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THE ROLE OF ARTIFICIAL INTELLIGENCE IN MEDICINE

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Abstract: The medical field is constantly developing and adopting new technologies. In recent years, artificial intelligence (AI) has emerged as one of the most promising technologies with the potential to bring revolutionary changes in medicine. AI is used in various aspects of medicine, including diagnosis, treatment, drug development, and patient care. This article examines in detail the importance, advantages, problems, and prospects of AI in medicine.

Keywords:artificial intelligence, AI algorithms, surgical robots, drugs, medical data, medical images, code, interface.

AI applications in medicine:

Diagnosis: AI algorithms help to accurately and early diagnose diseases by analyzing large amounts of medical data, including medical images (X-rays, MRIs, CT scans), laboratory results, and electronic medical records. For example, AI can help radiologists and physicians detect cancer cells, diagnose heart disease, and diagnose eye diseases. AI is used to optimize treatment processes, develop personalized treatment plans, and improve surgical procedures. For example, AI can be used in oncology to plan radiation therapy, determine drug doses, and control surgical robots. Today, AI also plays an important role in drug development, accelerating the drug development process and increasing its efficiency. AI algorithms help to identify new drugs, evaluate their effectiveness, and optimize clinical trials. AI is also used to improve the quality of patient care, monitor their condition, and provide medical services in the home. For example, AI can be used to monitor patients' vital signs, remind them to take medication, and provide alerts in emergency situations.

Advantages of AI

• Accuracy and speed: AI algorithms have the ability to quickly and accurately analyze large amounts of data, which speeds up the diagnosis and treatment processes.

• Personalized medicine: AI helps to develop personalized treatment plans taking into account the individual characteristics of patients, which increases the effectiveness of treatment.

• Cost reduction: AI helps to reduce overall healthcare costs by increasing the efficiency of medical services and reducing recurring costs.

• Additional capabilities: AI creates additional capabilities for doctors and medical staff, reduces their workload and helps them focus on the most important tasks.

Problems and limitations

• Availability and quality of data: The effectiveness of AI algorithms depends on the availability and quality of data. Insufficient or poor quality data in the medical field can limit the effectiveness of AI.

• Ethical and legal issues: The use of SI in medicine raises ethical and legal issues, including data privacy, accountability, and decision-making processes.

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• Cost and Integration: SI technologies can be expensive to implement and integrate into the medical infrastructure. In addition, acceptance of SI technologies by medical personnel and willingness to use them is also important.

Future prospects

AI has the potential to make a big difference in the field of medicine. In the future, AI is expected to develop in the following directions:

• More accurate diagnosis: AI algorithms will diagnose diseases more accurately and earlier, including by analyzing genetic and molecular data.

• Personalized treatment: AI will develop more effective and personalized treatment plans, taking into account the individual characteristics of patients.

• Acceleration of drug development: AI will further accelerate the drug development process and identify new drugs.

• Improved patient care: AI will further improve the quality of patient care, monitor their condition, and expand the provision of medical services in the home.

Of course, we will provide detailed information on how surgical procedures are performed with the help of artificial intelligence (AI):

The role of artificial intelligence in surgery.

Artificial intelligence can be used in several areas in the field of surgery, such as surgical planning: AI helps in pre-operative planning. It analyzes the patient's medical images (MRI, CT, X-ray) and helps determine the best path for surgery. This allows the surgeon to plan the operation more accurately and efficiently. And in the current era, AI can be used to control surgical robots. Such robots can accurately repeat the movements of the surgeon and even move more precisely than them. AI helps robots perform autonomous functions, such as precisely cutting or suturing tissues. Currently, AI can assist the surgeon by analyzing data in real time during surgery. For example, it can help determine the risk of bleeding or identify important anatomical structures. In this regard, AI can also be used to improve postoperative care. It helps to monitor the patient's condition, early detection of complications and development of personalized treatment plans.

Advantages of AI-assisted surgery

• Accuracy and safety: AI helps to increase the accuracy and safety of surgical procedures. The precise movements of robots and real-time support from AI reduce the risk of complications.

• Minimally invasive: AI allows for minimally invasive surgical procedures. This reduces pain for the patient, shortens recovery time, and reduces the appearance of scars.

• Efficiency: AI helps to increase the efficiency of surgical procedures. By reducing surgical time, using resources more efficiently, and reducing the need for repeat surgeries.

• Better outcomes: AI helps to improve the outcomes of surgical procedures. By making more accurate diagnoses, developing personalized treatment plans, and reducing the risk of complications during surgery.

Types of surgical procedures using AI

AI can be used in various fields of surgery, including:

1. General surgery: hernia repair, gallbladder removal, and other abdominal surgeries.

2. Cardiac surgery: heart valve replacement, coronary artery bypass grafting, and other heart surgeries.

3. Neurosurgery: brain tumor removal, spinal surgery, and other nervous system surgeries.

4. Orthopedics: knee and hip replacements, bone fracture surgeries, and other musculoskeletal surgeries.

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5. Urology: prostate removal, kidney tumor removal, and other urogenital surgeries.

For example:

• Mazor Robotics: This is a robotic system for spinal surgery that helps the surgeon place screws accurately and reduce the risk during surgery. One of them is the Computer Motion AESOP 3000 Surgical Robot with HR Controller.

The Computer Motion AESOP 3000 Surgical Robot with HR Controller is a robotic surgical system that is designed to assist surgeons primarily in minimally invasive surgery (MIS) procedures. The main functions and features of this system are as follows:

Computer Motion AESOP 3000 Surgical Robot with HR Controller

Computer Motion AESOP 3000 Surgical Robot with HR Controller-Key Features:

1. Endoscopic Image Control: The main function of the AESOP (Automated Endoscopic System for Optimal Positioning) system is to hold and control the endoscope. The surgeon can obtain a clear and stable image of the surgical field with the help of this robotic arm.

2. Voice Control: The AESOP 3000 system has a voice control function. This allows the surgeon to change the position of the endoscope without using his hands, only through voice. The HR Controller (Human Robot Controller) provides additional control capabilities.

3. Accuracy and Stability: The robotic arm is more accurate and stable when holding the endoscope than a human hand. This allows the surgeon to focus fully on the surgical field.

4. Reduced Fatigue: During long operations, the surgeon's hands can become tired, which can affect accuracy. The AESOP 3000 robotic arm reduces this fatigue and provides a stable image during surgery.

5. Minimally invasive surgery: The AESOP 3000 is ideal for minimally invasive surgery, as it allows for small incisions and helps the surgeon see the surgical field clearly.

6. Surgeon focus: Since the robot is responsible for holding and controlling the endoscope, the surgeon can focus on the important aspects of the operation.

7. HR Controller: The HR Controller (Human Robot Controller) provides additional control capabilities. With this controller, the surgeon can control the robot's movements more precisely and conveniently.

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The advantages of this system include precision, stability, reduced fatigue, and the ability to focus the surgeon on the operation. The AESOP 3000 helps to make surgical procedures more efficient and safe.

Computer Motion AESOP 3000 Surgical Robot with HR Controller uses proprietary software to operate. Software for such complex systems is not written in HTML. It is usually written in high-level programming languages such as C++, Python, or similar, as they are convenient for working directly with the device, processing data in real time, and implementing control systems.

However, a simple interface for a surgical robot like the AESOP 3000 can be created using HTML, CSS, and JavaScript. This is just an interface and does not control the actual robot.

Below is a simple interface code using HTML:

index.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>AESOP 3000 Бошқарув Интерфейси</title>
    <link rel="stylesheet" href="style.css">
</head>
<body>
    <header>
        <h1>AESOP 3000 Surgical Robot - Бошқарув Панели</h1>
    </header>

    <main>
        <section id="control-panel">
            <h2>Бошқарув</h2>
            <div class="control-group">
                <label for="x-axis">X Ўқи:</label>
                <input type="range" id="x-axis" min="-100" max="100" value="0">
                <span id="x-value">0</span>
            </div>
            <div class="control-group">
                <label for="y-axis">Y Ўқи:</label>
                <input type="range" id="y-axis" min="-100" max="100" value="0">
                <span id="y-value">0</span>
            </div>
            <div class="control-group">
                <label for="z-axis">Z Ўқи:</label>
                <input type="range" id="z-axis" min="-100" max="100" value="0">
                <span id="z-value">0</span>
            </div>
            <div class="control-group">
                <label for="rotation">Айланиш:</label>
                <input type="range" id="rotation" min="-180" max="180" value="0">
```

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```
            <span id="rotation-value">0</span>
          </div>

          <button id="start-btn">Бошлаш</button>
          <button id="stop-btn">Тўхтатиш</button>
        </section>
        <section id="status-panel">
          <h2>Ҳолат</h2>
          <p><b>Ҳолат:</b> <span id="status">Тўхтатилган</span></p>
          <p><b>X Ўқи:</b> <span id="x-status">0</span></p>
          <p><b>Y Ўқи:</b> <span id="y-status">0</span></p>
          <p><b>Z Ўқи:</b> <span id="z-status">0</span></p>
          <p><b>Айланиш:</b> <span id="rotation-status">0</span></p>
        </section>
      </main>

      <footer>
        <p>&copy; 2024 AESOP 3000 Бошқарув Интерфейси</p>
      </footer>
      <script src="script.js"></script>
    </body>
    </html>
```

This code creates a simple interface where the surgeon can use sliders to control the robot's movements. However, it does not control an actual robot.

Note: You will need specialized software and hardware to control a real surgical robot.

Conclusion: Artificial intelligence has the potential to revolutionize the medical field. AI can help improve the accuracy, safety, and efficiency of surgical procedures, and can be used in a variety of areas, including diagnosis, treatment, drug development, and patient care, improving the efficiency of medical services and helping to achieve better outcomes for patients. Despite the challenges and limitations, the future of AI in medicine is very promising. The development of AI technologies and their integration into the medical infrastructure can make a huge difference in the medical field and improve the lives of patients. Therefore, this technology is expected to be widely used in medicine.

REFERENCES:

1. Абушкин Дмитрий Борисович. Педагогический STEM-парк МГПУ / Д.Б. Абушкин // Информатика и образование. ИНФО. - 2017. - № 10. - С. 8-10.
2. Алексеевский, П.И. Робототехническая реализация модельной практикоориентированной задачи об оптимальной беспилотной транспортировке грузов / П.И. Алексеевский, О.В. Аксенова, В.Ю. Бодряков // Информатика и образование. ИНФО. - 2018. - № 8. - С. 51-60.
3. Бельков, Д.М. Задания областного открытого сказочного турнира по робототехнике / Д.М. Бельков, М.Е. Козловских, И.Н. Слинкина // Информатика в школе. - 2019. - № 3. - С. 32-39.

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4. Бельков, Д.М. Задания турнира по робототехнике "Автошкола" / Д.М. Бельков, М.Е. Козловских, И.Н. Слинкина // Информатика в школе. - 2019. - № 8. - С. 25-35.
5. Бешенков, Сергей Александрович. Использование визуального программирования и виртуальной среды при изучении элементов робототехники на уроках технологии и информатики / С.А. Бешенков, М.И. Шутикова, В.Б. Лабутин // Информатика и образование. ИНФО. - 2018. - № 5. - С. 20-22.
6. Бешенков, Сергей Александрович. Методика организации внеурочной деятельности обучающихся V-IX классов с использованием робототехнического оборудования и сред программирования / С.А. Бешенков, М.И. Шутикова, В.И. Филиппов // Информатика в школе. - 2019. - № 7. - С. 17-22.
7. Бешенков, Сергей Александрович. На пути к конвергенции общеобразовательных курсов информатики и технологии / С.А. Бешенков [и др.] // Информатика и образование. ИНФО. - 2016. - № 6. - С. 32-35.
8. Акинин, М. В. Нейросетевые системы искусственного интеллекта в задачах обработки изображений / М.В. Акинин, М.Б. Никифоров, А.И. Таганов. - М.: РиС, 2016. - 152 с.9.
9. Акинин, М.В. Нейросетевые системы искусственного интеллекта в задачах обработки изображений / М.В. Акинин, М.Б. Никифоров, А.И. Таганов. - М.: ГЛТ , 2016. - 152 с.10.
10. Астахова, И. Системы искусственного интеллекта Практический курс: Учебное пособие / И. Астахова. - М.: Бином. Лаборатория знаний, 2009. - 292 с.
11. Болотова, Л.С. Системы искусственного интеллекта: модели и технологии, основанные на знаниях: Учебник / Л.С. Болотова. - М.: Финансы и статистика, 2012. - 664 с.