

Chapter 98

Blockchain Technology Changing Traditional Methods of Applied Research in Bioinformatics

Natalia Rasskazova

 <https://orcid.org/0000-0001-8369-9061>

Penza State University, Penza, Russia

Liudmila Ratushnaia

Penza State University, Penza, Russia

ABSTRACT

It is evident that traditional research methods are going to change. The research should be based on the possibility of quick access to information, interactivity and interaction of participants in search for information, elimination of temporal and spatial obstacles. Everything mentioned above requires the use of new research technologies, including blockchain technology. This technology allows solving the problems of collection and systematization of scientific data, access to it within the framework of project operation and implementation at any organization, and joint efforts of various structures. Data saved in blocks and stored on different servers can be accessed by different users. It reduces the cost of coordinating the actions of different users who want to obtain certain information. This article explores how blockchain technology is changing traditional methods of applied research in bioinformatics.

INTRODUCTION

Modern society's development is connected with the use of digital technologies in all spheres. Digital technology as a system of methods and techniques are focused on receipt, storage, processing, use and dissemination of information with the help of computers. Performance and versatility of this schema have made IT popular. The development of research methods based on digitalization in the field related

DOI: 10.4018/978-1-7998-5351-0.ch098

to solving problems of improving the level and quality of human life is particularly relevant. Bioinformatics in this sense is one of the most promising areas of digital technology.

Bioinformatics (computational biology), which appeared at the intersection of molecular biology, genetics, mathematics and computer technologies, studies the sequences of nucleic acids in DNA/RNA or amino acids in proteins, their evolution, construction patterns, the relationship between the sequence of elements and the spatial structure of macromolecules, its physical properties and functions (T. Attwood, Parry D. Smith, 1999; A. Lesk, 2008). Bioinformatics as a synthesis of different sciences allows forming a new level of understanding biological processes occurring in cells and organisms. Various methods of applied mathematics, statistics and other exact sciences are used in bioinformatics.

One of the tasks of bioinformatics is processing a huge array of different biological data, identifying patterns that cannot always be seen in a conventional experiment, predicting the functions of genes and proteins encoded in them, building a model of gene interaction in the cell, drug designing. Using blockchain technology that can complement traditional methods of bioinformatics is of particular interest here.

Despite the fact that blockchain technology is quite new, there are a number of scientific works that reveal the essence of this technology, its advantages and disadvantages (R. Redien-Collo 2019; D. Teles & I. Azevedo 2019), as well as the possibility of its application in various spheres of life (S. A. Matthew & Md A. Quadri, 2019; I. I. Benna 2019). Blockchain has become particularly relevant in the financial sphere. Recently, however, it has become clear that blockchain technology can optimize the current and future delivery of health care, education and management services around the world (I. I. Benna 2019).

BACKGROUND

Blockchain technology was proposed in 2008 by Satoshi Nakamoto. This technology was the basis of the first cryptocurrency, Bitcoin. The blockchain can be defined as a distributed decentralized database that continues to register data records confirmed by the respective nodes. All data is stored in a public ledger, which includes all registered transactions. The blockchain consists of a linked sequence of blocks containing transactions with timestamps that are protected by cryptography. Blockchain technology allows recording transactions continuously keeping them unchanged while providing constant updates. Accordingly, the blockchain is provided partly by the database, partly by the development platform and partly by the virtual network intermediary.

The main characteristics of any blockchain are:

- decentralized structure of data storage;
- the highest level of data storage security;
- distributed data storage;
- maximum system transparency for users;
- inability to falsify once recorded data.

8 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/blockchain-technology-changing-traditional-methods-of-applied-research-in-bioinformatics/268690

Related Content

Video Face Tracking and Recognition with Skin Region Extraction and Deformable Template Matching

Simon Clippingdale and Mahito Fujii (2012). *International Journal of Multimedia Data Engineering and Management* (pp. 36-48).

www.irma-international.org/article/video-face-tracking-recognition-skin/64630

Bregman Hyperplane Trees for Fast Approximate Nearest Neighbor Search

Bilegsaikhan Naidan and Magnus Lie Hetland (2012). *International Journal of Multimedia Data Engineering and Management* (pp. 75-87).

www.irma-international.org/article/bregman-hyperplane-trees-fast-approximate/75457

How Do Financial Constraints and Financial Returns Matter in Investment Management?: Evidence From Brokerage Recommended Stocks of BSE 100 in India

Rohit Sood (2023). *Enhancing Business Communications and Collaboration Through Data Science Applications* (pp. 178-210).

www.irma-international.org/chapter/how-do-financial-constraints-and-financial-returns-matter-in-investment-management/320756

A Cross-Layer Design for Video Streaming Over 802.11e HCCA Wireless Network

Hongli Luo (2011). *International Journal of Multimedia Data Engineering and Management* (pp. 21-33).

www.irma-international.org/article/cross-layer-design-video-streaming/58049

Multimodal Data Integration and User Interaction for Avatar Simulation in Augmented Reality

Anchen Sun, Yudong Tao, Mei-Ling Shyu, Angela Blizzard, William Andrew Rothenberg, Dainelys Garcia and Jason F. Jent (2022). *International Journal of Multimedia Data Engineering and Management* (pp. 1-19).

www.irma-international.org/article/multimodal-data-integration-and-user-interaction-for-avatar-simulation-in-augmented-reality/304391