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The concept of Artificial Intelligence and its interconnection with cloud technologies

Научный руководитель – Ильяшенко Оксана Юрьевна

Лукьянченко Екатерина Леонидовна
Student (master)
Санкт-Петербургский политехнический университет Петра Великого, Инженерно-экономический институт, Информационные системы в экономике и менеджменте, Санкт-Петербург, Россия
E-mail: lukyanchenko@mail.ru

The relevance of the study is due to the high demand for the use of both AI and cloud technologies. Cloud technology is a disruptive technology used by companies in all industries; while the latest developments in the field of AI are used in the work of the majority of successful companies. Despite concerns about the ethical use and privacy of data, Artificial Intelligence and related Machine and Deep Learning find applications in many areas of human activity [1].

Thus, Oracle predicts that by 2025, up to 80% of companies' IT budgets will be invested in cloud technologies. IDC believes that 54% of IT infrastructure will be migrated to the cloud by 2021. Companies are making a choice in favor of cloud technologies considering the following advantages of their use:

1) Flexibility of customization and use. The company can choose the necessary services, their quantity and quality, the time of use, as well as scale the infrastructure on demand.
2) Payment for actually used resources. The likelihood of equipment downtime is excluded, since the provider accepts payment only for actually spent resources or time of use. Thus, the capital costs of the company become variable.
3) A wide range of services provided. In addition to computing power and data storage, cloud service providers are ready to provide services for Artificial Intelligence, Internet of Things, Machine Learning, services for developers and for effective business operation, and many others.
4) Guaranteed availability of services. Cloud market leaders such as Amazon, Microsoft, and Google provide customers with SLAs that guarantee 99.9999% availability of services. In the event of unavailability of services, the supplier is financially liable to the client.

AI is often applied with the use of cloud technologies. The relationship between these technologies can be considered from several positions [2]:

- Provision of a set of services with built-in AI by cloud service providers. This category can be divided into two subgroups:

1) Provision of resources on the PaaS model. The client is provided with a platform with the implementation of Machine Learning and the developed concept of AI using cloud infrastructure. An example of using resources for this model is IBM Watson and Google Cloud AI.
2) Provision of resources on the SaaS model. In this case, the vendor provides a ready-made software solution deployed in the cloud infrastructure and client is using built-in AI to solve a specific business problem. For example, Amazon Lex or Amazon Polly are SaaS solutions.

- The use of cloud services for the implementation of artificial intelligence. In this case, the company uses traditional services of a cloud service provider, most often cloud data storage, and AI is used external - it receives data from the cloud storage and places the processed data in the cloud storage.

These use models have already proven themselves to be effective, easy to implement and evolving solutions. The applications for cloud-based AI are vast and include finance, healthcare, manufacturing, insurance, marketing, automotive, military and other fields [3].

According to the Gartner Magic Quadrant, Amazon, Microsoft and Google are invariably the leaders in the cloud platform market (IaaS + PaaS) [5]. Each of these companies understands the importance and relevance of AI, therefore, defines the use of intelligent technologies as the most important vector of development.

These companies offer similar AI services in both SaaS and PaaS. Services in the SaaS segment are usually divided into several groups: natural language processing, speech recognition, image recognition. For example, in natural language processing, Amazon offers Lex for creating a chatbot that can communicate, and Comprehend for processing unstructured text information and highlighting key phrases and basic text topics. Microsoft Azure offers language processing services such as the Azure Bot Service for building chat bots, Speech Services and Language Understanding for use in applications that recognize voice messages, convert speech to text, or vice versa. Google Cloud Platform and IBM Cloud also have natural language processing services.

It is worth noting that in addition to the listed ways of using the interaction of cloud technologies and AI, cloud providers themselves can use AI to improve the efficiency of their activities. For example, a provider can use algorithms to detect a common cloud service usage pattern among the majority of users and offer cost savings, increased service efficiencies, and a customized service plan. Several providers are already using AI to optimize their data center energy consumption.

The main essence behind the interaction of cloud technologies and AI is that cloud providers add such services to their solutions that allow the use of intelligence to solve cognitive tasks: analysis, language processing, computer vision [4]. We can confidently talk about the emergence of such a segment as AIaaS (AI as a Service) on the cloud services market, and its further development, since AI requires large amounts of structured and unstructured data and computing power that the cloud can provide. Providers will continue to expand the AIaaS segment further due to the high demand and the rapid ubiquitous use of AI.

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