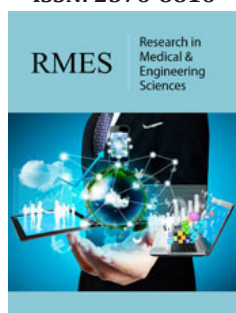


Intelligent Digital Clinic of Interacting Multimodal AI Assistants

Evgeniy Bryndin*

Interdisciplinary Researcher of the International Academy of Education, Technological Platform Medicine of the Futur, Novosibirsk, Russia

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***Corresponding author:** Evgeniy Bryndin, Interdisciplinary Researcher of the International Academy of Education, Technological Platform Medicine of the Futur, Novosibirsk, Russia

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Abstract

Humanity relentlessly pollutes nature. Pollution of nature is the cause of human diseases. Pollution of water and soil creates conditions for the emergence of infectious parasites. Inhabitants of water bodies and soil are carriers and distributors of infectious parasites. Humanity, consuming inhabitants of water bodies and soil, becomes a carrier of infectious parasites, a distributor of infections and a source of epidemics. AI medicine is developing for the prompt and effective treatment of rapidly spreading human diseases and the prevention of epidemics. An intelligent digital clinic of interacting multimodal AI assistants will solve the problem of prompt and effective treatment of the population.

Keywords: Environmental pollution; Human diseases; AI assistants; Intelligent digital clinic

Introduction to the Problem

When humanity defiles Nature, then Nature defiles humanity with diseases. Diseases are Nature's response to humanity's defilement. It is important to note that the emergence of diseases as a response of nature is a spiritual biological law [1-3]. Nature has no conscious intentions, but the changes we make to the environment lead to undesirable consequences, including the emergence of new diseases. Thus, it can be said that there is a relationship between the actions of humanity and the health of the population, and this topic requires deep analysis and awareness of the responsibility for the preservation of nature and the health of future generations [4-8].

At the present stage, intelligent digital polyclinics are being formed - a modern medical institution that uses digital technologies and artificial intelligence to optimize the processes of diagnosis, treatment and patient care. An intelligent digital polyclinic offers innovative solutions to improve the quality of medical care and improve interaction between patients and doctors, managers with medical staff, between medical institutions.

Intelligent digital assistants

Intelligent digital assistants are software that uses artificial intelligence technology to perform various tasks and assist users in their daily lives. Such assistants can work on various devices, including smartphones, computers, smart speakers, and other smart devices. The following are the key features and functions of an intelligent digital assistant:

- A. Assistants can understand and process user requests in natural language, allowing them to interact with them in a convenient and intuitive manner,
- B. Many digital assistants support voice commands, allowing users to control devices and get information without typing,

C. Assistants can be customized based on user preferences, remember their interests and offer personalized recommendations,

D. Digital assistants can be integrated with various services and applications, such as calendars, email clients, delivery services and many others,

E. Assistants can perform routine tasks such as reminders, scheduling meetings, sending messages and managing smart institution devices,

F. They can provide users with information on request, depending on their specialization,

G. Using machine learning, assistants can improve their responses and recommendations based on user interactions,

H. Modern digital assistants are designed with security and data protection issues in mind, giving users the ability to control what information is collected and how it is used,

I. Intelligent digital assistants can interact with each other.

J. Interaction between AI assistants can take various forms and for various purposes. AI assistants can work together to perform complex tasks. For example, one assistant can collect information, and another can analyze it and provide recommendations.

AI assistants can exchange data and work results to improve the quality of services provided. This can include joint access to databases and algorithms.

AI assistants can learn from each other's work, improving their algorithms and approaches to solving problems. In situations where a multifaceted approach is required, assistants can combine efforts to solve a problem more effectively, for example, in the field of medical diagnostics or data analysis.

An AI assistant can interact with several assistants at the same time, which allows for a more complete and detailed understanding of the information needed. AI assistants can interact with other software systems and platforms, which expands their functionality and improves professional experience.

These and other aspects of interaction are useful and effective in the healthcare sector. Intelligent digital assistants continue to develop, becoming more advanced and useful in medicine and everyday life. Intelligent digital clinics from AI assistants are beginning to form in medicine. To implement intelligent digital clinics, DeepSeek can be transformed into various interacting AI assistants.

Intelligent digital clinic of interacting AI assistants

The intelligent digital clinic based on interacting AI assistants is an intelligent healthcare system in which multiple digital assistants work together to provide comprehensive support to patients and medical staff. Here is how the intelligent digital clinic functions:

A. Each AI assistant specializes in certain aspects of healthcare, such as diagnostics, record management, medical history, medication reminders, etc.

B. Assistants exchange information with each other to create a complete picture of the patient's health. For example, one assistant can provide data on symptoms, and another can process it to create a preliminary diagnosis.

C. Assistants are customized for each patient, taking into account their medical history, preferences, and individual needs. This may include medication reminders, lifestyle and dietary recommendations.

D. Assistants organize video calls with doctors, preparing the patient for the meeting, collecting the necessary data and questions for discussion.

E. Assistants analyze patient data and provide the doctor with diagnostic and treatment recommendations based on best practices and the latest research.

F. Assistants track the patient's health through wearable devices, collecting information on physical activity, blood sugar levels, and other indicators.

G. Assistants collect patient feedback on the quality of service and use this data to improve their recommendations and functions.

H. Assistants make an appointment with a doctor for a specific day and time and remind the patient about it.

Multimodal adaptive smart interfaces are used for multi-format remote communication between intelligent assistants, medical staff and patients. Multimodal interfaces provide significant advances in how intelligent systems, users and medical staff interact naturally with different technologies. All interactions between assistants and patients are protected using modern encryption technologies and compliance with privacy standards.

The intelligent digital clinic improves the quality of medical care and makes it more accessible and personalized for each patient. Patients can receive consultations from doctors remotely via video link, which is especially convenient for people with disabilities or living in remote areas.

All patient data is stored electronically, which simplifies access to information for doctors and improves coordination between different specialists.

Large amounts of data collected from various sources (e.g. test results, medical history) can be analyzed to identify trends, improve the quality of care and develop new treatment methods. Based on the collected patient information, including genetic data, individual treatment plans can be developed, which increases the effectiveness of therapy.

Appointments, insurance processing, documentation and ensuring territorial interaction are automated, which allows

medical staff to focus more on the innovative development of the intelligent digital clinic. For example, using the technology of chromatin conformation in cells.

Chromatin conformation in cells

Every cell in your body has the same genetic sequence, but only uses some of those genes. This is what differentiates brain cells from skin cells. The three-dimensional structure of the genetic material determines which genes are accessible. Chemists at MIT have found a new way to predict these three-dimensional structures using artificial intelligence (AI) that is much faster than older methods. This new technology, called ChromoGen, can predict thousands of structures very quickly [9]. It helps scientists see how the three-dimensional shape of DNA affects cell function.

A cell's function depends on which genes are accessible to it. To study this process, DNA sequences are analyzed and modeled as they fold. By quickly mapping how chromatin folds, the ChromoGen system allows scientists to compare cell types, study gene regulation, and investigate how DNA mutations affect structure. This could lead to a better understanding of diseases linked to genetic changes and open up new avenues for epigenetic research.

In the cell nucleus, DNA wraps around proteins called histones to form chromatin. This chromatin has layers of organization that allow it to fit into tiny spaces. Epigenetic modifications, such as marks on the DNA, affect how the chromatin folds and which genes are turned on or off. Standard methods map these structures by linking nearby pieces of DNA, but they are slow. ChromoGen uses deep learning to read DNA and predict how it might twist and turn in cells. It combines two parts: one that reads the DNA, and the other uses AI to model the 3D shape based on vast amounts of previous data from experiments.

Deep learning methods have made it possible to predict the chromatin conformations of individual cells directly from sequencing data.

The researchers tested ChromoGen on more than 2,000 DNA sequences and found that its predictions matched the real data. ChromoGen can even predict structures in cell types it wasn't trained on, helping compare how chromatin varies between cells and what that means for gene activity. It can also investigate how DNA mutations change chromatin structure, linking this to disease. This study opens new avenues for studying cell biology using AI-powered virtual cells [10-38].

Conclusion

Spiritual development can help people understand that their actions have consequences. From a spiritual perspective, it is important to develop a deeper understanding and respect for nature, and to strive for harmony with the world around us. This includes caring for the planet, consuming consciously, and actively participating in its protection.

Tackling the problem of waste and pollution requires a comprehensive approach, including effective waste management, protecting ecosystems, and raising public awareness of the importance of protecting nature for health. Studying how infections occur in nature helps us understand how to prevent their spread and control epidemics. This is an important area of research in epidemiology, ecology, and medicine. Studying the routes of infection helps scientists and health professionals develop disease prevention and control strategies, as well as predict and prevent outbreaks.

AI medicine helps solve the problems of detecting diseases. Today, there are many services using AI technologies in clinics and medical institutions around the world.

Babylon Health service uses AI to provide consultations on symptoms. Users can enter their symptoms, and the system provides a preliminary diagnosis and recommendations for further actions. Babylon also offers the ability to communicate with doctors via video calls.

Ada Health application uses AI to assess symptoms and provide the user with recommendations on possible diseases. The user answers the questions, after which the application analyzes the data and suggests potential causes of the disease.

Buoy Health AI platform helps users understand their symptoms and directs them to the appropriate medical specialist.

IBM Watson Health platform provides solutions for analyzing patient data and helps doctors in diagnosing and choosing the best treatment based on large volumes of medical information and scientific research.

Zebra Medical Vision company develops AI systems for analyzing medical images such as X-rays, CT and MRI to detect various diseases and health conditions of patients.

Google Health is actively working on projects related to AI in medicine, including medical image analysis and development of tools to improve disease diagnosis.

PathAI uses AI to improve disease diagnosis based on the analysis of pathological sections. PathAI systems help doctors to interpret the results more accurately.

HealthTap platform connects patients with doctors and uses AI to provide recommendations and answers to health questions.

These examples show how AI medicine is integrated into the work of clinics and medical institutions, improving the quality of service, speeding up diagnostic processes and providing a more personalized approach to each patient. As technology develops, we can expect new solutions and expansion of existing capabilities, using robotic operators with spatial intelligence (Figure 1).



Figure 1: Robotic operator.

In the process of life, a person forms and develops a three-level spatial intelligence: adaptive, mental and ethical. Adaptive intelligence develops in the environment, forming a spatial adaptive ontology in memory. Mental intelligence develops through multimodal communication, learning, problem solving and decision making, forming a spatial semantic ontology in memory. Ethical intelligence develops according to ethical values, forming spatial value ontology in memory.

Modern technologies of artificial adaptation (visual, navigation, tactile, etc.) in the environment, generative intelligence and a virtual ethical environment make it possible to create robots with spatial intelligence as assistants for interaction in a real environment.

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