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Big Data Technologies in Health and Biomedical

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ABSTRACT: *In the last decade in order to analyze everything we do means to use the technology, we collect data in very large increases in the amount of many new developments in this field. At the intersection point of these trends we call "big Data", in order to be more efficient and productive, and helped to each sector. Biomedical technology in medical diagnosis and treatment can be used for the purpose of article, material, equipment, software, program, intelligent systems and equipment production is an interdisciplinary viewing technology. Biomedical Technology, as is the case in many developed and developing countries should be supported in Turkey priority science and technology are seen as one of the branches and various plans and programs. The rapid development of the right technology and there is a need for industry-academia relationship. In the health sector in other subgroups, is diagnostic kits. Hospitals, clinics, universities, laboratories and personally for many diagnostic kit used sensors comprise a wide market.*
Keywords: *Big Data, Health, Biomedical, Bioinformation*

I. INTRODUCTION

Based on large data into or to the health sector, but to capture the full value of before must undergo fundamental changes in the industry. In the field of health is an ongoing process large data revolution. The process which began with the increase in the source of information over the past decade, pharmaceutical companies, research, collects and the patient data in digital medical data, some States developed.The US federal Government and other public institutions, the scope of public insurance programs and other information to clinical trials in patients, including health information. In parallel, taking advantage of the latest technological developments from a variety of sources, information derivation and analysis facilitated. Information for a single patient, many hospitals, and laboratories and from doctor's offices can come. Along with financial concerns and other factors have increased demands for large data. Showing a steady increase over the last 20 years medical expenses in the United States by 2014 GDP is approximately 600 billion dollars with 17.6%. Turkey also is approximately 5.4 per cent GDP in 2014 and 95 billion Turkish Lira (TL). The use of more physicians to give up too many users will be free to share the results of treatment, and treatment has reduced the volume of.Within the framework of the new plans, when the desired results in treatment cost less than provided. Taxpayers can also enter agreements with pharmaceutical companies, pharmaceutical companies, the result of the treatment process and giving feedback to the patient's health can be improved and taken off the cost of the drug in this new environment, to compile data from large health care stakeholders can exchange information. The increase in health care costs in large data can be effective in clinical trend when exceptional. Physicians can use traditional jurisdiction receiving treatment decision. But in the last few years evidence based, systematic review of the clinical data and a move toward treatment when decision based on the best available information one chooses. Individual data in large data collected algorithms often has provided strong evidence. In the health sector in the marketing and the use of large data partially such as banking sector remained in the back. Large data may produce positive results, the first movements in the field. These developments are promising, but the important question is: in the health sector is all data capture and use the potential of large or are there barriers that will prevent you're checked out.

II. LITERATURE REVIEW

Over the course of a year, 14 old driver, 20,000 km, cognitive and physical health status after a certain time period tracked, reflex and slowed with the passing of slowdown into the nervous system events to determine. Here the reasons for falling asleep on the analysis of the drivers.In this study, slowing habits of drivers almost every driver with correlation between 0.74 similar deceleration habits. Don't fall asleep or slowdown here in terms of a number of important health habits can be identified. Here is the solution as the

autopilot or warning and warning systems can be improved [1]. Urban areas crowded situations cameras, sensors and a large and heterogeneous data generated by people who investigated the analysis process. Nowadays, no country immune to events in the urban emergency system second to none.Urban emergency events fire, storm, traffic jams, injury and fainting, the detection of cases such as the protection of human health and ensure the safety of his importance. Recently social media twitter photo of an emergency situation with the use of sharing all kinds of that location using the positioning information from the emergency response. As a result of the increase in traffic jam stress reduces stress on human health actions made a snapshot of the atmosphere of trust will be provided [2].

Clinical data dynamically variable and heterogeneous data sources obtained can be provided with useful information on caregiver teams. Patient-specific decision support system has been developed using information in the intensive care unit.Clinical databases due to reporting and billing. Big data analytics with medical records, it is important to force the bounds of the secondary use. Intensive care is taken into account, they are split into three difficulty, complexity, and it's corrupted. Solutions to these problems applications online patient tracking, personalized prediction and risk assessment. Use large data analytics to predict these personalized inevitable [3]. In everyday life people often tend to use mobile networks for data. Smart mobile devices with electronic health data can be collected automatically. However, a large amount of data, it is important to collect, transmit and processing techniques. Mobile electronic networks for data transfer anywhere extensible increases the volume of data and transaction process. To solve these problems, it is proposed to reduced Variable Neighborhood Search and tail Architecture. This method is electronic data integrity and fault-tolerant mechanism is designed for. By running the analysis layer, fast and stable data processing only valuable classified data are reported to the health personnel [4].The number of domestic animal breeding in the world is gradually increasing. Due to the owner's intensity dropped home alone pet control and increased stress levels on animal health issues. This will eliminate health issues such as decision-making it is necessary to find. This research allows pets behavior, following the development of health care. Here are the dogs that can be worn for sensor devices developed and health of the dogs have been used to track data and analysis. The big data analysis on the health and well-being of the animals were made to the raising of the level have been observed as they're happy[5]. Integrated biological sensors, smart home systems and healthy smart home system is proposed. Biological sensors here, blood pressure, respiratory rate, and detects your heartbeat.Having been host to transfer data at home artificial intelligence techniques, evaluation of health risk assessment activity monitoring, decision-making process. Decision making is an exercise for healthy individuals or patients at home as a result, home business advice, needs push or check health (check-up) is recommended [6].In this study, in terms of food developed automatic data collection system.Live data on the Web or social media, which also shared the aim to identify dangerous food events. To recognize the dangerous foods or dishes described an information template. Stay away from foods dangerous for the health of individuals by their health will be protected [7].

III. BIG DATA TECHNOLOGIES AND BIG DATA APPLICATIONS

III.1. Frame of New Value

The master of health services and to this end have developed a lot of code. But the traditional tools with large data may not always exactly in the sense of providing benefits. Drastic health value, such as reducing costs is focused on improving patient outcomes. These tools don't play an important role, although if the patient is more holistic approach based in health expenditures and is equal to the stakeholders on the results of the treatment of large data. Redefining values and there are five ways to determine the appropriate tools for the new era.

True Life: patients should diet, exercise, preventative maintenance, and other lifestyle factors by making the right choices about their own health should encourage to play an active role.

- The most up to date and correct Care: patients must receive appropriate treatment. Protocols in addition to excessive confidence, proper care, and who have access to the same information in all of the most appropriate treatment strategy in order to avoid duplication of working toward the same goal requires a coordinated approach.
- True provider: any good performance in treating patients with specialist records and must have the ability to get the results. They're on their own skill and talent rather than the master ones must be selected. For example, nurses or physician assistants many tasks without having to see a doctor.
- True value: health care providers and payers constantly improves the quality of retaining or health values should look at new ways to catch. For example, health care providers refund or designed to eliminate wasteful spending programs can improve a system that they use.
- True Innovation should focus on the identification of new therapies and health: Stakeholders-based approaches.Should apply to the development of innovation processes.For example; Trial for pharmaceutical research-developed, and efficiency.New ways to make data available value in new ways.The concept of

proper maintenance, if new data is recommended for a standard protocol for a specific disease may not give appropriate results. Other changes can promote other changes on the roads.True value of an investigation, if the doctor is patient perform a few operations of Appendix surgery way on with then most likely expensive complications can reveal what happened. This finding is to perform an appendectomy, however, about the value our opinions affect the right provider.Outlined some health leaders in these ways or to do so on the ground that focuses on the concept of a large data value we fixed. Take a few examples;

- Kaiser Permanente, the exchange of data between exactly all the wellness facilities and to promote the use of electronic health records, a new computer system, the HealthConnect.This system is developed and the results of reduced cardiovascular disease inspection visits and laboratory tests as aims to achieve the estimated $1 billion in savings.
- California Blue Shield, NantHealth, in partnership with health services and doctors, hospitals and health plans more coordinated and will allow to provide evidence-based care personalized, integrated technology system and improving patient outcomes. These include such areas as the prevention and care coordination, has helped to improve performance.
- AstraZeneca is committed to some chronic diseases and common illnesses to determine the most effective and affordable treatments to make real-world studies, a subsidiary of WellPoint data and analytical HealthCore has partnered with four-year-old.AstraZeneca research-developed investment decisions, to direct their own clinical trial data and HealthCore has used data.

III.2. Big Data in Health of Today

Health uses an array of large data solutions.Some health institutions for academic or research-oriented experiment with large data or advanced research projects.These agencies data scientists, statisticians, graduate and doctoral students working on the subject and with large data complexity Sciences. Some of this complexity in the lines, large data to simplify and what can be done to make it more accessible is deprecated.There is a large volume of data from us in health.EMRs has gathered large amounts of data. Most of this data is for entertainment purposes only. But the health data rate is increased enough to require big data today.Our work with health systems only a small part of the database table EMRs in medicine and related analytical cases related to the application of the current will be used.So, the majority of data collection can be thought of as fun today in health. The number of cases of the use expands data value for most of this data today, though many cases of real-world usage. New use cases that support the genomic data will certainly require large data approach.

III.3. Big Data Has Minimal Structure

Big data, the biggest difference between relational databases, classic relational databases,and data for a schema is required. Every piece of data in a well-defined location.In contrast, large data does not have almost no relational structure the large data, chaotic, distributed data stored in the file system raw version can be obtained from the source systems. Hadoop distributed file system, directories, a simple hierarchical format stores multiple data nodes.

III.4. Is Big Data, Row Data

Traditionally, large data is not converted any shape. Usually, there is no rule.To consume raw, fresh and ready when you are, so the best data are the raw data in terms of "Sushi Policy". "Health Catalyst late binding Data WareHouse" has followed the same principles. This approach applies business rules to convert semantic data, or implement a finite moment, in other words as much as possible close to the application tier.

III.5. Big Data in Health Will Be Important

Health organizations are analyzing large data in the future will be used for text-based notes. Discrete data up to date analytical technologies with physicians and nurses to take advantage of the valuable clinical information notes. Large data and textual indexing techniques and areas of knowledge discovery in the future will add real value to the health sciences.

III.6. Using Large Data

Real-time warning systems, you can use the large data is one of a few that are important. Real-time warning system is the process of a predictive analytical processes.Work in this area because there is no sufficient data for predictive analytic use cases health so far has been limited. Large data can help to fill this gap.An example of predictive analytic data, socioeconomic data. Socio-economic factors affect the health of patients with significant ways. Socioeconomic data, patients of a particular home address in an emergency ambulance semantically might indicate possible. Released from the hospital in the period of remote control of a patient with your doctor may be the ability to auto-date to arrive. Health systems, to be patient, check again to put you in the hospital or a taxi to get from home or have been found to be the cheapest cost to send an ambulance.These and other big data appointment systems, medications can help the incompatibilities with the estimate. The possibilities are limitless.

III.7. Big Data in Clinic Research

Your doctor will decide the best medical treatment even if it made the pill or potion will propose so here should be designed with the help of the proposed drug case data is likely to be very strong. Recently, pharmaceutical giants such as data sharing arrangements between commonly used as an anti-depressant "Desipramin" has led to new breakthrough as the drug discovery, has been found to be beneficial for all types of lung cancer.The spread of the plague large data also helps in the fight against. In Africa, cell phone location data, have helped predict the spread of the Ebola virus. What's your guess by watching the movements of the population has proved to be very valuable. These strategies have been used as natural disaster relief plan and the 2010 Haiti earthquake aftermath.Search large data solution and remedy for cancer discovery work is in progress. "Flatiron Health", health care technology company cancer patients potentially 96% of existing data has not yet been analyzed based on the idea of "Oncology has developed a service named Cloud". To advance the work in this field gathered during diagnosis and treatment for this can be used to retrieve the data and medical researchers aimed to make[8].

III.8. In Health Data Privacy and Security

Medical data are extremely personal and confidential information. Just seeing him the contact or allow doctor and related experts to be sure and it is necessary to putting back into place. Despite this, Cyber thieves targeting medical routine records and health by stealing credit card information used in health data is in the thoughts of making more money. "Hackers Anthem" cyber-attack group in United States largest health insurer by stealing from 80 million patient records for the biggest health related history of data theft. Fortunately, the thieves just as the patient's name, address and details they got credentials; diagnosis, treatment information, such as non-woven. But on this scale, a security breach such as patient records to be lost or stolen is a horror. "University of Southern for a situation like this and from "Body Computing" Centre Dr. Leslie Saxon, as some experts, suppliers of health data privacy and security issues, the establishment of an international organization of the United Nations governing style have called for.Nothing, from the privacy and security of patient data. But frankly, it's good for managing large data security has no integrated way. In a hospital only if you have permission to access a couple of data scientists, it's really nothing to worry about. If you have a large user base and cannot be expected to be safe when opening a different access.Health organizations, to ensure the security of large data are better today, some steps. Large data security technology is working on open source technology. To avoid big problems, organizations by being selective about large data vendors assumed that safe. Big data is the best option for healthcare organizations who want to implement raw Apache distribution is to purchase commercial distribution supported better. Another option might be to select a cloud-based solution. Azure HDInsight secure deployment to get started quickly with a corporate security and administration may be able to provide you with Cloudera. This company authentication, authorization, data protection and control that support payment card Industry compliant Hadoop has created an environment. No doubt other commercial deployments other HIPAA health sector-specific security requirements may be eligible for.

III.9. Big Health Data in Turkey

A huge amount of data in the health area and are produced every day. The benefit of this data in real people, in real life can get to work. Turkey is in "enabiz.gov.tr" to start the disease preventive diagnostic solutions developed with improving and on improving the quality of care. All citizens will be able to view the history of each place or emergency services will be able to view health information.Citizens ' blood pressure, pulse, sugar, weight and obesity can follow basic health indicators. In addition to these reports, the old prescriptions, lab work, x-rays, to make it easier for your doctor to diagnose the disease images in has become an aid material.The start of an emergency examination or treatment and medical examinations to collect when retrieving patient rate. At this point the person to do the old emergency health information is vitally important to reach them. Moreover, health care costs are the biggest economic challenges faced by our nation to reduce the potential return, one of the country's economy will contribute to the development [9].

III.10. A Few Health Application

Some devices to watch the patient gets. For example, Asthmapolis asthmatic patients by breathing has created a GPS Tracker which records. Information, individual, group, and moved to a central database, community-based, was used to identify trends. The data is then the Centers for disease control and prevention information about asthma catalysts known centers. The personalized treatment plan of physicians in this field and has helped to develop the possibilities of preventing [10].

Another company, Ginger.io, in conjunction with health care providers for patients accepted offers a mobile application, mobile phones and follow through with behavioral health therapies.Calls, texts, geography and even physical movements as application records from data. The patients also respond to health questionnaires via smart phones.Ginger.io implementation of the National Institutes of health and other sources of patient data with public research on health behavior. Data obtained with the lack of movement or other activity may be a sign that the person feels physically sick and can point out that the cause of irregular sleep patterns.Offers a kind of health coaching.Smart phones is just the beginning. The pedometer counting every step

in walking how many calories it takes to help you to plan the exercise, walking in one day to gauge the amount of use of mobile technology for healthy living, has presented to us. Can be worn lately Fitbit, Jawbone and Samsung followed the development of health devices such as storing a lot of data presented to us by compiling. Within walking distance of people and put forward to measure the number of steps, these devices can plug into an appropriate place of the body. People get older some diseases may show title. For that reason, some diet programs and sports activities may need to start the application.For this purpose, also plenty of walks.Thanks to a simple pedometer step counts, measuring calories, distance, so the energy spent on accommodation designs. This is a bit more developed devices with these measurements are saved and can be compared with the old record. Smart phones entered everyday life during this period, an application will be installed on Smartphones with a pedometer can perform the task.

So in the near future, we saved from this data using the possible diagnosis of our illness ourselves, putting the doctor will help both the doctor and share it will facilitate the diagnosis. A possible problem or problems before they occur, medications, medical data from large industrial and education by each time to databases in General about the State of health information is a resource that will allow you to access the achievement.Has the potential to detect problems before it happens, usually between biomedical and data professionals partnerships by recently formed a sample process "Pittsburgh health data Alliance" aimed at taking the data from various sources, to draw a comprehensive picture of the patient's private health package.Data on medical and insurance records, wearable devices, genetic data and even social media messages. This health care package is to occur, a physician prescribed by providing advanced predictive models is thinking of what treatment you will be able, in the same situation with possible outcomes assessment and also genetic factors and lifestyle data from other patients with will be supported Such data-based organization that runs programs in partnership with health quest to solve one of the greatest obstacles to health continues the industry's initiatives. Medical industry collects a large amount of data, but many different practices, different hospitals, stored in the archives of controlled by different clinics. It's also great to merge data in the denominator, the more efficient it is obvious that it will be.

Another partnership is between Apple and IBM. The two companies, iPhone and Apple product users, IBM's Watson Health "Bell medical services by providing analytical services of data sharing through a large data health platform collaboration. The idea here millions of potential users with real time biometric data is exploring with new medical insights.In the near future, face to face interaction with the doctor before, without installing or we can treat go. Telemedicine currently "BuzzWords" (a special password) and with the help of a computer, internet connection in your own home, remote medical treatment means.Here, in “webmd.com” in this site people own can express with a simple thing to diagnose, but afterwards you can continue taking a professional doctor service. This service is presented by the Healthtap.Without ever leaving the House to get a check-up is not far at all. With the help of smart phones the doctor's being able to make some diagnostic tests and should accommodate the hospital system. HealthTap, doctors patients health problems as a question and answer service for interactive health.The goal of being a more reliable online health resource "WebMD" doctors health tips list, physician assessment and drugs with subscriptions to add Telemedicine service that seeks to extend the system. I mean the phone will close and the phone didn't want an ambulance with treatment is the right way [11].

III.11. Health Improvement

Evaluated and health initiatives in 2011, the annual total cost savings potential effects were evaluated. Early success system to effect treatment paths around the reduced health expenditures from 300-450 billion dollars in health care costs in the United States has been estimated at the rate of $250 billion.Even with such a few simple intervention can have a major impact. For example; early screening for cholesterol and smoking cessation, along with those who are at risk for coronary heart disease by aspirin use can reduce the total cost of 30 billion dollars in maintenance. The benefits of using aspirin here now thanks to passed out and discovered large data. These actions have been promoting for some time, though, big data are no longer identifying high risk patients faster, more effective interventions and closely monitored. Big data in these areas, it was believed that many will find out new learning opportunities [12].

III.12. Big Data without Health Systems

Most of their most health systems analysis including meetings and reporting needs, without large data can be done today. Be achieved with traditional relational databases and health Analytics these databases by using large data more valuable will be a focal point.Currently, the vast majority of health care institutions such as regulatory reporting some issues are operational dashboards. The basic needs are met and some of the first advanced application of new use cases perpetuated as the need for large data. For example, wearable medical devices and sensors is some solutions in the future.

III.13. Big Data and Technology

Big data requires many special skill set use in health is largely limited to large data research. Traditional relational databases, SQL programming languages and information technology specialists and hospitals are not ready for other large surrounding data complexity.In fact, most organizations to manipulate data to retrieve data from a large data environment, and scientists are required. These are usually average around a health system expertise, Barrett is not also the physician-level should be considered to be knowledgeable.These experts is expensive and difficult to assemble, just research institutions can bring them together. Data such as internet banking to scientists and companies have the greatest medical scientist in the health industry in General has requested.

III.14. Big Data and Internet

Will be valuable in large data known as real in health can be explained as the Internet of things. The Internet of things, work, sleep, or while engaged in other activities, such as exercise information share with consumer goods, industrial machinery and growing network of everyday objects. Recently, cars, homes, major appliances, and even city streets will be connected to the internet can be thought of as the internet of things object. Sensors with continuous data flow-generating devices and applications in many ways, our lives and our jobs can be used to develop in a healthy manner.Wearables, produce data about the person's health and internet data into the cloud as part of things posted by any device. Wearables are perhaps the most obvious example of this type is one of the known devices. Many people now own heart rate, weight, at the step and as wearable fitness device. How often and how much intensive applications a user exercises can also be used to keep track of smartphones. Blood pressure monitors, glucose monitors and many more medical devices to send data to the cloud. Are individual patients will be forecast and Twitter message personalized message about drug ads from pharmaceutical companies, and only the arrival of health agencies using large data are accurate is a result they obtained. Another is even one lady's Facebook message itself without the knowledge that you are in fact pregnant before we're a predicted age. This pregnancy is no more get the information when the Lady's story is a coincidence, or is a performance?

III.15. Big Data and Home Care Management

To focus on patient care at home can be fitted with accessories people sensors and home patient health data into the cloud by collecting this data can be transmitted. Electronic scale, monitors, oxygen sensors proximity sensors are consistently going to be millions of patients may be transferred to the cloud and the data explosion. Health institutions and maintenance managers, complex tools to protect the health of patients, using this monitor in large data flow.All these different sensors at an unprecedented volume and speed data from health organizations. Hospitalization in hospital is essential to keep in health. Bedridden patient's potential health problems found in the home or in the case of an emergency you will need to alert the patient care manager. For example, sudden change in a patient's blood pressure, maintaining a healthy blood pressure range again later system until the maintenance Manager will send a real-time alert. In such a case, maintenance Manager will suggest the appropriate medication with the patient to use.

III.16. Roads Leading theDisease and Analytical Prescriptive

Another use of predictive analytics is an estimate of threads that leads to the disease. Similar threads to a specific disease with other patients by taking advantage of historical data, prediction algorithms over time to predict the trajectory of an individual's disease case data and with the help of machine learning libraries can be created that use programming languages.After the correct patient trajectories prediction, and to predict the trajectory of the patient to set appropriate treatment should be made immediately to intervene or pass to the next individual diseases will be a high probability. It will be Step by step developing disease, and estimated data.

III.17. Genomic Sequencing and Big Data

The human genome project by working for many years in the treatment of patients with increased use of genomic data is quite exciting.The cost of the full individual genes in recent years. The genome analysis of large genomic arrays, files and produces more data. How to install a genetic sequence into a large relational database object or just to manage the array will require a separate storage.

III.18. Health Data in the Future

The need for data-driven quality and cost of health systems improvement has become an urgent problem. Health organizations before connecting large data analytics technology maturation cannot afford to wait. In order to adapt to the future of the important factor here is that large data for a data storage solution will choose.Unstructured big data switch is ideal for relational databases.“Health Catalyst” hospitals in partnership with large data relying on natural resource systems, data models, as raw as much as possible to keep data has developed an architectural method. This data warehouse method to solve many of the problems encountered using data binding "just-in-time" approach using the new data warehouse architecture. This architecture taking raw data situation as any researcher who needs to pack a separate data and can create effective analysis and thus applies the meaning and semantic context.This approach is very similar to large data, has a large set of data at

the source, "March Layer" EDW instead would be a natural transition. Health is a powerful working with Catalyst and Microsoft parallel data warehouse HortonWorks Hadoop cluster are working together in a Microsoft APS Appliance containing.Parallel to this traditional relational database and can run a large data set. This also significantly increasing data processing power at the same time to be able to query both data stores. The doctor notes, predictive analytics, and other use cases as important methods that perform with natural language processing with large data has been attempted on the discovery attempts [13].

IV. CONCLULUSION

The great data to make the world a better place, if you want to know how to help health field for this most vital and there is a better example.Increase profit in health care and in the overhead outside waste data, treatment of the disease of epidemic diseases, improve the quality of life and can be used to prevent sudden death.World population increased rapidly and live longer than everyone else, is changing rapidly and many of the decisions of treatment models behind these changes is provided by large data. So far a patient as early as possible in their life hopefully, taking into account the early warning signs of serious disease, a much simpler and less expensive treatment will survive, of course, is not subsequently identified.The People must begin to using the big data before be ill.With the help of technology, we can even big data and its light on what doctors cannot achieve.

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