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SUCH A NEURON HAS A ROLE IN THE DEVELOPMENT OF CEREBRAL PALSY.

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Annotation. *The article explains in detail the importance of recurrent neural networks in various areas of society, their principles and types, how they are used in natural language processing, speech recognition, financial forecasting, the automotive industry, healthcare, video analysis, and many other areas. The prospects for improving existing technologies and creating new opportunities using RNNs are considered.*

Key words: *Recurrent neural networks, natural language processing, speech recognition, financial forecasting, automotive, healthcare, video analytics, technology.*

Аннотация. *В статье подробно объясняется значение рекуррентных нейронных сетей в различных областях общества, их принципы и типы, как они используются в обработке естественного языка, распознавании речи, финансовом прогнозировании, автомобильной промышленности, здравоохранении, видеоанализе и многих других областях. Рассматриваются перспективы совершенствования существующих технологий и создания новых возможностей с использованием RNN.*

Ключевые слова: *Рекуррентные нейронные сети, обработка естественного языка, распознавание речи, финансовое прогнозирование, автомобилестроение, здравоохранение, видео аналитика, технологии.*

Recurrent Neural Networks (RNNs) are one of the most important and widely used technologies in the field of artificial intelligence and machine learning. Recurrent neural networks (RNNs) are important technologies in the fields of artificial intelligence and machine learning, and are very effective in processing time series data

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and sequences. In their principle of operation, data from previous time periods affects the future state of the network, which helps to better learn time-dependent properties. Let's take a closer look at the principle of operation, types, and areas of application of RNNs in society. Their role in society is very broad and manifests itself in various fields. Below are some of the main roles of recurrent neural networks in society.

The basic principle of recurrent neural networks is that they are able to analyze data that changes sequentially over time using their "memory". Typically, each point in an RNN represents a specific time, and the network "remembers" the data from previous time points.

This is the basic form of a simple RNN network, which uses memory mechanisms to process the input and provide the output. However, it faces difficulties with long-term memory issues.

LSTM is an advanced form of RNNs, designed to store long-term memories. LSTM has special memory cells and memory mechanisms, which are more effective in learning long-term relationships of data.

GRU is similar to LSTM, but it is simpler and faster. GRU has two main levels for memory storage and forgetting processes, which make the network efficient.

Recurrent neural networks perform various tasks that benefit society in many areas.

RNNs are widely used in the field of NLP. They are used in text analysis, translation, message correction, text information extraction, and word understanding in chatbots. RNNs have properties that allow them to understand sequences of letters and words in particular. RNNs are used in Google Translate and other translation systems to translate text.

In customer service, for example, virtual assistants from Amazon and other companies.

RNNs are used to analyze speech and convert speech to text. For example, personal assistants such as Apple Siri and Google Assistant use RNNs to recognize and execute voice commands from the user. Speech recognition systems are time-series data, in which the sequence of words is important.

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RNNs are used, especially in economics and financial analysis, to forecast stock prices, exchange rates, and other financial indicators. They help predict future changes based on historical data.

Recurrent neural networks are used in the automotive industry, especially in automatic control systems. In self-driving cars, they are used to monitor the environment and predict the vehicle's behavior based on road hazards. For example, Tesla and other car manufacturers use this technology in their self-driving cars.

In healthcare, RNNs are used to analyze genetic data and historical medical data of patients. For example, they are used to predict diseases, monitor the health status of patients, and develop appropriate treatment plans. RNNs are also used to analyze radiological images and create prognoses for patients.

RNNs are used to analyze videos, track motion, and identify sequences of events. For example, RNNs are used to identify a specific situation or person in a video, or in facial recognition technologies in security systems.

RNNs are also used in the study and creation of music composition. They can be effective in creating new musical works, creating melodies for music, and reproducing popular songs. For example, projects such as Google Magenta use RNNs to artificially create music.

RNNs and the technologies that lead to their development are expected to become more effective and applicable to more areas in the future.

Integration with Generative Networks, such as GANs (Generative Adversarial Networks), can increase the efficiency of RNNs.

New technologies such as Transformer Networks can replace or improve RNNs in some cases, as they are more efficient at working with large amounts of data.

Recurrent neural networks play an important role in natural language processing. They are widely used in text analysis, translation, speech recognition, automatic data collection and inference. For example, automatic translation systems, chatbots and personal assistants have been developed using RNNs.

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In medicine, RNNs are used to predict diseases, analyze genetic data, process medical images and develop individual treatment plans for patients. They help predict the progression of the disease based on the historical data of patients.

RNNs are used in self-driving cars, for example, for predicting traffic, detecting problems, and ensuring safety. They help to analyze data from many sensors and determine the vehicle's behavior and environment.

In financial analysis, RNNs help to predict stock prices, exchange rates, credit ratings, and other financial risks. They allow you to predict future changes by analyzing past financial data.

Recurrent neural networks are also used in data analysis on social networks. They help in areas such as studying user behavior, analyzing opinions and messages, and creating targeted advertising. They are also used to automatically recommend video and audio content.

RNNs help to create new works by learning the structure of music. They are used to learn the rhythm and melody of music and create new and original compositions.

RNNs are used to optimize the behavior of robots and improve their interaction with their environment. They help robots learn the knowledge needed to perform multi-step tasks.

Climate change and ecology: RNNs are also useful in analyzing climate change, ecological systems, and changes in nature. They are used to model climate and predict global warming.

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