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Artificial intelligence elements application in applied problems solving

Textbook

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Содержание

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Introduction

Various subfields of AI research are centered around specific goals and the use of specific tools. Traditional AI research goals include reasoning, knowledge representation, planning, learning, natural language processing, perception. General intelligence (the ability to solve arbitrary tasks) is one of the long-term goals in this area. To solve these problems, AI researchers have adapted and integrated a wide range of problem-solving techniques, including search and mathematical optimization, formal logic, artificial neural networks, and methods based on statistics, probability, and economics. AI also draws on computer science, psychology, linguistics, philosophy, and many other fields. There is no single AI system that solves all problems or solves them effectively.

A key advantage of AI is its ability to solve problems in the real world. But, there are also many potential problems. An important task in the field of AI is to determine which of the possible problems are most likely to be solved with the help of AI, and which require different methods. Some of the main areas that contribute to solving complex AI problems are theory, engineering, and mathematics. While most AI researchers believe that AI will play an important role in future economic and technological development, there are many skeptics. Their skepticism includes concerns about the possible misuse of AI, concerns about its negative impact, and uncertainty about AI's ability to solve real problems. However, this dispute is not the only one in this area. Many AI researchers believe that it is impossible to predict which tasks will be solved by AI in the future. The reasons for this are that while there are many important problems to be solved in the real world, there is no single mechanism or technology that solves them all.

What is AI?

At a high level, AI is the concept of computing systems that work with greater and greater complexity to understand, predict, and solve problems in the real world. This definition of AI is a definition of intelligence and is not limited to computer systems.

AI is a field of research that focuses on creating intelligent machines, devices, systems, algorithms, and so on. Computers are at the heart of AI, and an intelligent machine is designed to be able to efficiently solve problems in the real world.

To solve such problems, you can use many different algorithms and intelligent systems. A machine can be intelligent if it can perform intelligent tasks – this concept is different from an AI system, which has a certain set of rules, including the ability to learn, learn to perform intelligent tasks, and also have a long-term memory. All kinds of algorithms can be used to solve intellectual problems – learn how to behave, detect patterns and distinguish the real world from its simulations.

AI researchers believe that all intelligent systems can be improved by improving their ability to perform intelligent tasks – this is called algorithmic intelligence, or the ability of a machine to learn. However, there is some controversy in this area over the definition of intelligent machines, and the robustness and reliability of existing methods for designing and improving intelligent systems.

AI evolution

The path from a specific problem to an AI solution is called the «machine learning» process. Machine learning methods are a combination of an algorithm with a set of parameters and data, as well as a set of parameters and a set of data Examples of machine learning algorithms include machine learning in the form of neural networks that can identify patterns in the real world and classification systems that can identify different objects in a given set of images.

One of the important features of AI is that the quality of predictions can be improved by changing the parameters (called «features») and the data set (in the case of classification algorithms). For example, in the case of classification algorithms, if the dataset is based on the identification of different colors, then when the dataset changes, the predictions will change and can better predict the colors. This feature of machine learning plays a key role in understanding the accuracy of AI algorithms.

AI is a dynamic and rapidly evolving area of research with a wide range of different applications. There are several interpretations of AI. AI is not a single technology, but a whole range of technologies, in particular, machine learning, artificial neural networks, large-scale distributed systems, and so on. In particular, machine learning and deep learning are two different terms used in different disciplines. Machine learning is a method of applying machine learning algorithms to a machine that requires any kind of input, such as a car that will drive itself.

AI concept

AI is commonly used to describe technology that uses information processing and information management principles such as computing, storing, routing, and processing input signals or information to make intelligent predictions or decisions – this is called artificial intelligence. AI has different definitions based on different fields of study and different applications.

AI systems can be intelligent in three different ways:

1. Learning: AI systems can learn to recognize patterns in the real world and classify them. For example, artificial intelligence systems can recognize patterns in images and classify them according to their features.

2. Intelligence: AI systems can be intelligent if they understand the processes involved in decision making or in the interaction between a human and an intelligent system.

3. Reasoning: AI systems can also reason using various inputs – for example, AI systems can understand rules that make inferences. For example, AI systems can understand how a person learns based on certain logic and analyze that logic to predict the best learning strategy.

Advanced machine learning techniques will be used to improve AI systems and make better decisions. For example, AI systems can learn logical structure through concepts like perception, decision, action, etc. They can then start learning to act on logic. In fact, AI systems can learn both from a set of real data and from rules that have been established by reinforcing previous decisions – this is called machine learning.

This process takes place on a large scale in computers. For example, it is possible to predict a person's behavior based on their observed behavior and their predicted behavior. In another sense, machine learning is often referred to as the process of combining past events with data from the current scenario and predicting the future of the current situation. From this point of view, machine learning is a task that is performed in the current situation.

On the other hand, in terms of vision, AI systems can make decisions. AI systems can determine the correct answers based on various inputs and understand the reasons for a decision made by the system. In this context, AI systems basically learn to behave based on their experiences.

The term AI is widely known, but many people do not understand the concept and various applications of AI. The reason people get confused about AI is because AI is defined based on different areas of research and AI is used in different applications – and they are also called different technologies.

Some AI applications are as simple as using a machine learning algorithm to classify images. In another sense, it may also be the process of discovering new patterns in data and making decisions based on those patterns. For example, a computer may make decisions based on images that are classified into such categories.

There are two approaches that can be used to determine the quality of an AI system. One approach is a general approach and does not necessarily make an AI system a great solution. The second approach is called the concrete approach and aims to make the AI system a great solution. In a general approach, the goal is to have AI systems that can handle limited tasks. A specific approach is designed to solve one specific problem.

Each approach has its strengths and weaknesses. For example, a specific approach is better suited for making decisions based on specific requirements. For example, it is better to perform a specific task. The general approach is usually very effective for decision making, but not always effective for solving a specific problem. For example, a general approach can be effective for improving an existing model.

AI Applications and Capabilities

Artificial intelligence can be used to analyze information and make decisions based on data. Through these solutions, businesses can gain insights to help them make better decisions. This means that AI can provide feedback in a variety of ways, from simple ideas such as optimizing a marketing approach to complex systems such as a decision within the context of a decision. This will help the business optimize the solution and make it better, but also simpler.

As AI technology advances, new applications emerge. For example, artificial intelligence technologies can help improve healthcare – for example, to detect cancer in patients. On the other hand, AI can also help us solve business and technical problems by developing more efficient processes.

Machine learning algorithms, as they are more commonly known, can take data in the form of text, images, audio, video, or measurements, process it, and determine a set of rules. Based on the set of rules that the machine learns, it can make decisions and perform actions based on that decision. This allows AI technologies to improve systems, products, processes and information. AI applications are more commonly referred to as a class of applications, but they can be used for different purposes.

Simulation intelligence

The general problem of modeling (or creating) intelligence is divided into subtasks. They consist of certain traits or capabilities that researchers expect from an intelligent system. The traits described below have attracted the most attention in the past, although this list is far from exhaustive.

Design (construction) of intelligence. Imitation of intelligence. Show intelligence.

The first concerns the availability of intelligent systems capable of simulating the behavior observed in a wide range of situations and conditions. It is often assumed that artificial intelligence systems will be built to replicate many of the features displayed by real intelligence, with the intention of eventually showing that real intelligence is possible.

The demo part is dedicated to demonstrating real intelligence. This suggests that true intelligent systems exist.

We have specific examples of real intelligent systems with large datasets. Such systems run useful algorithms in real situations. Algorithms do not necessarily mimic the behavior observed in the real world; however, they were designed to achieve specific goals.

Applications of intelligence include the recognition of events and actions that are not explicitly defined by current human programming. This is a characteristic of artificial intelligence systems, which today is called predictive intelligence.

Detection of types of objects and objects. Identification of various objects or details. Recognition of information associated with these objects. Create object or information representations. Interpretation of information. Analysis of information represented by objects. Establishing relationships between objects. These are examples of intelligence in computer science. Examples include image processing algorithms, networks, knowledge bases, virtual computing environments (supercomputers), and artificial neural networks (artificial neurons).

In the field of computer science, artificial intelligence and artificial neural networks are considered artificial intelligence systems. Thus, artificial intelligence is defined as «the development of intelligent systems that can simulate complex intelligence that can have human-like computing power.»

Building intelligent systems requires a proper understanding of intelligence. This means developing smarter systems with the right understanding of intelligence. This includes the development of intelligent systems that can mimic cognitive processes, human perception, human thinking.

Intelligence in Cognitive Systems Design and build intelligent systems capable of simulating complex cognitive behavior. These systems must be extremely complex and reliable. More complex cognitive behavior requires more powerful computational and computational resources. Understanding and improvement of computational processes and mechanisms of intelligence. There are three aspects that are involved in understanding and improving the computational processes and mechanisms of intelligent systems: cognitive systems, cognitive science, and cognitive psychology.

The study of intelligent systems that mimic complex cognitive behavior

Research and development of intelligent systems that mimic complex cognitive behavior is a scientific research aimed at developing more intelligent systems. Such systems are needed to simulate complex cognitive behavior. These systems must be extremely intelligent and powerful.

An important point in research and development in the field of artificial intelligence is that we must develop artificial intelligence that mimics complex cognitive behavior. More complex cognitive behavior requires more powerful computational and computational resources. Therefore, in order for scientists and engineers to create intelligent systems, we need to spend more computing resources.

This leads to the question: how much computing power is required to create more intelligent systems?

First, we need to understand and define intelligence. We define intelligence as an intelligent system that can act as an intelligent system. Thus, the intelligent system mimics complex cognitive behavior. The system can simulate various types of cognitive behavior. However, how complex this cognitive behavior is is a matter of debate. This is a question that requires an answer from more complex cognitive models of behavior. In addition, we need to decide how we can build smarter systems.

Second, we need to understand and define learning. Learning is a learning process followed by the evolution of an intelligent system. Learning is an action that is necessary to receive a reward. This is what people do. Similarly, intelligent systems learn to perform more complex cognitive activities. Intelligent systems learn more complex cognitive behaviors in their environment. When used in different environments, they learn to perform more complex cognitive activities.

Third, we must create systems that mimic certain complex cognitive behaviors. There are two types of systems that are used to simulate complex cognitive behavior. The first is called evolutionary computation. Evolutionary computing is a mechanism for constructing more complex cognitive models of behavior. In a sense, evolution is a mechanism for creating smarter cognitive behavior. In addition, evolution is a mechanism for building more complex cognitive models of behavior. It is also used in machine learning. In other words, it is a mechanism that allows intelligent systems to learn and perform more complex cognitive actions. Another mechanism that mimics complex cognitive behavior is modeling. Modeling is a mechanism for modeling cognitive behavior.

This knowledge is needed by scientists and engineers. This knowledge is important for scientists and engineers. They need to know what is required in research and development in the field of artificial intelligence.

All these steps require more computing resources to create more intelligent systems. More complex cognitive behavior requires more powerful computational and computational resources.

There are five types of artificial intelligence systems. First, there are software systems. Software systems are artificial intelligence systems that are simulated on computers. The second is hardware systems. These are artificial intelligence systems that are simulated on computers and ultimately create and mimic the physical behavior of real objects. The third one is convergent algorithms. Convergent algorithms are algorithms that are trained and imitated by machines. The fourth is cause-and-effect algorithms. These are algorithms that mimic physical behavior. It is the most important machine learning algorithm. The last type is evolutionary algorithms. Evolutionary algorithms are systems that mimic the behavior of biological animals and plants.

Knowledge Representation

Knowledge representation and knowledge engineering enable AI programs to intelligently answer questions and make inferences about real-world facts that previously required humans.

The next major breakthrough in knowledge technology, which will completely change the rules of the game for every company in existence today, will be knowledge engineering, especially in terms of knowledge representation and knowledge engineering.

We need to be realistic about the impact it will have on much of the work people do. We're still in the infancy of knowledge engineering and AI just didn't have the time or resources to improve it to the point where we could use it to solve real world problems.

Whether or not AI is further developed, knowledge engineering is an area where we can benefit now.

To accelerate the development of this field, technology companies must be willing to take risks and actively engage with experts on topics related to knowledge engineering. By itself, knowledge engineering already shows great potential to improve many existing AI applications.

Knowledge representation and reasoning is a field of artificial intelligence (AI) designed to represent information about the world in a form that a computer system can use to solve complex problems, such as diagnosing a health condition or having a natural language dialogue. Applications of AI can be found in many areas, but primarily in data processing areas such as processing signals from sensors and processing search results and documents in big data processing.

Data mining has also become a field that has been developed with the advent of big data. Data mining is a field related to the creation of tools that collect, analyze and organize information into simplified representations. Once information is collected, it can be used to make predictions in finance, medicine, chemistry, and many other fields.

Graph algorithms, which are data mining tools, can be used to represent data in a computer system. These are specialized tools, often based on neural networks, that are well suited for data mining. Graphical algorithms are commonly used to model data in the form of simple charts or maps, such as data graphs, to show some information. Graph algorithms allow you to represent data as a sequence of nodes, each node represents the data and the connections between these nodes.

Neural networks are a special type of neural network used to perform artificial intelligence, graph algorithms, and machine learning. Neural networks are a type of machine learning that has been actively researched for decades. They are very effective in basic computing and artificial intelligence applications, especially in teaching. Neural networks are divided into different types such as long-term, short-term, random, linear, and vector.

The benefits of neural networks are well known. Neural networks can be used to solve many problems, they are flexible and generate results in a timely manner. They are used to solve various problems, including pattern recognition, anomaly detection, and machine learning. A neural network is simply a collection of nodes and connections that act as inputs and outputs to help neural networks perform complex tasks and generate desired results.

Modern deep learning architectures that implement neural networks are extremely powerful and efficient and can be used to efficiently solve data problems that would be difficult to solve with traditional methods. Machine learning algorithms for neural networks are specifically designed to mimic aspects of information processing in the human brain, allowing neural networks to solve complex problems.

Artificial intelligence systems are not limited to data processing tasks and can be used to provide a better understanding of the world around us and improve certain aspects of human behavior. AI is moving beyond data processing and is starting to use machine learning in the real world.

In the business world, AI systems can help increase productivity and reduce unnecessary overhead in areas such as supply chain management and supply chain optimization, manufacturing, inventory, customer relationship management and quality control. AI systems can be used to create new products, discover new ideas and patterns, and improve the inventory management process in a manufacturing or sales company.

In healthcare, AI systems can be used to analyze vast amounts of data from medical or diagnostic images to identify specific diseases and tissue changes.

By law, AI systems can provide decision support for litigation preparation, objectivity, facts, and other legal information. They can identify potential biases in evidence and present data to the courts.

Finally, AI systems can help industries with manufacturing and logistics. AI systems can help reduce factory inventory or use autonomous vehicles and machines to reduce the time and effort required to deliver goods.

Current applications of AI include a range of problems in information processing, computer vision, speech recognition, text recognition, image processing, video processing, audio processing, machine learning. Many of the underlying machine learning algorithms have been developed over decades, and now many systems have reached their limits.

AI is starting to reach the limit of the technology's performance on certain tasks and moving into new and more complex areas.

Due to the variety of applications, it will be several years before AI systems reach their full potential. In the business world, AI systems can increase a company's efficiency and speed, and reduce or eliminate unnecessary costs by analyzing data and developing new processes to create new products.

The AI system can use the information that has been provided to the system to determine whether it should make a prediction about the outcome of a particular decision. For example, an AI system can understand that a certain decision has been made based on the information provided by the user. It can then determine if the prediction provided by the user is accurate. If the prediction an AI system makes is accurate, it can reduce processing time and improve decision accuracy.

Logico-linguistic modeling

Logical-linguistic modeling is a six-step method developed primarily for building knowledge-based systems, but it is also used in manual decision support systems and systems for analyzing and delivering information. It uses knowledge-based structured models such as graphs, flowcharts, networks, and feedback loops to describe the flow of information in complex systems such as social networks and business networks. These models can then be used to evaluate the correctness of the communication and obtain the expected results. Applications range from information systems and business intelligence to knowledge creation and management, business process optimization and knowledge management systems. However, the process begins with the definition of a specific subject matter or subject area and continues with the formulation of an appropriate logical model for it. This step is not easy because different knowledge-based models describe different aspects of the problem. A logical-linguistic model is built as a set of the most relevant assumptions made in a given field of knowledge. The logical-linguistic model is organized as a natural hierarchy, starting with the simplest hypothesis and ending with the strongest hypothesis. In a strict logical framework, the assumption of a first level of abstraction means that the system was designed without introducing any secondary assumptions, so it has high-level consistency and relatively low-level constraints. The second level of abstraction assumption means that the system was designed without any secondary assumptions. The third level of abstraction assumption means that the system was designed without any secondary assumptions. At this final stage, most of the restrictions in the system have been removed, so there is a minimal chance that the system will completely fail. Each level of abstraction implies that certain restrictions have been removed or reduced. Restrictions imposed by restrictions at the initial level of abstraction usually reduce the range of possibilities available to the system. If any failure modes appear at the second level of abstraction, the third level is usually sufficient to eliminate them. Logic modeling begins with the definition of a specific subject matter or subject area and continues with the formulation of an appropriate logical model for it. The results of the modeling process show which constraints can be removed or reduced, and which constraints are explicitly implied in the logical model. If all restrictions are removed or reduced, the system has a very high degree of complexity. However, when the initial guess has been changed, the level of difficulty is usually reduced. The time required to build a logical model is often inversely proportional to the number of constraints included in it. When there are too many constraints, a reasonable logical model must be built to show the efficiency of the system. However, if there are no restrictions, then the system can be built very quickly. The results of the modeling process show which constraints can be removed or reduced, and which constraints are explicitly implied in the logical model. As noted earlier, the process begins with the definition of a specific subject problem or subject area, a system for optimizing business processes and knowledge management. The process then proceeds to formulate an appropriate logical model for it. In business processes, the requirements and constraints of the system are detailed in the business requirements document. Similarly, the constraints placed on the system by business processes are described in the business process document. Thus, the problem and constraints are specified and defined together.

Most people believe that a logical model should also describe the system. However, this is often not the case. The logical model of a particular system can describe the logical relationships between constraints, but cannot describe or explain the constraints themselves. There are many ways to view the logical model. However, logical models tend to give a complete picture of the system both logically and structurally. Thus, the logical model of the system is not necessarily considered complete. The logical model describes the structural representation of the system, but provides a structural representation only for certain logical constraints. Examples of structural modeling methods include the topological method, structural decomposition, and structural decomposition and reconfiguration methods. Although structure is expressed by a structure diagram, this does not necessarily mean that the structure includes all constraints. Another type of structural modeling is the decomposition of a structure into layers of structural components. A framework can represent a logical system, business processes, and logical constraints, but it can also be expressed as constraints defined in a business process and then assigned to a logical component and logical constraints. Decomposition may be performed as part of a business process and may require the removal or modification of some or all of the constraints in the logical model. In addition, it may be necessary to modify the logical model by appropriate structural decomposition to include new structural elements. Alternatively, structural decomposition may be required to transform the logical structure into new structural elements. Decomposition and structural decomposition are processes that create new structural elements and pass them to logical constraints, but these new elements can only have the same logical constraints in the structural decomposition as the passed elements. Decomposition occurs for logical constraints that are considered complete, or for constraints whose logical representation is defined in the logical model. The process of adding constraints to a structural element requires structural decomposition, as this is where the new element is created and added. The topological method allows you to remove constraints in a structural element without changing the logical model, while structural decomposition and reconfiguration methods usually require structural decomposition as an explicit step before changing the logic. The topological method may be the most general type of structural decomposition and has the advantage of not requiring additional structural decomposition steps. For example, decomposition can be carried out in a business process component. There may be other elements in this business process that can also be included as building blocks. The decomposition can take place in a logical model or, depending on the current logical model, in a structural component, a business process component, or a topological component. If the structural decomposition is done by a topological method, this can remove more restrictions. The process of structural decomposition may include several steps, such as extracting a structural element based on a logical component representing a logical constraint. For example, a logical model representing a structure with constraints expressed as logical constraints may require a topological decomposition before the logical component structure can be modeled.

In this section, the structure of a logical component is considered as a topological decomposition of the logical structure. Topological decomposition and structural decomposition and reconfiguration methods can be used to decompose logical components in this logical structure. If a structural element and a logical component have different logical constraints, then the logical component will be created and transferred to the logical constraints during structural decomposition, but the logical element will not be placed in the logical constraints.

A logical component cannot be directly placed in a structure as a structural element. A structural element is either created or added to the topological structure from logical constraints in the topological structure. Topological decomposition and structural decomposition and reconfiguration methods can be used to create structural elements in a topological structure. The logical elements of the topological structure are placed in the topological structure by imposing structural constraints on the topological structure.

Semantic heterogeneity

Semantic heterogeneity occurs when a database schema or datasets for the same domain are developed by independent parties, resulting in differences in the meaning and interpretation of data values. To distinguish between databases and data sets with different purposes and authorship structures, metadata in different data stores is sometimes tagged with metadata tags that describe the query and collection point. This is called semantic heterogeneity.

For example, database schemas can be designed for different applications with different semantic structures, but with consistency. On the other hand, datasets and resources can be retrieved in different ways and represent different information resources. Data analytics is the process of reducing information to its most relevant essence, evaluating the relevance and interpreting various data objects and information points based on their relationship to other data.

Semantic heterogeneity plays a key role in many cases, for example:

Effective knowledge management, managing dispersed, complex and ever-changing knowledge assets.

Creation of human-centric infographics, web applications or audiovisual content in knowledge management systems.

Independently developed knowledge databases and multimedia environments (eg websites, web applications) are already used by many professionals. And now the rapidly growing Internet of Things (IoT) market is increasingly focused on improving embedded devices such as smart devices and sensors, which are sources of knowledge as well as information. And while self-organizing and self-tuning systems are increasingly found in dynamic industrial systems, the more diverse approaches of new generations of experts around the world are inspiring the creation of completely new concepts in knowledge management. This also manifests itself in the development of application-specific database approaches that are specific to each area or project.

Given the different levels of knowledge accumulation in different areas, we do not expect application-specific databases in knowledge management systems to be used for all kinds of data. Just imagine if in a data-driven knowledge management system you could only find a database or query that fits the application. This may seem in some cases too simple, and sometimes too naive. When dealing with multiple data systems for knowledge management, we expect databases or query engines of different levels of complexity to work together. This may have led to the creation of multiple databases and query engines, resulting in semantic heterogeneity.

Nowadays, as more and more databases are being developed from specific databases on the same topic, it may be necessary to define new datasets (samples) for each database or database query. Some solutions exist, such as classifying metadata fields in databases and databases for different collections. But the challenge is to use existing databases as often as possible, not create new databases for different purposes.

Another good example of semantic heterogeneity is the multitude of software platforms and data processing engines used for web services. Each platform and database has its own way of displaying data. It is important not to use different data sources for different web applications, but to find a way to reconcile different data sources with different web applications. While data sources, data management, applications and systems are heterogeneous, we need a database that provides all the data we need when different applications or systems are required. And as new platforms and databases are developed, semantic heterogeneity can be expected to remain a key feature of data analysis systems.

Data Discovery

The complexity of various databases and data engines is often hidden from the end user. In many cases, if a data user is not familiar with data sources, data management systems, and data analysis, they are likely to be unable to find the data they need. Data discovery tools used by data scientists in an enterprise provide a more consistent view of data across applications and data sources and are used to discover data sources and data management systems. Therefore, data discovery tools designed to discover data sources and data management systems must be able to integrate with all systems used to create data. In addition, any tool should be able to link the data discovery tool with other data analysis tools or data management systems.

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