



Modeling - from Virtualization Technologies to Artificial Intelligence



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Abstract

Through the experience gained, decision-making in difficult situations, forecasting risks in advance, and suggesting optimal solutions, a base of useful advice is created and perfected, which makes the work process in any field more convincing and successful. It is undeniable that as time goes by, based on the analysis of correct or incorrect answers to various requests and cases, artificial intelligence will become “smarter” than it is today and is smarter today than it would have been before, even if technological capabilities had allowed it.

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1 Introduction

The development of technological processes has significantly improved the availability of software tools needed to create services that require the technical or other characteristics of artificial intelligence to work successfully. Artificial intelligence has the potential to fundamentally change and simplify traditional approaches to managing virtually every work or business process. It cannot be ignored that, through so-called experience, decision-making in difficult situations, forecasting risks in advance, and suggesting optimal solutions, a base of useful advice is created and perfected, which makes the work process in any field more convincing and successful. It is undeniable that as time passes, based on the analysis of correct or incorrect responses to various requests, cases, and situations, artificial intelligence will become "smarter" than it is today and is smarter today than it would have been before, even if technological capabilities had allowed it (Lee et al., 2018).

There are various artificial intelligence platforms, such as: ChatGPT - one of the first leaders in answering the necessary questions; Google Gemini - which works well with text files, code, and images; Microsoft Copilot - integrated for office programs and Windows operating systems; Claude (Anthropic) - for text analysis; Perplexity AI - a search engine with AI-based capabilities, etc.

- The Midjourney platform works well for generating high-quality art images; DALL.E for generating text-to-images; Leonardo AI for designers and games; and Stable Diffusion is an open-source platform.
- Runway ML platform for generating and editing video files; PikaLabs for working from text to video, and Synthesia for videos with AI avatars.
- People use ElevenLabs for natural AI voice generation for working with voice and text, Play.ht for text-to-audio, and the Descript platform for audio/video editing.
- GitHub Copilot is used for programming code, Replit AI for writing code in the browser, and Codeium is a free AI code assistant.
- The following platforms work well in the educational field: Khanmigo (Khan Academy), for language learning - DuolingoMax; Socratic by Google, etc. There is also a long list of platforms used for specific businesses or educational purposes.

The main basis, the prerequisite for this incredible progress, was created by the improvement of modeling and virtualization technologies. Virtualization in computer technology is a modeling technique that uses software methods. In part, we can imagine it this way: modeling is the creation of a certain software product, and virtualization is the execution of these programs. It is difficult to strictly define where modeling ends and virtualization begins. If we look at today's educational reality, we will see that this situation is unimaginable without these two closely related terms. Any innovative approach is difficult to implement without advances in computer technologies and their widespread use in the educational process. Various software packages are widely implemented in the teaching of the humanities and natural sciences, which successfully use modern advances in computer technologies in the fields of virtualization and modeling (You et al., 2025).

As for modeling itself, the use of modeling is one of the features of science management. The existence of the modeling concept is due to the complexity of the control problem and the difficulty of conducting experiments in real life. With the help of a model, it is possible to simplify a real-life situation, which increases the ability of a person to understand the essence of the problem he is facing and to solve it optimally. Today, modeling is one of the systematic ways that makes it possible to see future options and determine in advance the potential results obtained in the case of alternative solutions (Lombardi & Di Pietro, 2011).

There are three main types of modeling: physical, analog, and mathematical.

A physical model is a clearly expressed object or system that is obtained by describing its enlarged, sometimes reduced, geometric dimensions. A physical model is also called a portrait model. A physical model facilitates the perception process and helps us make the right decisions.

Analog model - this is an analogy of the object under study that acts like the real object, but does not resemble it.

As for the mathematical model, it refers to the description of the properties of a phenomenon or object using symbols, which is why it is also called a symbolic model. When using a mathematical model, it is possible to understand particularly complex phenomena. Here, it is important to consider the advantage that, when making organizational decisions, the use of a mathematical model is most often recommended.

While discussing the modeling process, the following main stages can be distinguished: problem formulation, model construction, model reliability verification, model application, etc.

It can be safely said that today there is no part of our life, no sector, where artificial intelligence systems are not used. The use of artificial intelligence (AI) systems in the public sector can bring significant benefits in terms of simplifying the decision-making process, improving service delivery, and introducing many other innovative approaches. However, the use of artificial intelligence poses a number of risks. Its use is connected with many challenges: in particular, challenges in terms of transparency, accountability, freedom of expression, and the right to privacy.

If we look at the **generalized analysis of information received as a result of public information requests**, the Institute for Development of Freedom of Information (IDFI) requested the following information from public institutions:

- ❖ Name, purpose, creator, and user of the software;
- ❖ Description, parameters, results set by it, and its use in the decision-making process;
- ❖ User manual/instructions, as well as technical manuals;
- ❖ Legal acts regulating the use of software;
- ❖ Rules for compliance with ethics and personal data processing standards;
- ❖ Audit report and conclusion on the functioning of the program.

Here we can name the leading institutions that use artificial intelligence systems:

- 1) Ministry of Internal Affairs of Georgia and its subordinate LEPL - Public Security Management Center 112;
- 2) Prosecutor General's Office of Georgia;
- 3) Georgian National Tourism Administration;
- 4) LEPL - Education Management Information System;
- 5) LEPL - National Center for Education Quality Development.

It can be said that the implementation of artificial intelligence systems in the public sector of Georgia is at the initial stage of development; however, there are already many successful examples of the use of this technology in the private sector: remote verification systems, automatic document identification systems, communication automation programs, and many other tools.

In order for the public sector to be able to get the maximum benefit from these technologies, along with technological readiness, it is critically important to have access to and publicize information about the systems used, so that the public has information about the features of the systems' functioning. To eliminate the risks of bias, enables an external observer to discuss possible shortcomings of the system, and gains a high degree of trust. The study revealed that information about the use of artificial intelligence is so scarce that it becomes difficult not only to exercise control over its use, but also to enjoy the right to a fair trial.

2 Conclusion

The public sector has a dual role in the development of artificial intelligence and, accordingly, faces a dual challenge. First of all, the public sector should contribute to the creation of an appropriate ecosystem for AI in order to form national startups and industries in the country, attract investors and donors, use AI applications in various sectors, and achieve socio-economic growth and prosperity through artificial intelligence. At the same time, for the development of artificial intelligence, the government should create a regulatory framework that will balance and reduce the threats, risks, and challenges associated with artificial intelligence systems, and ensure effective mechanisms for enforcing the adopted legal and ethical standards. It is also important to specify the procedures and responsibilities for verifying the functioning of artificial systems, and to make the results of such verification available to the public. It is important to start taking appropriate steps in this direction at the initial stage of the introduction of artificial intelligence.

Conflict of interest statement

The authors declared that they have no competing interests.

Statement of authorship

The authors have a responsibility for the conception and design of the study. The authors have approved the final article.

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