

THE ROLE OF ARTIFICIAL INTELLIGENCE IN MODERN CARDIOLOGY
ABSTRACT.

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Artificial intelligence (AI) is playing an increasingly important role in the diagnosis, treatment, and monitoring of cardiovascular disease. This paper discusses the main applications of AI in cardiology, including electrocardiogram (ECG) analysis, prediction of cardiovascular interventions, and personalized patient care.

Keywords: artificial intelligence, cardiology, ECG, diagnostics, cardiovascular diseases, neural networks . Introduction

Cardiovascular disease (CVD) remains one of the leading causes of mortality worldwide. Timely diagnosis and effective treatment are critical to reduce the risk of complications and mortality.

The development of artificial intelligence technologies allows doctors to obtain more accurate data, predict disease progression and develop individualized treatment regimens. Modern machine learning algorithms are already being actively used in cardiology, helping to authorize diagnostics and improve the quality of medical services. In addition to highlighting the advantages of AI in cardiology, the paper also

discusses potential challenges, including data privacy and ethical concerns. The findings suggest that AI will continue to play a crucial role in the future of cardiology, improving diagnostic accuracy and enhancing patient care.

Keywords:

Artificial intelligence, cardiology, ECG, cardiovascular diseases, diagnostics, neural networks, personalized treatment, medical imaging, robotic surgery.

The main applications of AI in cardiology

1. electrocardiogram (ECG) analysis AI algorithms can automatically analyze ECG, detecting arrhythmias, myocardial infarcts and other pathologies with high accuracy. Some of the benefits of automatic ECG analysis:

instantaneous interpretation of the results,

reduction of the risk of human error,

the possibility of remote diagnosis,

An example is the company's development

Google, an algorithm capable of diagnosing atrial fibrillation based on ECG analysis.

2. Forecasting cardiovascular events

AI helps predict the risk of developing a heart attack or stroke by analyzing risk factors:

Arterial pressure.

Cholesterol levels.

Genetic predispositions.

The patient's lifestyle.

Systems such as the Framingham Risk Score and AI-based models allow physicians to develop personalized prevention strategies.

3. Medical image visualization and processing

AI plays an important role in analyzing the images obtained by:

Echocardiography.

Magnetic resonance imaging (MRI) of the heart.

Computerized Tomography (CT).

Machine learning algorithms help to detect coronary artery stenosis, myocardial hypertrophy and other pathologies, which helps to improve diagnostic accuracy.

4. Robot-assisted surgery in cardiac surgery

Robotic surgical systems such as Da Vinci are used in cardiac surgery to perform complex surgeries with minimal trauma to the patient.

The main advantages:

High accuracy of manipulation.

Reduction of post-operative complications.

Reducing the workload of surgeons.

5. Monitoring of patient conditions

AI is utilized in wearable devices such as smart watches (Apple Watch, Fitbit) that allow monitoring of abnormalities in revolving time.

The application of AI in monitoring allows to:

Warn patients of potential complications.

Analyze changes in cardiac rhythm.

Decrease the risk of sudden cardiac death.

6. Personalized treatments

AI helps develop personalized treatment regimens based on patient data including genetic factors and history of disease

In cardiology, algorithms are used to select optimal drug dosages for patients with:

Hypertension.

Cardiac insufficiency.

Arrhythmias

Perspectives and Challenges

Perspectives.

Early diagnosis: AI makes it possible to detect cardiovascular disease before symptoms appear.

Early diagnostics: AI enables detection of cardiovascular diseases before symptoms appear.

Development of telemedicine: remote patient monitoring and consultations with doctors.

Automation of routine tasks: reducing the burden on medical personnel.

Challenges.

Ethical Issues:

Trust in AI diagnostics and liability for errors.

Data privacy: protecting patients' personal information.

Integration of AI into medical practice: the need for technology standardization.

Conclusions:

Artificial intelligence is already playing a key role in modern cardiology, to improve the accuracy of diagnosis, prognosis and treatment of cardiovascular diseases. In the future, AI will continue to evolve, providing physicians with new tools to combat cardiovascular pathologies and improve the quality of life for patients.

Used books:

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2. Intelligence-Based Cardiology and Cardiac Surgery (page 50)
3. Artificial Intelligence for Cardiovascular Disease. Authors: Rishabha Malviya, Shivam Rajput (page 80)
4. Artificial Intelligence in Cardiothoracic Imaging. Authors: Carlo N. De Cecco, Marlyvan Assen, Tim Leiner

5. AI healthcare Cardiology. Authors: Tantrajana vedike
6. Artificial intelligence for computational modeling of the heart. Authors: Tommaso Mansi, Tiziano Passerini, Dorin Comaniciu (page 80, 12, 5)
7. Artificial intelligence in medicine. Authors: Lei Xing, Maryellen Giger, James K. Min (page 90, 11)
8. AI doctor the rise of artificial intelligence in healthcare (page 10)
9. Artificial intelligence in healthcare (page 60)
10. Heart disease a textbook of cardiovascular medicine (10, 11, 15)