

Error analysis in big data analysis

Abstract

Practice errors in medicine are among the situations that disrupt patient-physician communication, reduce work efficiency, and eventually lead to the formation of an atmosphere of distrust. Various aspects of the subject have been examined in the symposiums we have held with Prof Dr. Ethem Geçim for 14 years. We shared our information at medikolegalduzlem.com. Big Data analysis is important in system audits. It is inevitable to reach erroneous results if the data belonging to these are made carelessly and negligently. The main problems encountered in big data analysis are:

1. Dependency: Computer dependency is at the forefront of algorithm and process monitoring.
2. Chaotic situation: The problem of systematic change is observed in the supervised learning machine. In the unsupervised learning machine, the definition of the identity of grouping is problematic. In the learning machine system of the reward-punishment system, there is a case study based on random data, not systematic. It is very difficult to reach an inductive conclusion from this situation. There is absolutely a need to organize a constant, standard data flow.
3. Loss of control: Steps that need to be checked are skipped in big data monitoring. Injustice occurs.
4. Waiver of rights: The expert is content with the data given by the machine as a dependent. There is a problem with the development of innovative processes.

In that case, it is useful to pay attention to the following points in the regulation on data ethics:

1. Identity: In the big data analysis of the expert, it is important to classify and group the personal data and to accept it in court. In this respect, it is necessary to control whether the expert is legitimate, sufficient, and effective.
2. Confidentiality: The problem of privacy of the person being examined is important. The approach of the telemedicine application, which we call image-based analysis, to this problem is subject to legal and ethical evaluation.
3. Ownership: There are inadequacies in the regulation of the infrastructure applied in the field of health. The purchase of each tool and its accessible application also needs regulation.
4. Reputation: Audit problematic of non-standard practices of practitioners is evident. As a result, there is a need to evaluate error definition, error measurement, error effect, and error tolerability in big data analysis.

Keywords: Big data, error analysis, chaotic situation, administration process, medical malpractice

 Yasar Bilge

Ankara University, Faculty of Medicine, Department of Forensic Medicine, Ankara, Türkiye

Received: 28 November, 2022

Accepted: 15 February, 2023

Published: 19 June, 2023

Corresponding Author: Yasar Bilge, Ankara University, Faculty of Medicine, Department of Forensic Medicine, Ankara, Türkiye
Email: yasarbilge@hotmail.com

CITATION

Bilge Y. Error analysis in big data analysis . Atlantic J Med Sci Res. 2023;3(2):81-5. DOI: 10.5455/atjmed.2022.11.019

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Definition

By using information and communication technologies between distant places; The data used in the provision of health services for the purposes of diagnosis, treatment, preventive medicine, research, evaluation, continuing education, and improving the health of individuals and communities is known as big data (1). Big data shows very variable content and direction for the following situations. These are volume, speed, variety, variability, value, detail, voluntariness, versatility, reality, validity, different platform, visualization, duration of usefulness, vulnerability, speed of diffusion, fluidity, viability, virtuality,

value, robustness, sellability, arrogance, dissatisfaction, visibility, vitality, connectivity, data terminology, verifiability, prowess, multiplicity, vitality (2).

History

Medical applications through electronic communication started in the 1960s, with NASA monitoring the physiological measurements of astronauts during space flights from the center on earth via satellite. Leading in big data applications in the USA, Canada, Australia, the UK, and Germany countries (3,4). In our country, telemedicine systems started under the name of

the "Turkey Health Transformation Project" supported by the World Bank and carried out by the Ministry of Health. The use of e-pulse, virtual reality, and 3 d techniques is common in our country (5). With the Regulation on the Delivery of Distance Health Services published in the Official Gazette dated February 10, 2022, and numbered 31746, telemedicine applications were considered to be widespread. As a result, problems related to big data control and forecasting have come to the fore.

EPIDEMIOLOGY

Mortality and morbidity assessment is required to explain the magnitude of the problem encountered in the healthcare field. According to the World Health Organization reports, chronic diseases are responsible for 63% (57 million people) of all deaths in the world (6). 36 million of these deaths are due to cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases. An increased risk of death has been observed in the elderly (6). A similar situation is observed in our country (7).

OBJECTIVE

There is a widespread use of big data applications that are effective in reducing mortality and morbidity. In this respect, this compilation has been prepared for the purpose of configuring, explaining, and applying cheap, fast, accessible, and sustainable big data applications.

FUNDAMENTAL RIGHTS OF HUMAN

Physicians' obligation to keep confidential is regulated in Article 23 of the Patient Rights Regulation, titled 'Confidentiality of Information', Articles 5 and 9 of the Medical Professional Ethics Rules, and Article 4 of the Medical Deontology Regulation. The principle of "The patient has the right to expect the physician to respect the confidentiality of all medical and private information about his/her private life" is stated in the Lisbon Declaration of Patient Rights.

According to Article 1 of the Biomedicine Convention, protecting the dignity and identity of individuals in the practice of biology and medicine is the most fundamental obligation of the state parties. According to Article 4 of the Convention for the Protection of Human Rights and Human Dignity with respect to the Application of Biology and Medicine, "any intervention in the field of health must be carried out in accordance with relevant professional obligations and standards". The protection of private life and the right to inform, which are included in Article 10 of the same Convention, are among the most important rights to be considered in telemedicine applications. In accordance with Article 56 of the Constitution, it is necessary to ensure that people have access to qualified health services. In accordance with Article 17 of the Constitution and Article 5 of the Convention on Human Rights and Biomedicine, it is essential that any intervention in the field of health be made with the free and informed consent of the person concerned. Universal medical ethical principles that physicians must comply with

while performing their duties in Article 6 of the Turkish Medical Association's Code of Professional Ethics of Medicine; are counted as "usefulness, non-harming, justice, and autonomy". Many articles of the Patient Rights Regulation, especially Articles 6, 11, and 18, contain provisions parallel to these regulations.

ADVANTAGES

Elimination of the necessity for the doctor and the patient to be in the same place, reducing hospital costs. Telemedicine applications are mostly used in radiology, cardiology, dermatology, psychiatry, and emergency medicine fields, such as remote patient follow-up, access to consultation databases for the diagnosis and treatment of the disease, and training for personnel and patients who are far from centers (8,9). Outdated information is difficult to falsify. Since it is documented and analyzed, it is measurable, and portable, and quality can be achieved (10). Being able to deliver health services over long distances increases the quality of service (11). Regional differences disappear in the diagnosis and treatment process. It is possible to save time and access information at any time.

DISADVANTAGES

In unstructured systems, the quality decreases, the services provided to patients and clinicians suffer, and sometimes the examinations need to be repeated once again (12,13,14). The trusting and moralizing effect of the doctor-patient relationship disappears. Violation of confidentiality obligations: Security problems often arise in the form of unauthorized access to records from a remote site, breach of privacy, deletion or modification of records, accidental deletion of data stored on computers, and detection and proof of negligence and violations (15). It is possible for thousands of records to be compromised as a result of carelessly sending electronic information to the wrong addresses (16,17). In August 2000, the confidentiality of the records of 858 patients was violated as a result of carelessly wrong appointments (18). Also, some of the people who have access to medical information may leak the information. A healthcare worker gave a computer disk containing the names of 4,000 HIV-positive patients to two newspapers, and members of a company called Medicaid sold printouts containing patients' financial information to managed data marketing companies. A banker, on the other hand, seized the mortgage statements of cancer patients and earned large amounts of money by using them (17,19). In June 2008, files containing all genetic codes, addresses, and information of approximately 30 thousand donors registered in a Bone Marrow Bank in Istanbul were copied from a computer and stolen (20,21). In addition, overtreatment leads to side effects and complications in the patient (22).

EFFECTS OF BIG DATA APPLICATIONS ON ERRORS

In accordance with Law No. 1219 and the Medical Deontology Regulation and the Rules of Professional Ethics of Medicine, the physician should examine the patient directly and personally, take the anamnesis, evaluate the patient's health history together

with the results of the examination and examination, diagnosis It is essential that he arranges the treatment within the framework of his medical knowledge. Of course, it is necessary to inform the patient about the diagnosis, and the recommended treatment, to obtain the patient's consent, and to inform the patient about what needs to be done regarding the treatment (12,13).

Illumination in accordance with the Patient Rights Regulation and the Medical Professional Ethics Rules; should be in accordance with the cultural, social, and mental state of the patient. The information should be given in a way that can be understood by the patient, simply, without hesitation and doubt. Clarification on the patient's health status and diagnosis, the type of treatment proposed, the chance of success and its duration, the risks of the treatment method for the patient's health, the use of the drugs given and possible side effects, the consequences of the disease if the patient does not accept the recommended treatment, possible treatment options, and risks. needs to be done. In medical interventions to be made with big data applications, lighting should be done in a way that includes these elements (13).

In the Principles on the Practice of Telemedicine prepared by the World Medical Association, it is stated that informed consent should at least include how telemedicine works, how to make an appointment, privacy issues, and the possibility of technical problems including violation of confidentiality (22).

It is thought that the clarification of the content of the service should be done by informing the physician directly during the video call, but after that, after the clarification is done properly, he may be asked to sign the electronic form on this subject. On the other hand, it should be determined how some obligations will be fulfilled within the scope of health service delivery with big data. It should be determined how the right to examine the file and records containing information about the health status of the patient, regulated in Article 16 of the Patient Rights Regulation, will be exercised. Issues related to the use of big data methods such as what to do in case of technical problems during the video call, how to follow an emergency situation during the interview, and how to carry out prescription procedures in cases where medication is required should be determined and the patient should be enlightened on these issues (22).

The World Health Organization states that the biggest concern in telemedicine applications is the protection of patients' personal data (16). The World Medical Association also stated in the Principles on Telemedicine Practice that the physician should ensure that the patient's confidentiality is maintained and that the patient's personal data is protected (22). The right to respect the privacy of the patient is regulated in article 21 of the Patient Rights Regulation; It requires that medical evaluations regarding the patient's health status are carried out confidentially, medical procedures are carried out in an environment of reasonable secrecy, and that people who are not directly involved in the treatment are not present during the medical intervention. However, this is difficult to control in a big data application.

Evaluation in Terms of Compulsory Liability Insurance Regarding Medical Malpractice It can be considered valid in telemedicine applications. However, in the Compulsory Financial Liability Insurance Communiqué on Medical Malpractice published in the Official Gazette dated 21.7.2010 and numbered 27648, there is no clear provision regarding whether telemedicine practices are within the scope of compulsory professional liability insurance. However, in Article A.1.4 of the General Conditions, it is stated that the policy will cover all the professional activities of the insured, and telemedicine applications are not included among the cases excluded from the coverage in Article A.3. However, the indemnity arising from the activities of the insured outside of his professional activity, which is covered by the policy and the limits of which are determined by the rules of law or ethical rules, are considered within the scope of compulsory professional liability insurance (14). The defacto-created situation: Need, necessity, trade, entrepreneurship, social responsibility, and public interest situations contain paradoxes (14). Since the burden of proof and informed consent are controversial, the content analysis should be done in terms of malpractice. Because according to Article 23 of the Medical Code of Professional Ethics and Article 16 of the Medical Deontology Regulation, personal examination, diagnosis, and treatment are required. The problem of recording medical interviews involves serious discussion. There is also a problem in terms of the Personal Data Protection Law. Remuneration, billing, and relations with SSI and private insurance companies should also be examined. There are also dilemmas in the fields of Information, Promotion, and/or Advertisement. The situation is also evaluated in terms of the provisions regarding the Power of Attorney in the Turkish Code of Obligations 502/2. Within the scope of Article 48 of the Consumer Protection Law No. 6502, the question of whether the provisions of a power of attorney agreement will be applied as in a standard medical contract or a distance service contract may come up (19,20). According to the 12th article of the Law on the Practice of Medicine and Medical Arts, it is forbidden for a physician to do any kind of trade by opening a shop or a store. According to Article 28 of the Civil Servants Law, civil servants cannot engage in any activity that requires them to be considered merchants or artisans according to the Turkish Commercial Code. As in every sector, the provision of remote health services has started to be discussed in the health sector during the pandemic period. Especially people who find different diseases find the hospital environment risky. Therefore; Many people want to conclude their treatment processes by meeting with the physician remotely as much as possible. In fact, this need is present in normal times for the elderly and those who request a consultation for medication. However, with the pandemic period, it has become clear how important it is.

Article 11 of the Turkish Medical Association's Code of Professional Ethics of Medicine, Article 8 of the Regulation of Medical Deontology: A commercial aspect cannot be given to the professions of medicine and dentistry and treatment establishments. According to Article 24 of Law No. 1219 on the

Style of Execution of Medicine and Medical Arts, a physician cannot advertise while practicing his profession, cannot be a tool for commercial advertisements, and cannot give a commercial appearance to his work; may not act to mislead people, cause panic, mislead, or cause unfair competition among colleagues. The physician may notify the area of specialization, working days, and hours, which have been accepted in accordance with the Medicines Specialization Regulation, if any, in the announcements to be made by means of broadcast media. The form and dimensions of signage and similar promotional tools are determined by the local medical chamber. Physician Professional Ethics Rules of the Turkish Medical Association Article 14: Physicians cannot send patients to other physicians or examination-treatment institutions in return for financial gain. Physicians cannot benefit from intermediary persons to provide for patients. Commercial Advertisement and Unfair Commercial Practices Regulation Article 5(ğ): Advertisements cannot contain expressions or images of patients before and after treatment.

Physician Professional Ethics Rules of the Turkish Medical Association Article 12: While performing his profession, the physician considers the principles of preventive medicine with scientific and contemporary diagnosis and treatment methods.

Regulation on Private Health Institutions where Outpatient Diagnosis and Treatment is made Article 29/4: Health institutions can provide information that protects and improves health. Provided that it is not contrary to the provisions of the first paragraph, it may promote and place advertisements to inform the public about the opening, service areas, and services it provides. However, within the scope of information and promotion activities, misleading, exaggerated, scientifically unproven information and explanations aimed at creating demand cannot be included.

Private Hospitals Regulation Article 60/2: By private hospitals; information and promotions that protect and improve health can be made. Within the scope of information and promotion activities, misleading, exaggerated, scientifically unproven information and explanations that create demand cannot be included.

According to the Regulation on Specialization Training in Medicine and Dentistry, dated September 3, 2022, and numbered 31942, the Board of Specialization in Medicine was established. This institution has been given the authority to supervise and evaluate educational programs and to plan academic work.

MEASURE

In Article 31 of the Turkish Medical Association's "Physician Professional Ethics Rules" regulation, it is stated that the physician cannot give this information to anyone else unless there is a legal obligation. In the institution, who will have access to which data with which authority should be very well defined, and an advanced control mechanism can be established to prevent unauthorized persons from accessing the patient's health records

and stored images? As little information as possible should be used and transferred to serve the purpose, and personal identifiers in the records during the transfer should be removed from the records. Citizens of other countries are not authorized to practice medicine in our country. If it is made responsible, it can be made to work. It can be included in the reimbursement scope of the teleconsultation service. Investment costs can be covered (6).

CONCLUSION

The physician-patient relationship is based on trust, personal examination, and knowledge of the patient's medical history. For this reason, big data can be used in situations where the physician cannot be physically found in a timely and safe manner. Telemedicine minimum contract fee schedule can be prepared. Telemedicine can be left to the patient's choice. Telemedicine applications can be legally covered by health insurance. In the transfer of the patient's data by protecting the confidentiality obligation of the physician; Adequate security measures can be increased within the system for issues such as data loss, data theft, and data access authorization. Informed consent from the patient can be obtained in data transfer via telemedicine. In case of loss in international applications, the way of repairing the damage can be clarified according to contract law. In our country, it may be considered necessary to evaluate telemedicine services within the scope of distance contracts specific to consumer law.

Conflict of interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical approval

Ethics committee approval is not required.

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