

## THE ROLE OF BIG DATA ANALYSIS IN REDUCING THE RISK OF CARDIAC SURGERY

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**Abstract:** Nowadays, cardiac surgery is recognized as a complex and high-risk procedure in the medical field. In order to increase the accuracy and efficiency of these procedures, Big Data analysis is gaining importance. This article analyzes the application of big data technologies in cardiac surgery, their potential for reducing surgical risks, and the development of individual treatment approaches using these technologies.

The article discusses methods for predicting risk factors based on patient historical data, surgical outcomes, and clinical indicators using big data. It also analyzes ways to use Big Data technologies to plan operations, improve diagnostic accuracy, and reduce postoperative complications. The advantages of using advanced technologies such as artificial intelligence, machine learning, and statistical modeling to process big data are highlighted.

The results of this study provide new approaches to improve safety in cardiac surgery and improve the quality of life of patients. In addition, they reveal innovative opportunities that help improve the efficiency of the healthcare system and optimize resource allocation through big data analysis.

**Keywords:** Cardiac surgery, information technology, Big-Data, data.

**Introduction:** Cardiosurgery is an important medical field focused on the surgical treatment of complex diseases related to the heart and vascular system. Although these procedures are important in saving human lives, their high level of risk and complexity require optimization of medical processes. Increasing the success of cardiosurgical procedures and reducing risk factors are among the urgent tasks of modern medicine.

In recent years, the application of Big Data technologies in the healthcare sector has opened up new opportunities. Through big data analysis, it is possible to make accurate predictions based on patients' medical history, clinical indicators, diagnostic data and surgical results in the field of cardiac surgery. This serves to identify risk factors in advance, plan surgical procedures and develop individual treatment approaches.

This article is devoted to the application of big data technologies in cardiac surgery, analyzing the possibilities of reducing risk factors and effectively managing processes using Big Data. It also highlights advanced approaches used to improve the quality of diagnostics and treatment based on big data. The results

of this study can serve as a basis for the wider introduction of innovative technologies in the field of cardiac surgery.

## **Main part**

### **1. The concept of Big Data and its importance in cardiac surgery**

Big Data is a collection of data that is characterized by its volume, diversity, and speed, and modern technologies are required for its processing and analysis. In the field of cardiac surgery, big data technologies allow for in-depth analysis of large-scale patient data collected in the healthcare system. This technology can be used to assess risks based on the patient's medical history, laboratory results, genetic data, and post-operative observations.

### **2. Areas of application of big data in cardiac surgical practices**

#### **2.1. Diagnosis and identification of risk factors**

By analyzing patients' medical records using Big Data technologies, it has become significantly easier to identify risk factors for cardiac surgery. Machine learning algorithms have high accuracy in detecting symptoms of heart disease at an early stage. This allows minimizing risks during the preoperative preparation stage.

#### **2.2. Operation planning and optimization**

Big data analysis is essential for predicting potential complications during surgery. Computer simulations can help improve surgical planning and preparation of necessary instruments. Big data can also provide surgeons with accurate recommendations for decision-making during surgery.

#### **2.3. Postoperative monitoring and rehabilitation**

Big Data technologies are used to remotely monitor the condition of postoperative patients and develop individual rehabilitation plans for them. For example, IoT devices and biometric sensors monitor heart rate, blood pressure, and other vital signs. Also, using data collected in real time, complications are identified in advance and measures are taken to eliminate them.

### **3. Big Data technologies are tools used in cardiac surgery**

#### **3.1. Artificial Intelligence and Machine Learning**

Artificial intelligence (AI) algorithms are an effective tool for quickly analyzing large amounts of data and making predictions. In cardiac surgery, AI helps assess patient risk and optimize surgical outcomes.

#### **3.2. Statistical analysis and big data platforms**

Hadoop, Apache Spark, and other platforms are used for big data analysis. These systems allow you to process large amounts of data and draw accurate conclusions.

#### **3.3. IoT devices and real-time monitoring**

IoT devices that monitor heart activity are important for real-time detection of risk factors and monitoring patient status in the postoperative period.

### **4. Benefits of Big Data Analytics in Cardiac Surgery**

- **Increased accuracy:** Performing diagnostic and surgical procedures with high accuracy.
- **Cost reduction:** Increase cost efficiency by avoiding inappropriate diagnoses and surgeries.
- **Individualized treatment:** Developing treatment plans based on each patient's individual indicators.

## 5. Implementation difficulties

There are the following challenges in applying big data technologies in cardiac surgery:

- **Data security and privacy:** The need to protect patients' personal information.
- **Developing technological infrastructure:** Working with big data requires high-quality technologies.
- **Shortage of specialists:** The need for qualified personnel in medicine and information technologies.

## 6. Future prospects

The expansion of big data technologies in cardiac surgery is driving new innovations in the field. There is an opportunity to further improve safety and efficiency by integrating new artificial intelligence algorithms and IoT technologies.

**Conclusion:** The complexity and high risk of cardiac surgery require the introduction of modern technologies in this field. Big Data analysis plays an important role in optimizing cardiac surgery processes, reducing risk factors, and individualizing the treatment process. This article analyzes the role of big data in diagnostics, surgical planning, and monitoring the postoperative condition of patients.

Big Data technologies enable in-depth analysis of patient medical data, identification of risk factors, and management of processes using artificial intelligence. IoT devices and real-time data collection technologies also increase efficiency in monitoring patients' condition in the postoperative period.

However, there are challenges in applying big data in cardiac surgery, such as developing technological infrastructure, ensuring data security, and training qualified personnel. In the future, by more widely implementing big data technologies, it is possible to significantly reduce the risks of cardiac surgical procedures and ensure safer and more efficient processes for patients.

This approach opens up enormous opportunities for innovative development not only in cardiac surgery, but also in general medicine. Thus, big data analysis is emerging as one of the key factors that will bring medical technologies to a new level in cardiac surgical practices.

### Literature:

1. Abdusamatovich K. S., Olimjonovna T. F. Application of web applications in medicine //Eurasian Research Bulletin. – 2022. – T. 14. – C. 46-50.
2. Malikov, M. R., Rustamov, A. A., & Ne'matov, N. I. (2020). STRATEGIES FOR DEVELOPMENT OF MEDICAL INFORMATION SYSTEMS. Theoretical & Applied Science, (9), 388-392.
3. Berdiyevna, A. S., & Olimjonovna, T. F. (2022). INNOVATIVE APPROACHES IN THE EDUCATION SYSTEM TO INCREASE YOUTH PARTICIPATION. Web of Scientist: International Scientific Research Journal, 3(3), 674-677.
4. Toxirova, F. O., Malikov, M. R., Abdullayeva, S. B., Ne'matov, N. I., & Rustamov, A. A. (2021). Reflective Approach In Organization Of Pedagogical Processes. European Journal of Molecular & Clinical Medicine, 7(03), 2020.
5. Olimjonovna, T. F. (2023). SOCIO-HISTORICAL FOUNDATIONS OF FORMATION OF INTEREST IN THE PROFESSION AND DEVELOPMENT OF PROFESSIONAL THINKING THROUGH PEDAGOGICAL COMMUNICATION.
6. Olimjonovna T. F. Pedagogical Communication and its Role and Significance in Developing the Professional Thinking of Students //Eurasian Scientific Herald. – 2023. – T. 16. – C. 82-86.

7. Tohirova, F., & Esanmurodova, D. (2024). THE IMPORTANCE, ADVANTAGES AND DISADVANTAGES OF THE MODULAR PROGRAM IN THE EDUCATIONAL SYSTEM. *Modern Science and Research*, 3(1), 789-794.
8. Olimzhanovna, T. F. (2023). Facts About the Poisonous Mammal-Loris. *Miasto Przyszłości*, 42, 592-594.
9. Elamanova, M., & Toxirova, F. (2023). FACTS ABOUT THE POISONOUS MAMMAL-LORIS. *Modern Science and Research*, 2(12), 226-229.
10. Olimjonovna, T. F. (2023). FERMENTLAR VA ULARNING INSON ORGANIZMIDAGI O'RNI.
11. Olimjanovna, T. F. (2023). ZAHARLI SUTEMIZUVCHI-LORIS HAQIDA FAKTLAR.
12. Olimjonovna, T. F., Rustamjonovna, T. P., & Zafarovna, I. S. (2023). Causes Leading to Baldness and How to Deal With Them. *Miasto Przyszłości*, 42, 216-220.
13. Abdusamatovich, K. S., & Olimjonovna, T. F. (2023). Information technologies in the economy. *Genius Repository*, 26, 30-33.
14. Olimjonovna, T. F. (2023). TELEMEDITSINA TEXNOLOGIYALARINI RIVOJLANTIRISH.
15. Olimjonovna, T. F. (2023). AXBOROT TEXNOLOGIYALARINI TA'LIM JARAYONIDA QO'LLASHNING PEDAGOGIK-PSIXOLOGIK OMILLARI.
16. Karabaev, S., & Toxirova, F. (2023). DEVELOPMENT OF TELEMEDICINE TECHNOLOGIES. *Modern Science and Research*, 2(4), 698-702.
17. Karabaev, S., & Toxirova, F. (2023). PEDAGOGICAL AND PSYCHOLOGICAL FACTORS OF USING INFORMATION TECHNOLOGIES IN THE EDUCATIONAL PROCESS. *Modern Science and Research*, 2(4), 703-707.
18. Abdusamatovich, K. S., & Olimjonovna, T. F. (2023). Information technologies in the economy. *Genius Repository*, 26, 30-33.
19. Tohirova, F. O., Nasrullayev, N. B., Tolibjonova, S. D., & Abdullayeva, V. D. (2024). TIBBIYOTDA AXBOROT TIZIMLARI VA ULARNING TURLARI. *IQTISODIYOT VA ZAMONAVIY TEXNOLOGIYA JURNALI*, 3(10), 1-7.
20. Tohirova, F. O., Nasrullayev, N. B., & Mansurova, J. S. (2024). TIBBIYOTDA ISHCHI O'RINLARINI AVTOMATLASHTIRISH ASOSLARI. *IQTISODIYOT VA ZAMONAVIY TEXNOLOGIYA JURNALI*, 3(10), 13-19.
21. Tohirova, F. O. (2024). PEDAGOGIK MULOQOT VA UNING AHAMIYATI. *PEDAGOGIKA, PSIXOLOGIYA VA IJTIMOIIY TADQIQOTLAR JURNALI*, 3(10), 36-41.
22. Tohirova, F. O., Rizaeva, M. M., & Oblakulova, J. A. (2024). DIDACTIC OPPORTUNITIES OF FORMING PROFESSIONAL INTEREST AND IMAGINATION IN MEDICAL PEDAGOGICAL STUDENTS. *PEDAGOGIKA, PSIXOLOGIYA VA IJTIMOIIY TADQIQOTLAR JURNALI*, 3(10), 42-48.
23. Tohirova, F. O. (2024). PEDAGOGIK MULOQOT VA UNING AHAMIYATI. *PEDAGOGIKA, PSIXOLOGIYA VA IJTIMOIIY TADQIQOTLAR JURNALI*, 3(10), 36-41.
24. Olimjonovna, T. F. (2024). MODUL DASTURI TA'LIM TIZIMIDA AHAMIYATI, USTUN TOMONLARI VA KAMCHILIKLARI.