Artificial Intelligence in Accessible Tourism[*]

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Abstract. The article considers the experience of using artificial intelligence in many different sectors and branches of the economy. Applications for artificial intelligence are unlimited. Artificial intelligence can rationalize and take measures providing the best chance to achieve a specific goal. The federal project "Artificial Intelligence" was approved by the government commission on digital development. State regulation in the field of artificial intelligence should help accelerate economic growth and competitiveness of the national economy, improve the well-being and quality of life of citizens, ensure national security and law and order, and achieve Russia's leading positions in the world in the field of artificial intelligence. A digital intelligent platform should appear soon to support the activities of experts in the examination of the quality, effectiveness, and safety of a medical device. The technology can be applied in many different sectors and industries, including tourism. The most challenging aspect of tourism is tourism for the disabled or accessible tourism. The development of the project "Digital Profile of a Tourist" by the Big Data Association is aimed at determining the needs of tourists with disabilities and identifying their unrealized demand.

Keywords: Artificial Intelligence, Big Data, Immersive Technologies, Digital Transformation, "Accessible Tourism".

1   Introduction

Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and simulate their actions. In the 1980s Barr and Faigenbaumdefined artificial intelligence as "an area of computer science that develops intelligent computer systems, that is, systems that have capabilities that we traditionally associate with the human mind". Later, some algorithms and software systems began to be attributed to AI, the distinctive feature of which is that they can solve certain problems in the way the man would do [1, 2, 3].

An important characteristic feature of artificial intelligence is its ability to rationalize and take measures that provide the best chance of achieving a particular goal. Artificial intelligence includes a wide range of related technologies and processes, including machine learning. Algorithms can automatically learn and adapt to new data without human help. Deep learning methods enable automatic learning due to the absorption of vast amounts of unstructured data, such as text, images, or video [4].

This article aims to show the advantages of artificial intelligence, its applications in accessible tourism

2   Main Content

Artificial intelligence is based on the principle that human intelligence can be defined in such a way that a machine can simulate it and perform tasks from the simplest to the most complex ones. The goals of artificial intelligence include imitation of human cognitive activity. Researchers and developers in this field are taking remarkably quick steps in simulating such activities as learning, reasoning, and perception to the extent that they can be specifically defined. Some people believe that innovators will soon be able to develop systems that exceed the ability of people to learn or reason about any subject. But others remain skeptical because all cognitive activity is riddled with the value of judgments that are subject to human experience [5, 6, 7].

Artificial intelligence can be classified into two categories: weak and strong. Weak artificial intelligence embodies a system designed to do one particular job. Weak AI systems include video games such as the top chess example and personal assistants such as Amazon's Alexa and Apple's Siri. You ask the assistant a question, and it answers the question for you. Strong artificial intelligence systems are those that perform tasks that are considered "human." Systems are programmed to handle situations in which they may be needed to solve problems without human intervention. These systems can be found in applications such as self-driving cars or hospital operating rooms [8, 9].

From the very beginning, artificial intelligence has been the subject of special attention by both scientists and the public. One common idea is that machines will be so highly developed that people will not be able to keep up with them,

Different sectors of the economy deal with a huge amount of data available in different formats from disparate sources. A great amount of data, known as big data, is becoming easily accessible and accessible due to the gradual use of technologies, such as advanced computing capabilities, and cloud storage. Companies and governments understand great possibilities that can be gained from the use of big data. Thus, artificial intelligence capabilities are used by various industries to collect, process, communicate and share useful information from data sets. One of the methods of AI, which is increasingly used to process big data, is machine learning [10, 11].

Different machine learning data applications are formed using a complex algorithm or source code embedded in a machine or computer. This programming code creates a model that identifies the data and builds forecasts around the data it identifies. The

model uses parameters built into the algorithm to create patterns for the decision-making process. When new or additional data are available, the algorithm automatically adjusts the parameters to check for a change in the pattern, if any. However, the model should not change [12, 13, 14].

Until 2011, big data technologies were considered to be used only for scientific analysis and they did not have any practical output. However, the volume of data grew exponentially and the problem of the huge amount of unstructured and heterogeneous information became relevant in early 2012. The surge of interest in big data is visible in Google Trends [15, 16].

On September 1, 2020, the first national standards in the field of artificial intelligence were adopted by the Federal Agency for Technical Regulation and Meteorology: GOST P 58776-2019 "Means of monitoring behavior and forecasting of people's intentions. Terms and definitions" and GOST P 58777-2019 "Air Transport. Airports. Technical means of inspection. The method of determining the quality indicators of illegal attachments detection by shadow X-ray images."

On August 27, 2020, the Presidency of the Government Digital Development Commission approved the federal "Artificial Intelligence" project. The federal "Artificial Intelligence" project provides for the following sources and volumes of the project financing from January 2021 to December 2024 with a total volume of 36.3 billion rubles, including 29.4 billion rubles from the federal budget (fig. 1).
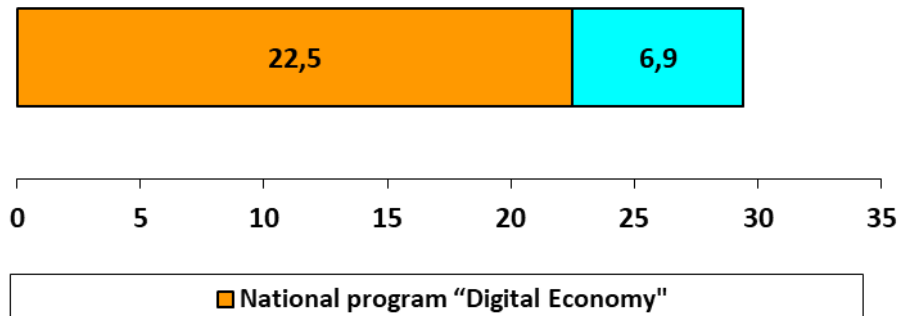

Fig. 1. Distribution of the Federal Artificial Intelligence project funding from the federal budget

The main items of expenditure in the Artificial Intelligence project showed in Table 1.

Table 1. The main items of expenditure in the Artificial Intelligence project

Expenditure item	Volume, billions of rubles
Grant support for small businesses to develop, use and commercialize products, services, and/or solutions using artificial intelligence technologies, as well as developers of AI open libraries and AI projects acceleration	18,2
Improving the availability of hardware needed to meet AI challenges	6,9
Improving the level of personnel support for the Russian AI technology market	2,2
Promoting and developing the community	1,3
Creating a comprehensive system for public relations regulating arising due to the development and use of AI technologies	0,242
Introducing AI solutions in the economy and improving the availability and quality of data needed to develop AI technologies	Volume is not specified

Trends focus the public attention on the ethical problems of artificial intelligence, four of the trends presented affect the interests of people and only one is related to the market (Fig. 2).
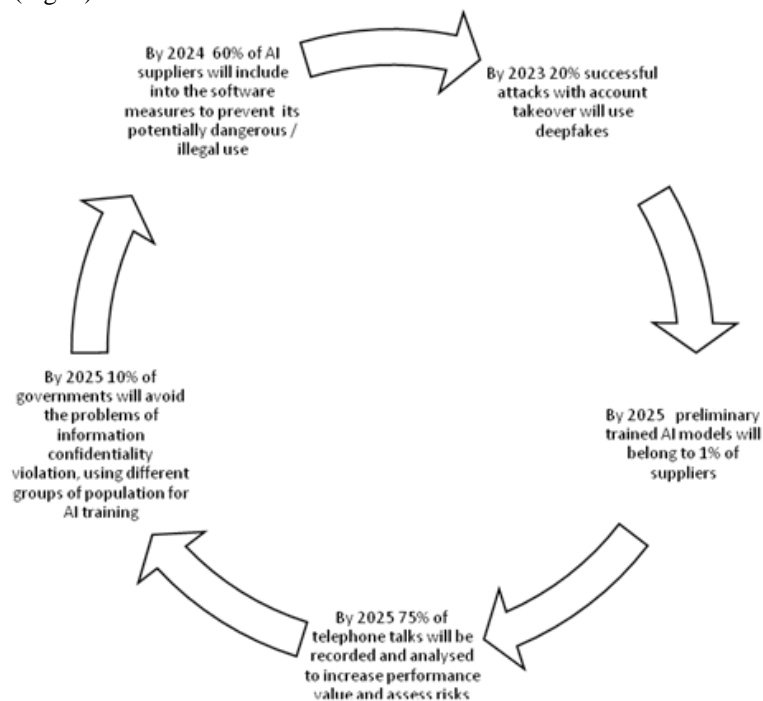
Fig. 2. The main trends of AI development according to Gartner analysts who analyzed the global AI market in January 2021

The Russian concept of AI regulation is more detailed than a European one, AI regulation should accelerate economic growth and foster competitiveness of the national economy, improve the well-being and living standards, ensure national security, law and order, and should help Russia to achieve the leading position in AI field. The concept defines that the development of AI and robotics technologies should be based on the core ethical norms and prioritize man's safety and well-being, protect his "fundamental rights and freedoms [17, 18].

At the end of April 2021, it became known about the Ministry of Digital Development, Communications, and Mass Media proposal to expand the introduction of artificial intelligence in Russia. In particular, the agency pointed to the need to use digital assistants in educational and medical institutions. The Russian government has allocated 1.4 billion rubles to support start-ups engaged in artificial intelligence technologies under the 'Digital Economy" program. As part of the digital transformation of Roszdravnadzor, a digital platform built on artificial intelligence will be created for citizen interaction. It will help to conduct a natural dialogue in text (sites, messengers, mobile applications) and voice service channels (open question). It will be possible to form automatic answers to the questions of Russians asked in a free form and related to the respect for their rights in the field of health care.

There should also appear a digital intelligent platform to support the activities of experts in the examination of the quality, effectiveness, and safety of a medical product. The stack of technologies used will include logical artificial intelligence, optical text recognition, and robotic workflows. It is planned to form a database of expert knowledge along the lines of activity with a variable structure based on adaptive information unified presentation of data and rules.

Applications for artificial intelligence are unlimited. The technology can be used in many different sectors and branches of the economy.

When most people hear the term "artificial intelligence" in tourism, the first thing that usually comes to their mind is robots or applications for mobile phones. However, nothing could be further from the truth when considering the aspect of AI in the application to tourism for people with disabilities or using other terms like affordable tourism, tourism for the disabled, or inclusive tourism.

"Inclusive tourism should be interpreted as social integration," said Scott Ryan, one of the propagandists and founders of "accessible tourism," and tourism is the most universal way of social integration. Therefore, it is necessary to modernize the tourism sector, in which the concept of "accessibility of tourism for all" will be considered in terms of adapting the infrastructure of tourist centers and sightseeing facilities to the various needs of all people, including the disabled and elderly people, etc. The level of development of inclusive tourism in our country is minimal and requires widespread. Having studied the experience of world countries, one can develop and offer new innovative approaches to the organization of accessible tourism in Russia.

According to the World Health Organization (WHO) estimates, 15% of the world's population lives with some form of disability. Accessibility for all tourist facilities, products, and services should be a central part of any responsible and sustainable tourist policy.

The creation of the "Accessible Tourist Destination" international merit badge is the result of a joint committee of the World Tourism Organization (WTO) and the ONCE Foundation to the recognition and promotion of accessible tourist destinations. These goals are to recognize and promote tourist destinations that make great efforts to ensure that their destination can appeal to any tourist, regardless of physical, sensory, or cognitive abilities.

ATD is annually awarded worldwide by the United Nations specialized agency, such as the World Tourism Organization. This is not a certificate of accessible destination, confirming its superiority in this area, but a merit badge, which emphasizes the initiatives taken so far, as well as the efforts to maintain and improve the level of accessibility achieved.

An Expert Committee has already been appointed to evaluate materials for the World Tourism Organization ATD2021. It brings together some of the most recognized experts on universal accessibility in tourism, representing tourist destinations, consumers, the tourist industry, as well as disabled people organizations (DPO), and international organizations. As a result of the Expert Committee work, a joint decision will be made to select a single tourist destination as an example of 2021accessibility. In addition, the Committee may also decide to make special references to different types of destinations, depending on the profile of ATD2021 candidates.

"Accessible tourism" allows people with disabilities in terms of mobility, vision, hearing, and cognitive functions to act independently, fairly, and with dignity, providing universally designed travel products, services, and the environment (Darcy-andDickson, nd). According to the European Network of Accessible Tourism (ENAT, nd), accessible tourism includes:

- barrier-free areas: infrastructure and facilities;
- transport: by air, land, and sea, suitable for all users;
- high-quality services: provided by trained personnel;
- events, exhibitions, attractions: everyone can take part in tourism.

Since all tourist services are based on people, their awareness of the subject, knowledge, and skills are crucial to success. The human factor has been and will be a key factor in the design of any adapted tourist product because the levels of attention and care required by these groups must be highly individualized. Social skills (empathy, sociability, assertiveness, etc.) are essential in accessible tourism, as most of these people will need direct support or assistance in many leisure activities.

With the advent of the Internet, robotics, virtual or augmented reality, and big data, the technological revolution provides new opportunities to improve the services and destinations available to tourists. Providing human resources with the necessary digital skills will help to adjust these services to real and specific needs and different types and levels of disability or limited mobility.

The level of demand for the adaptation of facilities and equipment in accessible tourism is high. The "inclusion" strategy of groups of people with disabilities leads to greater sustainability of initiatives. In this "global" concept, the versatility and adaptability of a tourist offer are perfectly complemented by environmental criteria and integration of the territories and local population.

Accessible tourism allows all people to participate and enjoy tourism. Many people have access needs, whether they are physically healthy or not. For example, older and less mobile people have access needs that can be a huge obstacle when traveling or touring. Thus, accessible tourism is a constant desire to ensure accessibility of tourist destinations, products, and services for all people, regardless of their physical limitations, disability, or age. Thisincludespublicandprivatetouristfacilities, and services.

Accessible tourism involves collaboration between all stakeholders, governments, international agencies, tour operators, and end-users, including disabled people and their organizations. A successful tourist product requires effective partnerships and cooperation in many sectors nationally, regionally, and internationally.

From idea to implementation, visiting one destination usually involves a variety of factors, including access to information, different types of long-distance travel, local transport, accommodation, shopping, and restaurants. Thus, the impact of accessible tourism extends not only to tourist beneficiaries but also to society as a whole, reinforcing accessibility in the social and economic values of society [7,8].

Accessibility is also an important aspect of realizing the rights of the world's aging population. As we get older, our chances of getting a permanent or temporary disability increase. Thus, the emphasis on accessibility can ensure that we can participate fully in social life in our golden age. Accessibility also benefits pregnant women and those who are temporary cannot travel.

Improvements in physical and service infrastructure, with a focus on accessibility, also contribute to a more mindful attitude to different generations in development planning. For families with young children, accessible infrastructure, especially in transport, urban planning, and building design, empowers these families to participate in social and cultural activities [7].

The United Nations is committed to sustainable and equitable development. Of course, making basic changes to the facility, providing accurate information, and understanding the needs of disabled people can lead to an increase in the number of visitors. Improving the availability of tourist services enhances their quality and enjoyment for all tourists, as well as improves the quality of life in local communities.

The development of the "Tourist Digital Profile" by the Big Data Associations aimed at identifying the needs of tourists in a particular region and identifying their unrealized demand. For example, information about travel expenses, travel geo-data, lists of visited attractions, cafes, and hotels will help the authorities to pay attention to the "weak points" of resorts and build the necessary infrastructure. The Russians' data will be anonymized. The project contributes to the development of accessible tourism.

Virtual reality is an important area of AI application in accessible tourism. Virtual reality is a technologically created world transmitted to man through his senses: vision, hearing, touch, and others. Virtual reality simulates both impact and impact reactions. To create a convincing set of reality senses, the computer synthesis of properties and virtual reality reactions is made in real-time.

The benefits and effects of technology are as follows: time and staff costs saving; transfer of complex instructions to interactive training; no real damage to equipment or health in the event of an error; the ability to repeat actions an unlimited number of times in a training format; standardization of learning and testing conditions. The

difficulties of introducing immersive technologies are the following: time for implementation takes from 3 to 6 months; the cost of the technology; a single educational platform; the ability and need for regular use of technology; VR/AR systems must be integrated into a single set of software, the company must be competent enough to support (Fig. 3).

To reproduce the user's contact with the environment in the most accurate way, the user interfaces are used, most realistically corresponding to the simulated objects: a computer steering wheel with pedals, device control handles, a pointer in the form of a pistol, etc. Virtual reality gloves and hand tracking with video cameras are used for contactless object control.

Direct connection to the nervous system. The devices described above affect the human senses, but the data can be transmitted directly to nerve endings, and even directly to the brain through brain interfaces.

Visiting and exploring new places, especially those that are physically inaccessible to disabled people, are of particular interest to them. Digital 3D simulation to preserve heritage sites. A system of calligraphy learning using virtual reality technology. Evaluation and analysis of traffic to mass tourist attractions. Visual communication projects such as animation and game projects depicting the importance of cultural heritage through storytelling. Cultural education with the help of virtual reality.
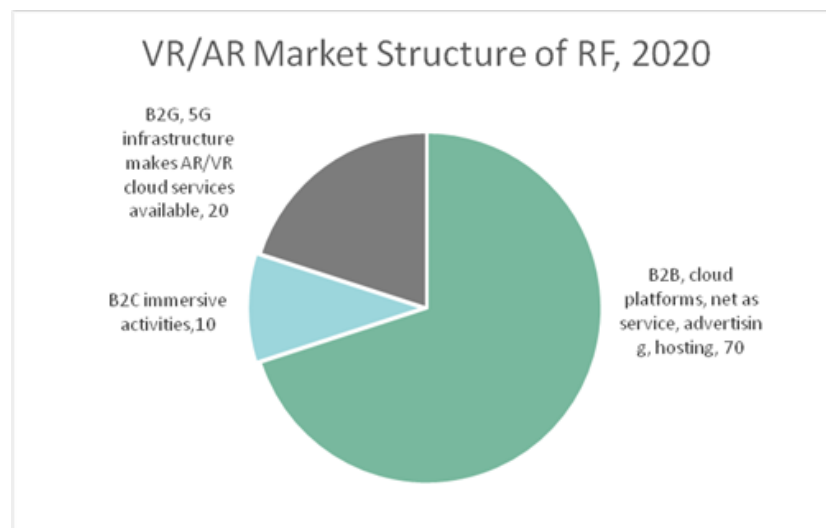
Fig. 3. VR/AR Market Structure according to THT Consulting.

Depending on the purpose of visiting the network, it is possible to distinguish different types of virtual tourism: educational, cognitive, entertaining, scientific, exotic.

Each type of virtual tourism is characterized by its type of tourist: virtual vagrants, extremes, collectors, etc. To some extent, we can speak about the formation of a tourist virtual community.

The tourist should be convinced that he would get to the place, which was recommended by the operator. To solve this problem and ensure competitiveness, the tourism business focuses its attention on rapidly developing virtual technologies, namely 3D.

The benefits of introducing virtual technologies are as followers:

- the ability to consider all the small details of interest;
- clarity of the route, as once it has already been passed virtually;
- visualization of the atmosphere of the destination (arrival);
- tour operator's timesaving.

Currently, the following apps have been developed: The Grand Canyon Experience Titans Realities of Space 2.0 EVEREST VR. VR Museum of Fine Art the Blue Destinations Google Earth VR is one of the top ten mobile apps for tourism. In 2014Artgidjoint the top - the best guide to the artistic life of St. Petersburg and Moscow. Top Trip Tip has combined all Russian tourist resources. Friendly Cities is an unusual and brand-new mobile guide to the world's most popular cities. Friendly Cities is a project about small cafes, wine bars, flea markets, festivals, art galleries, and shops of local designers.

Interactive guidebooks have geolocation and route-building ability, integrate with social networks, virtual galleries, use the application without a permanent connection to the network, interactive software, including video, animated graphics, 3D, audio comments, and circular panoramas. One can introduce marketing tools - promotions, surveys - into apps. Special counters will allow one to conduct a detailed analysis of the user's interaction with the content. It is also possible to enter infrastructure information of all types for disabled people.

The innovative direction of the hotel industry is the introduction of the Virtual Concierge system into hotel activities. Guests can use this type of service with the help of a telephone application, website, TV screen in rooms, or displays of various types and sizes, which are mounted inside walls and furniture, decorated in elements of the interior, and installed in the form of free-standing information stands. By placing the board inaccessible hotel locations, one can show a guest the way to the conference room, restaurant, lobby bar, spa, etc. without concierge help. Content is managed through a Web browser on a computer or tablet. Internet news blocks are automatically updated.

Virtual Concierge functions:

- transfer information to any room of the hotel due to the work of audiovisual signs in a single mode with different hotel management systems;
- booking places in a restaurant, spa, etc;
- demonstration of the hotel's catalog of offers, restaurant menus;
- guest requests to the administrator
- showcasing guests through galleries and 3D tours of various hotel services: room types, restaurants, and bars, meeting rooms, etc.;
- providing information about weather, exchange rates, breaking news;

- with the help of maps, one can pave the route for the guest with the attractions, restaurants with a certain type of cuisine, the level of city roads congestion before the trip;
- with the help of a TV "virtual concierge" one can work with documents, presentations, and tables, as well as contact all hotel services;
- Control of the system is as intuitive as possible and in many ways similar to the menu of a smartphone.

Today, the Virtual Concierge system is already used by representatives of such networks as The Ritz-Carlton», «Marriot», «Westin Hotels & Resorts», «Hyatt Regency», «Hyatt Regency New Orlean», «Andaz 5th Avenue in New York», «Hyatt Regency Denver Tech Center"), "Fairmont Hotels &Resorts», «Holiday Inn», «Inter-Continental», «Vander Valk Hotels» (Ne), «Accor» («Novotel»); hotels: «Burj Al Arab» (Dubai, UAE), «Denit» (Barcelona, Spain), "Del Coronado" (Coronado, California).

Consequently, the Virtual Concierge system has become a new channel of communication with the customer.

3 Conclusions

Thus, it should be noted that artificial intelligence is a powerful means of data processing and can find solutions to complex problems faster than traditional algorithms written by programmers. Artificial intelligence is gradually becoming a daily routine and is being introduced into a wide variety of business spheres, including accessible tourism.

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