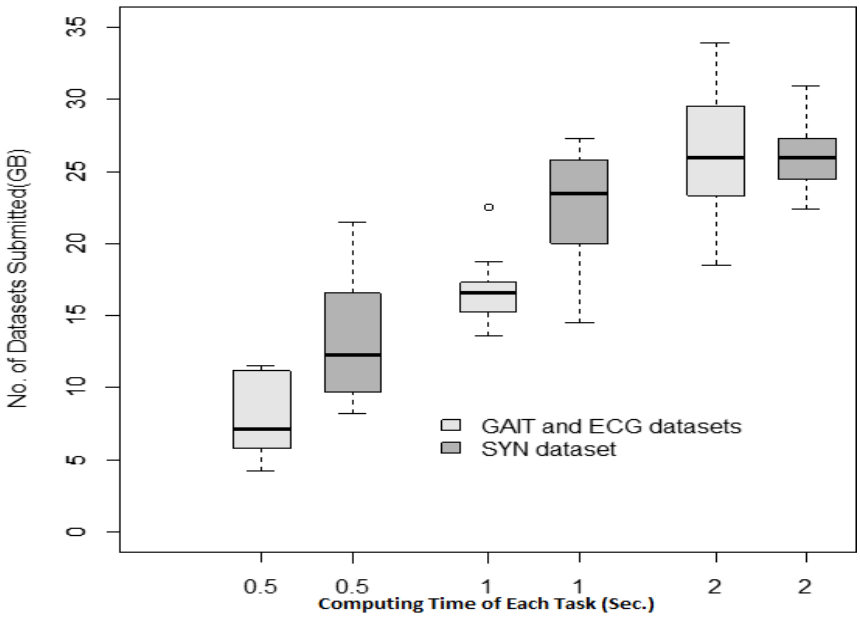

Fig. 5. Example dataset submitting and computation capabilities.

Results applying various data sets to be on the rate increment over LSH with examining of result set sizes. While fluctuating σ_r and m is appeared in figure 5. The majority of this change is seen with under 50 randomizations. As expressed before, the extent of an outcome set is exceptionally reliant upon the particular question portion. A typical example will yield countless, while an irregularity will yield little sets. Along these lines, both figure 4 and 5 showed rate increments. Figure 5 shows crude result set sizes with m = 25 and σ_r = 0.1 for a reference.

The integrity of the outcome sets for the Monte Carlo guess were evaluated by finding the mean and standard deviation of the Euclidean separation of the inquiry fragments to their particular result portions. Figure 5 and 6 show the impacts of shifting both m and σ_r separately. While expanding m, the mean and standard deviation focalize to the separate hypothetical values except for standard deviation for SYN. The SYN dataset's higher standard deviation is because of the

expansion of consistently dispersed clamor that outcomes in areas that are not typically conveyed. A slight difference in standard deviation is watched while expandingσ_r. This outcome is normal as expanding σ_r will build the pursuit outside of a fragments quick capacity.

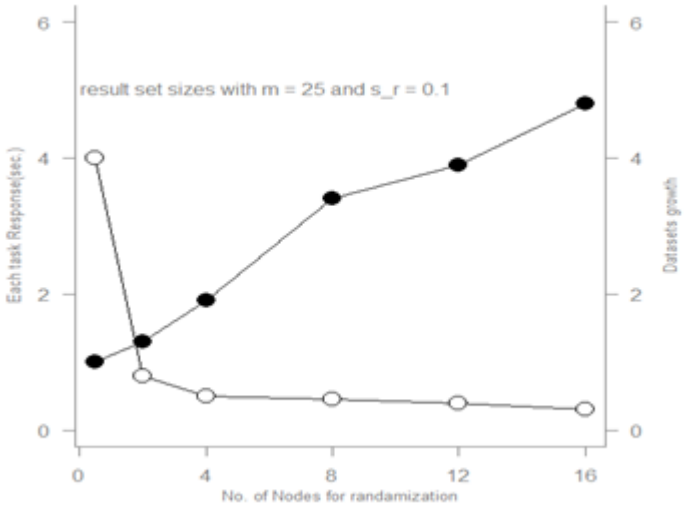

Fig. 6. Randomized and size of each task response time per dataset growth.

Conclusion

In this paper dealing with different type of datasets generated by the biomedical field. How the calculation process of the datasets using the big data technology. Considering three different data sets as an input to the dataset example GAIT, ECG, and SYN. Different type of computation mediums are to be created for faster and deeper analysis of the datasets. To be store, transfer, compute, and analyze the datasets is a complex task. For minimizing there overhead using a Monte Carlo technique. There is a different type of spite of the fact that there are some genuine difficulties for flag preparing of physiological information to manage, given the present condition of data capability and no standardized structure, there are opportunities in every progression of the procedure towards giving systemic enhancements inside of the social insurance research and practice groups. Aside from the undeniable requirement for further research in the area of data wrangling, collecting, and combination constant and discrete medicinal data designs, there is likewise an equivalent requirement for creating novel standard handling systems concentrated towards physiological standards.

References

1. Aly, A. M., Sallam, A., Gnanasekaran, B. M., Aref, W. G., Ouzzani, M., & Ghafoor, A. (2012). M3: Stream Processing on Main-Memory MapReduce. *Icde*, , No. 8, pp. 1253–1256.

2. Babu, M.R., Krishna, P.V.and Khalid, M. (2013). A framework for power estimation and reduction in multi-core architectures using basic block approach. *Int. J. Communication Networks and Distributed Systems, Inderscience Enterprises Ltd.*, Vol. 10, No. 1, pp. 40–51.
3. Bader, D. A., & Bader, D. A. (n.d.). Massive-Scale Streaming Analytics.
4. Belle, A., Thiagarajan, R., Soroushmehr, S. M. R., Navidi, F., Beard, D. A., Najarian, K., Arbor, A. (2015). Big Data Analytics in Healthcare, Vol. 2015.
5. Canale, S. (2013). The Bravehealth Software Architecture for the Monitoring of Patients Affected by CVD. *5th Telemed,* pp. 29–34.
6. Elsebakhi, E., Lee, F., Schendel, E., Haque, A., Kathireason, N., Pathare, T., … Al-ali, R. (2015). Large-scale machine learning based on functional networks for biomedical big data with high performance computing platforms, Vol. 11, pp. 69–81.
7. Gachet, D., Buenaga, M. De, Puertas, E., & Villalba, M. T. (2015). Big Data Processing of Bio-signal Sensors Information for Self-management of Health and Diseases, pp. 330–335.
8. Gupta, P., & Tyagi, N. (2015). An Approach Towards Big Data-A Review. *IEEE International Conference on Computing, Communication and Automation (ICCCA2015)*, pp. 118–123.
9. Hassanalieragh, M., Page, A., Soyata, T., Sharma, G., Aktas, M., & Mateos, G. (2015). Health Monitoring and Management Using Internet-of-Things (IoT) Sensing with Cloud-based Processing : Opportunities and Challenges.
10. Holzinger, A. (2014). *Biomedical Informatics*.
11. Kreps, J. (n.d.). Questioning the Lambda Architecture. *Radar.oreilly.com*. Retrieved from http://radar.oreilly.com/2014/07/questioning-the-lambda-architecture.html
12. Liu, X., Iftikhar, N., & Xie, X. (2014). Survey of real-time processing systems for big data. *Proceedings of the 18th International Database Engineering & Applications Symposium on - IDEAS '14*, , No. October 2015, pp. 356–361.
13. Maske, M., & Prasad, D. P. (2015). An Introduction to Real Time Processing and Streaming of Wireless Network Data. *Ijarcce*, Vol. 4, No. 1, pp. 228–231.
14. Mohanty, H. (2015). Big Data: An Introduction. In H. Mohanty, P. Bhuyan, & D. Chenthati (Eds.), *Big Data SE - 1* (Vol. 11, pp. 1–28). Springer India.

15. MySQL :: MySQL 5.7 Reference Manual. (n.d.). Retrieved April 7, 2016, from http://dev.mysql.com/doc/refman/5.7/en/
16. Network, I. (2016). Cloud-Enabled Wireless Body Area Networks for Pervasive Healthcare, , No. SEPTEMBER 2013.
17. Paper, C. (2015). Futures Business Models for an IoT enabled Health Care sector from a causal layered perspective Futures Business Models for an IoT enabled Health Care, , No. AUGUST.
18. Saravanan, S. (2015). Big data exchange between Ambulance Bus to Hospital network through internet in Telemedicine using computer communication network and 3G Mobile Antenna, pp. 3–9.
19. Singh, K., & Kaur, R. (2014). Hadoop: Addressing challenges of Big Data. *Advance Computing Conference (IACC), 2014 IEEE International*.
20. Soediono, B. (1989). Using Intel® VTune™ Amplifier XE to Tune Software on the 2nd Generation Intel® Core™ Processor Family. *Journal of Chemical Information and Modeling*, Vol. 53, pp. 160.
21. Soudris, D., Xydis, S., Baloukas, C., Hadzidimitriou, A., Chouvarda, I., Stamatopoulos, K., … Ghia, P. (2015). AEGLE : A Big Bio-Data Analytics Framework for Integrated Health-Care Services, , No. Samos Xv, pp. 246–253.
22. Wang, M. D. (2015). Biomedical Big Data Analytics for Patient-Centric and Outcome-Driven Precision Health, pp. 1–2.
23. Young, S. D. (2014). Behavioral insights on big data : using social media for predicting biomedical outcomes. *Trends in Microbiology*, Vol. 22, No. 11, pp. 601–602.

Corresponding Author:
Rizwan Patan*,
Email: *patanrizwan.gouse@vit.ac.in*