

IMPROVING 2D ANIMATION CREATION METHODS FOR MEDICAL EDUCATIONAL VIDEOS BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGIES

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Abstract: This article examines the improvement of methods for creating 2D animation for medical educational videos based on artificial intelligence technologies. In modern education, the importance of visual information is steadily increasing; therefore, animated materials are widely used in the field of medicine to explain complex processes. The article analyzes the possibilities of simplifying the animation creation process with the help of artificial intelligence, saving time and resources, and increasing the effectiveness of education. In addition, the role of 2D animation technologies in medical education, their didactic potential, and ways of developing them through innovative approaches are discussed. The results of the research show that the use of artificial intelligence technologies improves the quality of medical educational materials and helps students better understand and absorb knowledge.

Keywords: artificial intelligence, 2D animation, medical education, educational videos, digital technologies, visual learning, multimedia technologies.

Annotatsiya: Ushbu maqolada tibbiy ta'lim jarayonida foydalaniladigan o'quv videolari uchun 2D animatsiya yaratish usullarini sun'iy intellekt texnologiyalari asosida takomillashtirish masalalari yoritiladi. Zamonaviy ta'lim jarayonida vizual

axborotning ahamiyati ortib borayotgani sababli tibbiyot sohasida murakkab jarayonlarni tushuntirishda animatsion materiallardan keng foydalanilmoqda. Maqolada sun'iy intellekt yordamida animatsiya yaratish jarayonini soddalashtirish, vaqt va resurslarni tejash hamda ta'lim samaradorligini oshirish imkoniyatlari tahlil qilinadi. Shuningdek, 2D animatsiya texnologiyalarining tibbiy ta'limdagi o'rni, ularning didaktik imkoniyatlari va innovatsion yondashuvlar asosida rivojlantirish yo'llari ko'rib chiqiladi. Tadqiqot natijalari sun'iy intellekt texnologiyalaridan foydalanish tibbiy o'quv materiallarining sifatini oshirish hamda talabalarning bilimni yaxshiroq o'zlashtirishiga xizmat qilishini ko'rsatadi.

Kalit so'zlar: sun'iy intellekt, 2D animatsiya, tibbiy ta'lim, o'quv videolari, raqamli texnologiyalar, vizual ta'lim, multimedia texnologiyalari.

Аннотация: В данной статье рассматриваются вопросы совершенствования методов создания двумерной анимации для медицинских учебных видеоматериалов на основе технологий искусственного интеллекта. В современном образовательном процессе значение визуальной информации постоянно возрастает, поэтому в сфере медицины для объяснения сложных процессов широко используются анимационные материалы. В статье анализируются возможности упрощения процесса создания анимации с помощью искусственного интеллекта, экономии времени и ресурсов, а также повышения эффективности обучения. Кроме того, рассматривается роль технологий 2D-анимации в медицинском образовании, их дидактический потенциал и пути развития на основе инновационных подходов. Результаты исследования показывают, что использование технологий искусственного интеллекта способствует повышению качества медицинских учебных материалов и лучшему усвоению знаний студентами.

Ключевые слова: искусственный интеллект, 2D-анимация, медицинское образование, учебные видеоматериалы, цифровые технологии, визуальное обучение, мультимедийные технологии.

Enter

In the modern education system, the use of information and communication technologies is becoming an important component of the educational process. Especially in the field of medicine, visual materials are of great importance for explaining complex biological processes, anatomical structures, and physiological mechanisms. In medical education, animated videos make it possible to describe complex processes in a simple and understandable way. Therefore, animation technologies are widely used in the medical education process. In recent years, the rapid development of artificial intelligence technologies is also creating new opportunities in the field of multimedia and animation. Using artificial intelligence, the process of creating animation is being automated, and the development of graphic elements, modeling of movements, and the creation of visual effects are being carried out much faster and more efficiently. This simplifies the process of creating educational videos and improves their quality.

The main part

The use of 2D animation technologies in medical education allows for the presentation of complex medical information in a visual and understandable form. Depicting anatomical structures, cellular processes, or physiological mechanisms through simple graphic images helps students understand the topic faster. Especially in medical education, animation technologies are an important didactic tool, since many processes are too complex to be directly observed with the human eye. The use of artificial intelligence technologies also opens up new methodological opportunities in creating animation. For example, automatic voice synthesis, technologies for creating animation from text, or automatic image editing capabilities greatly simplify the process

of creating animated videos. This allows educational institutions to quickly and effectively develop high-quality educational materials.

In addition, animations created on the basis of artificial intelligence also play an important role in organizing an individual learning process. Students will be able to use animated materials that match their level of knowledge. This increases the flexibility of the educational process and improves the level of knowledge acquisition of each student. The use of animated materials in the process of medical education not only facilitates the explanation of complex processes, but also significantly improves the process of students' perception of knowledge. In particular, showing biological and physiological processes occurring in the human body through simple graphic elements helps students to understand the subject more deeply. For example, when the process of blood circulation, the activity of the nervous system, or biological changes at the cellular level are explained step by step through animated images, a clear picture is formed in students. This serves to consolidate theoretical knowledge in a practical way.

The rapid development of artificial intelligence technologies has brought the process of creating animation to a more efficient and innovative level. With the help of artificial intelligence algorithms, it is possible to automatically generate graphic objects, model movements, and optimize images. Such technologies allow animators and content creators to create complex animated scenes in a short time. As a result, the process of developing medical educational materials is accelerated and their quality significantly increases. Systems based on artificial intelligence are also able to automatically analyze images, identify objects, and adjust movements when creating animation. For example, graphic elements created based on anatomical models can be automatically moved using artificial intelligence. This allows you to realistically demonstrate various processes in the human body. At the same time, such technologies can make educational videos more interactive and understandable.

The use of 2D animation in medical educational videos also plays an important role in attracting the attention of students. Compared to traditional text or static images, animated materials increase the interest of students and activate their process of learning. Through animation, it is possible to explain complex topics in a simple and logical sequence. This also increases the level of student memorization of the topic. Modern artificial intelligence technologies also provide voice synthesis and automatic translation capabilities during the animation creation process. Such capabilities allow educational videos to be prepared in different languages and presented to a wide audience. For example, medical animated videos can be automatically dubbed or enriched with subtitles using artificial intelligence. This ensures the international use of educational materials.

It is also possible to analyze animated materials and evaluate their effectiveness using artificial intelligence. Special algorithms help determine how effectively students are learning the video. Based on this information, it will be possible to improve the structure of educational videos and organize the educational process more effectively. Another important aspect of medical animation technologies is their ability to create a safe learning environment. Some medical processes can be difficult or dangerous to demonstrate in real conditions. Animated videos allow you to show such processes in a safe and understandable way. This helps medical students acquire important practical knowledge.

In addition, the use of 2D animation technologies will expand the possibilities of distance learning in medical education. By using animated videos on online learning platforms, students can independently study complex topics. This increases the flexibility of the educational process and allows students to independently develop their knowledge. In the future, further development of artificial intelligence and animation technologies is expected to lead to the emergence of new innovative approaches in the

field of medical education. With the help of such technologies, it will be possible to create interactive educational materials, virtual laboratories, and simulation training systems.

As a result, the quality of education in the medical field will further improve, and students will have the opportunity to effectively master complex knowledge. The principles of visual communication are of great importance in creating medical educational videos. Visual information is perceived by the human brain faster and is better remembered than textual information. Therefore, explaining complex scientific concepts through animated videos in medical education is an effective method. For example, biological processes in the human body, the effects of drugs on the body, or the stages of disease development can be clearly and sequentially depicted using animation. Such visual materials help students to deeply understand the topic and consolidate theoretical knowledge.

In the future, the further development of artificial intelligence and animation technologies will lead to the emergence of new innovative systems in the field of medical education. With the help of artificial intelligence systems integrated with virtual reality, augmented reality and animation modeling technologies, it will be possible to create more realistic educational materials. Such technologies will allow medical students to deeply study complex processes and develop practical skills. Therefore, improving the methods of creating 2D animation for medical educational videos based on artificial intelligence technologies is one of the important directions of modern education. These technologies not only increase the efficiency of the educational process, but also serve to popularize knowledge in the field of medicine and develop innovative teaching methods. It is also important to adhere to the principles of pedagogical design when creating medical educational videos. Animated materials should not only be aesthetically attractive, but also convey information to students

clearly and intelligibly. Therefore, color harmony, clarity of graphic elements, and logical sequence of actions are of great importance in the process of creating animation. With the help of artificial intelligence technologies, it will be possible to optimize such elements and increase the visual quality of educational materials.

One of the important stages in creating medical animation is the scientifically correct development of the content. All processes shown in animated videos must comply with the scientific foundations of medical science. Therefore, it is important for animation creators to work in collaboration with medical specialists. Artificial intelligence technologies also help in this process, as they create the opportunity to analyze scientific data and form visual models.

The scripting process is also important in creating animated educational materials. The script determines the content, sequence, and main idea of the educational video. Using artificial intelligence technologies, it is also possible to automatically create a script based on text data or optimize an existing script. This further speeds up the animation creation process and increases the quality of the content.

Medical animation videos also play an important role in expanding the imagination of students. For example, it can be difficult to show microscopic processes or the mechanisms of the functioning of internal systems in the human body through simple images. Animation allows you to clearly and in detail depict such processes. Therefore, animated videos are considered an effective didactic tool in medical education. Artificial intelligence technologies also provide automatic modeling capabilities when creating animations. For example, anatomical models or graphical representations of biological processes can be automatically generated using artificial intelligence algorithms. This simplifies the workflow of animators and reduces the time spent on creating animations.

In addition, artificial intelligence-based technologies also make it possible to analyze animated videos and evaluate their educational effectiveness. With the help of special software systems, it is possible to determine how students perceive animated videos, which parts they watch more often, or which topics they encounter difficulties in. Based on this information, it will be possible to improve educational materials. Another important factor in creating animation for medical educational videos is the clarity and simplicity of information. Educational materials should not be overloaded with overly complex graphic elements, as this can distract students from the main content. Therefore, it is also important to adhere to the principles of minimalism when creating animation. Artificial intelligence technologies also allow in this process to optimize graphic elements and reduce unnecessary details.

Summary

In conclusion, the use of 2D animation technologies in the creation of medical educational videos is important for increasing the efficiency of the educational process. The development of artificial intelligence technologies simplifies the process of creating animation and allows you to improve the quality of visual materials. With the help of such technologies, it will be possible to depict medical processes in a clear and understandable way. In the future, the further development of artificial intelligence and animation technologies will create new opportunities in the field of medical education. The use of modern multimedia tools will make it possible to organize the educational process more effectively, consolidate the knowledge of students and improve their professional training.

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