

Intelligent Management of a Network of Smart Billboards on the IoT Platform in Industry 4.0

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Abstract: Artificial intelligence plays a special role in new technologies used to develop advertising and marketing. Artificial intelligence, which plays a special role in improving the effectiveness of advertising and marketing, has had its say in the business market, and this process continues. A quick search for any product in Internet search engines is an indispensable process for the marketing market. With the help of artificial intelligence, it is possible to present the required product or service in a timely manner, at a high level, taking into account the individual characteristics of the customer using virtual environments and street advertising. In the modern world of cyber-physical systems, machines created using intelligent algorithms facilitate human labor in almost all areas. Intelligent management of a network of smart billboards AI research in advertising and marketing has a positive impact on economic development. The article deals with the application of artificial intelligence in the field of advertising and the principle of their work. In this area, the processes of application of new technologies are studied. When preparing the article, scientific analysis of problems and their solutions, application of results, methodological system approach were used.

Index Terms: Artificial intelligence, advertising marketing, smart billboard, online advertising, machine learning, algorithm, consumer.

1. Introduction

The rapid expansion of Industry 4.0 has paved the way for the use of artificial intelligence technologies in advertising and marketing. Marketers with state-of-the-art technology can present the products that users want on time. As a result, both the seller and the buyer were satisfied with the service. With the help of artificial intelligence, product recommendations in advertising cause big changes, play an important role in the shopping process.

We live in an era where artificial intelligence has infiltrated marketing. Currently, artificial intelligence is of great interest, because it is a priority in many areas. Along with online advertising, street advertising occupies a special place. Therefore, the use of artificial intelligence in marketing should be considered as one of the main areas of application. Many companies are spending a lot of money on research and development of artificial intelligence. Some sources predict that the use of artificial intelligence will reduce the workforce and lead to unemployment, while others predict that this will create great opportunities. If the marketing of advertised products and services is organized well, it will improve the well-being of people and lead to economic growth.

The relevance of this article can be explained not only by the growing popularity of SI, but also by the growing volume of information and the importance of marketing.

2. Artificial Intelligence

The founder of the theory of artificial intelligence (AI), an Azerbaijani scientist, our compatriot Lotfi Zadeh worked in California and was the only lifetime professor of this institution. Today the theory applies to all areas.

Artificial intelligence is the general name for algorithms and technologies, it is the goal of human intelligence. It is a hardware and software system with many capabilities such as human behavior, digital logic, movement, speech and voice recognition. It is also used for drawing automation, machine learning, semantic analysis, and large volumes of information tasks. In other words, artificial intelligence makes computers think like humans.

SI continues to cover many modern areas - media, advertising, science, medicine, etc. We are no longer surprised by unmanned vehicles equipped with artificial intelligence, "smart" virtual assistants, robots that help fight deadly

diseases, algorithms for predicting future customer behavior, etc. ...

One of the spheres of application of SI is street advertising. This is the most common smart billboard network among this type of advertising. Billboard is an independent design board for large-scale advertising [1]. Billboards are outdoor advertising that can help you achieve the desired results by openly expressing your opinion. The first billboard appeared in America about 100 years ago.

The most commonly used technologies in targeted advertising are face and vehicle recognition. Existing systems provide an intelligent advertising system with many functions such as gender and age recognition and object detection. The main goal is to improve the effectiveness of outdoor advertising using biometric approaches and machine learning technologies.

Billboards are usually large, visible billboards along streets and highways. The only challenge is to develop a structure that is resistant to windy weather. Billboards must comply with all legal requirements when calculating the project and must not pose a threat to road users. It must be calculated firmly and strictly without violating fire safety rules. It is resistant to various weather conditions, it is installed on high steel columns and on highways, sections of roads with high traffic. The structure of the "super site", which is street advertising, consists of two non-parallel large billboards. A person moving in any direction cannot but look at the sign. Smart billboards can be 16, 48, 96 pages. These types of billboards, placed on urban and rural buildings, on major highways, in public places, on vehicles, are based on artificial intelligence.

Touch screen interactive billboards are more popular. One responds to the heat, the other helps the train move or park the car. For the first time Burger King installed billboards in Moscow with different temperatures. When it's cold outside, a billboard displays hot food, and when it's hot, milkshakes are displayed. In this way, the images are adapted to the most likely consumer preferences regarding the weather. Over the years, various companies have used this method to showcase their products on smart billboards. For the first time in Berlin, the company has placed a joint billboard with operator JCDecaux. When a person next to a billboard connects to Wi-Fi, they gain access to the official ad site. In real time, it changes the shades of the advertisements displayed on the board, and this change is described on the board.

Yahoo's smart billboard is based on a concept called grouping, which many prefer to get more attention [2]. This board uses image recognition technology that works with cameras to identify demographic data and gather information. Yahoo's system doesn't just take pictures, it can record voice using microphones to collect key words spoken by the group. An additional method used to attract attention is eye tracking, which measures the ability of passers-by to see using sensors mounted on the board. The NEC (Nippon Electric Corporation) digital billboard is specially designed to display advertisements that reflect the personal interests of passers-by. NEC Digital Billboard uses wireless tags as RFID Radio Frequency Identification chips. As RFID chips such as credit cards and cell phones are increasingly used today, these chips act as invisible labels for people. These chips encode information collected about people, so the digital board can recognize a walking person by reading the target's RFID information. NEC Digital Billboard has also implemented a facial recognition app to identify the gender, ethnicity and age of a shopper. The success of the billboard is due to the fact that it recognizes people's faces using facial recognition techniques, as well as a "high-precision" camera that detects their gender.

Smart billboards are a technical tool to fully express the opinion of an advertiser. The more attractive the billboards, the more CPM (cost per milliliter) they can get [3].

- Provide a Wi-Fi connection.
- Submission of requests and service requests
- Ports for charging mobile devices.
- Real-time product roadmap information
- Regular information about the brand on the business page on social networks.

3. Robots and Drones

Along with the advertised products, robots and drones have recently become increasingly relevant as a field of application of artificial intelligence in the development of marketing activities. Delivery of parcels by drones is a novelty in the field of mail delivery for the world's largest companies and retailers. Amazon was the first American company to use drones to deliver orders to customers. The advantage of such delivery is the absence of traffic jams and traffic lights. In addition, courier work is a great opportunity to repair cars and reduce fuel costs. However, executors have difficulty getting the packages. Problems with cargo in the yard and when entering roads. Delivery of ordered goods via Wi-Fi and SMS is difficult. In this case, architects and builders need to rethink the overall design of the home for remote delivery. These can be letterboxes, drone landing pads that can be installed on roofs or windows. In 2015, mobile operator Yota delivered SIM cards to customers using Copter-Express drones. For example, a drone lands in a Moscow park with billboards, and a saleswoman takes a SIM card out of the drone and hands it to a customer. The first commercial food delivery by drones in Russia was carried out by DoDo Pizza (a pizza chain).

Drones, which are already very popular, help people in many areas. During emergencies, helpless people, mountain climbers, soldiers are provided with the necessary equipment, food, etc., drones are used in delivery. We must

emphasize the role of drones in the victory of our country in the 44-day Patriotic War of Azerbaijan. After the victory of Azerbaijan, smart boards "Karabakh is Azerbaijan" can be found not only in Azerbaijan, but also in many countries far from Azerbaijan.

In terms of security, the likelihood of the aircraft being stolen is higher along with the cargo it is carrying. The software used to monitor and control the operation of the device is flawed and there are "gaps" in the system, such as the likelihood of a cyberattack. For safety reasons, Amazon has proposed limiting the maximum altitude for drones to 400 feet (~ 122 m), which is less than 100 feet (~ 30 m) of the minimum altitude allowed for civil aviation.

It is advisable to have the Internet anywhere. For example, the Internet, which is important for travelers, makes it possible to immediately publish good photos from the trip, as well as the necessary information - to clarify the opening hours of the museum, check in for a flight and much more [4].

Of course, the advertised products must be censored by law. The same product cannot be advertised anywhere in the world. In Muslim countries, canteens are closed during Ramadan. Goods and services of conflicting states are not subject to advertising. Around the world, it is desirable to place public service announcements on smart billboards, for example, a ban on violence against children, women and animals, and the need to protect nature.

Modern technologies are used in everyday things. Recently, at home, cars, clothes, etc., you can see the work of artificial intelligence at the facility. Such applications, called smart objects, are based on cybersecurity along with human intelligence. Consider a suitcase, which is one such item.

1. GPS tracker - locates the bag.
2. Bluetooth lock - you can open and close the suitcase only using the application on your smartphone. If an unauthorized access attempt is made, the phone will alert you.
3. Fingerprint recognition is a technology similar to that used in smartphones. To open the cover, you need to put your finger on the scanner.
4. Built-in scales - helps to avoid excess weight when packing.
5. Power Bank is a self-contained battery capable of charging tools. The most powerful model is able to "revive" the technique up to 8 times. Models with two or more ports are available.
6. Independent movement - some specimens pursue the owners, skillfully maneuver between obstacles and can even carry a passenger. These are already scooter suitcases.
7. Electronic label - simplifies check-in for the flight. Electronic boarding pass information is automatically transferred to the label. Luggage should only be placed in the transmission. The practice of sticking paper labels by hand is gradually becoming a thing of the past.

The only drawback of a suitcase with such capabilities is the high cost. This is due to the peculiarities of the suitcases.

- Production of high-quality, damage-resistant materials: polycarbonate, aluminum, reinforced nylon;
- Availability of special storage;
- Wheels are often larger and more reliable;
- The average weight of hand luggage is 4 kg on average.

With the advancement of artificial intelligence technologies, the terms "soft sale" and "hard sale" in marketing are well known to advertising professionals. Despite the widespread use of these terms, there is no generally accepted definition in the world. Soft advertising is a more advanced form of advertising that aims to generate a positive emotional response. The goal is to subconsciously direct the buyer's reaction to the brand that is promoting it. Software marketing companies often create attractive or funny ads because they tend to generate the most positive emotions [5].

Tough commercial advertising means a direct and assertive approach. Hard selling is aimed at forcing the consumer to buy a product or service in the short term, and not at assessing their capabilities and deciding to wait. The terms "soft selling" and "hard selling" are not marketing recommendations or advertising metrics. Outdoor advertising (Out of Home) has already become a part of society. About 4 billion users worldwide have mobile phones. Gradually, mobile communication serves not only for communication, but also for obtaining information. It now personalizes the ad format and characterizes it "one by one", creating an unprecedented opportunity for the advertiser to customize ad targeting. In addition to sending messages to consumers by phone, you can find out their wishes, user searches and track regular purchases. The data center collects location information from mobile users every 15 seconds using applications that use a global positioning system (GPS) signal [6].

Intelligent work - IVR (Interactive Voice Response) has the ability to independently create a voice assistant for the call center and automate complex tasks. Voximplant robots that can be built on the Dialogflow Connector are difficult to distinguish from live operators. This significantly reduces the transaction costs for the order. For example, a voice assistant accepts an application for a restaurant for 4 rubles, and an order from a call center operator will cost 9-10 rubles, including salaries, taxes and other expenses. The undoubted advantage of this technology is the ability to quickly scale up during strikes or large-scale events. Users can now start a conversation with a seller of a product or service directly from the search results. In this case, a user experience is required. This is a new, simplified experience for advertisers. Previously, to interact with the brand, the user had to go to the site through a search engine, then there were

search ads with a "Call" button, now it is enough to click "Start a conversation" to find out more about the offer [7]. Studies have shown that, for example, with repetitive repetitions, answers to hundreds of typical questions can be obtained via chat or a hotline. This can lead to aggressive, rude or even immoral behavior. Artificial intelligence helps to significantly stabilize the situation: reducing the waiting time for the consumer, instantly finding the desired results, individualizing the message (news) in the dialogue, all this is faster, bringing the problem to a level that satisfies both parties.

Let's take a look at a few examples: IBM Watson is a company information system that delivers significant results in improving customer experience, empowering, leading edge technology, and accelerating growth. Watson's primary focus is to understand natural language questions and find answers to them using SI. For example, using Watson, you can create a chatbot or virtual assistant, negotiate, learn, draw conclusions, and make recommendations between the user in natural language using a skillful program [8].

Dialogflow is a program that supports the creation of communication interfaces for websites, mobile applications, popular instant messengers and IoT devices. Building a chatbot with it speeds up the process by recognizing what the user wants to do, the content of the text and recommending the appropriate response.

Salesforce Einstein is a platform that allows you to automate customer activity information using artificial intelligence, create forecasts and recommendations based on them, and use them in business processes.

3D graphics are used in print ads, websites, advertisements, corporate image films, and educational videos. In addition, video, along with computer graphics, is used to present computer graphics prototypes, to indicate new areas and to attract investors [9].

Marketers rely on artificial intelligence to make it special for marketing. New marketing startups based on the use of algorithms are created almost every day. The world's largest digital industry leaders (IBM, Microsoft, Google, Amazon, Facebook) invest heavily in the use of artificial intelligence in their products and services.

4. The Introduction of New Technologies

Industry 4.0 not only helps to analyze the large amount of collected data, but also allows it to be connected to the new network. SI - Builds consumer platforms, answers questions, entertains, shares information, and accompanies purchasing decisions.

The key to marketing is to know what the demand for information is and to use it, which is impossible without SI in this area. The information collected about users includes information about their actions, information about buying and selling, active searches on social networks, preferred brands, etc. happens. SI helps you select structured, posted information. It is important to announce the results in advance in order to solve a specific marketing problem. For example, it is important to inform the marketer about the product and offers, and the specific customer about the product they like.

Books	5-core (8,898,041 reviews)	ratings only (22,507,155 ratings)
Electronics	5-core (1,689,188 reviews)	ratings only (7,824,482 ratings)
Movies and TV	5-core (1,697,533 reviews)	ratings only (4,607,047 ratings)
CDs and Vinyl	5-core (1,097,592 reviews)	ratings only (3,749,004 ratings)
Clothing, Shoes and Jewelry	5-core (278,677 reviews)	ratings only (5,748,920 ratings)
Home and Kitchen	5-core (551,682 reviews)	ratings only (4,253,926 ratings)
Kindle Store	5-core (982,619 reviews)	ratings only (3,205,467 ratings)
Sports and Outdoors	5-core (296,337 reviews)	ratings only (3,268,695 ratings)
Cell Phones and Accessories	5-core (194,439 reviews)	ratings only (3,447,249 ratings)
Health and Personal Care	5-core (346,355 reviews)	ratings only (2,982,326 ratings)
Toys and Games	5-core (167,597 reviews)	ratings only (2,252,771 ratings)
Video Games	5-core (231,780 reviews)	ratings only (1,324,753 ratings)
Tools and Home Improvement	5-core (134,476 reviews)	ratings only (1,926,047 ratings)
Beauty	5-core (198,502 reviews)	ratings only (2,023,070 ratings)
Apps for Android	5-core (752,937 reviews)	ratings only (2,638,172 ratings)
Office Products	5-core (53,258 reviews)	ratings only (1,243,186 ratings)
Pet Supplies	5-core (157,836 reviews)	ratings only (1,235,316 ratings)
Automotive	5-core (20,473 reviews)	ratings only (1,373,768 ratings)
Grocery and Gourmet Food	5-core (151,254 reviews)	ratings only (1,297,156 ratings)
Patio, Lawn and Garden	5-core (13,272 reviews)	ratings only (993,490 ratings)
Baby	5-core (160,792 reviews)	ratings only (915,446 ratings)
Digital Music	5-core (64,706 reviews)	ratings only (836,006 ratings)
Musical Instruments	5-core (10,261 reviews)	ratings only (500,176 ratings)
Amazon Instant Video	5-core (37,126 reviews)	ratings only (583,933 ratings)

Fig.1. Some of the products that Amazon puts on the marketing market

Large databases have long been an integral part of marketing. Big databases comes from many different sources: live data, CRM, web analytics tools, mobile apps, weather reports, social media, research repositories, real-time data sensors used on the Internet of Things, and more. Such factors are important for the development of advertising and marketing. When these applications are based on artificial intelligence, it is also beneficial to get results quickly. Big data forecasting is a critical area of artificial intelligence software. A marketing forecast based on this analysis is the foundation of an effective brand strategy in the marketplace. Therefore, it is especially important for companies to collect information on the results of user activities carried out and planned in recent years. Amazon is the largest American company in the global market and has always maintained its popularity at the forefront. Its database has received millions of views since May 1996. Let's classify some of the products that Amazon puts on the market.

Table 1. NaiveBayes

	Number of landmarks	Number of correctly classified points	Number of misclassified points	TP Rate	FP Rate	Precision	Recall	F-Measure
Class 1	16772	13049	3723	0.782	0.009	0.962	0.782	0.863
Class 2	12874	11611	1263	0.902	0.022	0.902	0.902	0.902
Class 3	14782	14197	584	0.960	0.064	0.796	0.960	0.870
Class 4	14809	14347	462	0.969	0.047	0.844	0.969	0.902
Class 5	12067	9457	2610	0.784	0.009	0.944	0.784	0.856

Table 2. MultilayerPerceptron

	Number of landmarks	Number of correctly classified points	Number of misclassified points	TP Rate	FP Rate	Precision	Recall	F-Measure
Class 1	16772	16301	471	0.972	0.008	0.974	0.972	0.973
Class 2	12874	12041	833	0.935	0.006	0.972	0.935	0.953
Class 3	14782	14778	4	1.000	0.008	0.969	1.000	0.984
Class4	14809	14419	390	0.974	0.007	0.974	0.974	0.974
Class 5	12067	11497	570	0.953	0.010	0.949	0.953	0.951

Table 3. iBK

	Number of landmarks	Number of correctly classified points	Number of misclassified points	TP Rate	FP Rate	Precision	Recall	F-Measure
Class 1	16772	16228	544	0.968	0.012	0.961	0.968	0.964
Class 2	12874	12571	303	0.976	0.004	0.982	0.976	0.979
Class 3	14782	14322	460	0.969	0.007	0.974	0.969	0.971
Sinif4	14809	14457	352	0.976	0.007	0.973	0.976	0.975
Class 5	12067	11523	544	0.955	0.009	0.956	0.955	0.956

Cluster {1,2,3,4,5}

Collaborative Filtering Recommendation Model Based on User’s Credibility Clustering.

As can be seen from the tables, sources selected on the basis of given products and estimated products were classified by joint filtering with classes. The degree of compatibility was determined by the principle of proximity.

5. Methodology

Today the SI search is reinvented. For example, the self-learning system RankBrain in the Google search engine, Yandex's new search algorithm is one of the main tools for shaping a search, automatically selecting and providing the most appropriate recommendation to the user. They can “guess” what the user is looking for based on the email and decide whether to offer an appropriate response. A large amount of information matches only keywords.

Algorithms can now understand the intonational context of the request. Recognizes voice search, semantic analysis, emotional state and other status of the user. Optimizing marketing and promotional materials for smart car searches is more conducive to brand promotion [10]. Google has introduced a new Google Ads service for marketers and advertisers. Industry 4.0 helps make the advertisements on this service more effective. In a machine learning-based system, an advertiser can compose up to 15 headlines and up to 4 advertising texts. Analyzes the reaction to all options, checking possible combinations in different audiences. Then he selects the best option for each user (taking into account his age, place of residence, etc.). This way, people performing the same search will see different ads. Among the advantages of such a tool is the placement of ads by marketers, which means an increase in exposure and income.

Google Ads (formerly Google AdWords and Google AdWords Express) are a type of online advertising used by businesses to promote their products and services on Google Search, YouTube, and other sites. Google Ads also allows

advertisers to target specific goals, such as increasing the number of phone calls or the number of website users. With a Google Ads account, advertisers can customize their budgets and goals, and start or stop ads at any time.

Google Ads can serve ads when people search the Internet for products and services offered to people. By leveraging smart technology, Google Ads helps deliver ads to potential customers.

1. Start by getting more visitors to your site or more calls to your business.
2. Then select the geographic region in which you want the ad to appear. It can be a large city, region or country with a small radius around the plant.
3. Finally, advertisements are created and a monthly budget is set. Once approved, an ad can be displayed when users in the targeted area are looking for similar product or service offerings. Payment is made only when users click on the ad or show interest in the call.

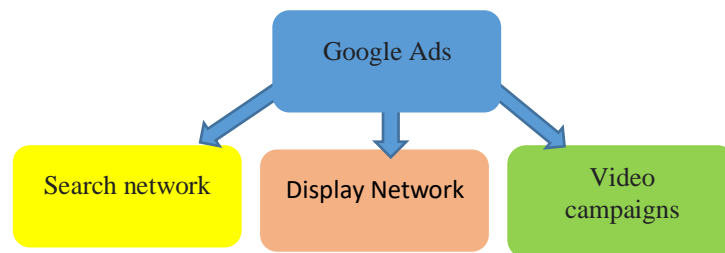


Fig.2. Types of Google As

When an X-question is asked in Industry 4.0, it chooses the most effective of the previously asked or defined answers to the X-question. For this reason, every time question X comes up, artificial intelligence filters the answers to question X and presents the most rational ones. It would be wrong to think of artificial intelligence under one heading. There are also concepts that make up artificial intelligence, such as machine learning and deep learning.

Machine learning is another artificial intelligence science that includes deep learning, a branch of artificial intelligence. It is an algorithm that allows a machine to achieve logical and rational results using data. For example; write an algorithm that captures information about the purchases of customers in the store. This algorithm; When buying chips, shoppers also report that they bought a cola. Therefore, the crisp shelves and cola cabinets are getting closer to each other, which increases sales. This example is the simplest form of machine learning. Machine learning tells us when modern technology is beyond our grasp.

Using machine learning algorithms, it can process gigantic, ever-changing historical data to predict which products a user wants to see next. As a result, there will be very few ads on the Internet that follow the user, showing a product they don't want to buy. Deep Learning - Deep Learning is a subset of Artificial Intelligence and Machine Learning, and they have a very similar structure [11]. Deep learning works like a neuron in our brain. Let's take a look at the concept of deep learning using chips as an example. By introducing the functions of the machine learning chip, in-depth learning forms its own rules and allows you to distinguish between the chip and the cola.

One of the best examples of self-learning algorithms, developing and presenting learned information is Google Translation, one of Google's products that translates into over 100 languages and is based on deep learning.

Specialists from the US Foundation for Information Technology and Innovation conducted research in the field of artificial intelligence. The study focuses on 30 indicators for six types of artificial intelligence: talent, research, development, applications, data, and hardware. According to the results, the United States is leading in the development and use of artificial intelligence. The United States is a leader in the key areas of startup investment, research, and financing. In second place is China, which has achieved success in several areas. China ranks among the 500 most powerful supercomputers in the world in terms of performance compared to other countries. The third country is the European Union.

It sits at the intersection of natural language interfaces (text messengers, voice services) and e-commerce. Telegram, WhatsApp, Facebook, etc. It is designed for communication between the company and users through instant messengers. Here, consumers can communicate with a brand representative (human, chatbot, chat) through their personal page to get user support, ask questions, get personal recommendations, read answers.

Technological, economic and social factors influence the development of interactive and programmatic advertising. The emergence of smart ads is driven by big data, algorithms and cloud computing. However, its further growth may depend on such business factors as investment in artificial intelligence technologies, industrial innovation, government regulation and end-user acceptance [12].

Over time, artificial intelligence not only analyzes data, but also helps people create innovation. Of course, people do most of the creative work. Mondelez, an international brand based in Japan, has launched an artificial intelligence ad campaign for one of its products. The winners, who said they will use the algorithm when the brand is well received at ad festivals, set an example of how to create a "perfect" ad.

Wordsmith is primarily a software package for linguists that creates structured text information publications in real time. As a paid logo maker, Logojoy uses artificial intelligence and machine learning to create service company logos.

6. Hyperindividualization and Customization

An "individual" approach to the consumer to attract attention is an important decision to improve the service. Hyper-individualization is a slightly different form of individualization. Here you can understand how to treat the user, how much to contact him, place, date of purchase, information about a new brand. This personalization takes into account user behavior in real time. Personal information about a person obtained on the Internet practically adapts communication. Regardless of the size of the audience, artificial intelligence is able to create a unique dialogue with each user (advertising tool, email, website) and deliver relevant information.

With the advent of YouTube Director Mix (which is automatically based on video and many text changes), YouTube allows advertisers to create and submit customized ad campaigns. An integrated video template allows dynamic online videos to create news, search queries and design elements for different members of the target audience [13]. Local advertising is a widely used promotion tool that has a greater impact on the audience. This form of advertising, which does not use direct or indirect purchase invitations, is also called "natural" advertising.

Today, any media format (images, audio and even video) can be analyzed in detail using artificial intelligence. Google Cloud Platform is a collection of cloud services used for end-user products such as Google Search and YouTube. Media plans are a tool of the media (television, press, radio, outdoor advertising, Internet) in the delivery of advertising messages. With its help, you can plan the display of display advertising materials, plan advertising campaigns, optimize coverage, cost and other features. Digital marketing is based on artificial intelligence and is capable of organizing broadcasts with the participation of a small number of people, creating highly relevant campaigns, analyzing and verifying information. Akil.io is a high-tech online service for creating and executing various services using an external server. He creates business solutions based on the Industrial Zone of the Russian University, which uses artificial intelligence algorithms to automate various business processes[14]. Also, a centralized platform for collecting ads, created in conjunction with an advertising agency, allows you to analyze information about the effectiveness of campaigns and make decisions on their optimization using artificial intelligence algorithms.

The question arises: if everything sounds so attractive, why are brands and agencies in no rush to use artificial intelligence tools?

The first is inertia and lack of technical knowledge. The second is to show empathy that worries advertisers and marketers. Empathy is understanding the emotional state of others, understanding how they are feeling, and expressing compassion. It is carried out using mirror neurons located in the brain, which also allow you to reflect the feelings and emotions of other living things. Of course, computers are already capable of recognizing emotions, so humans, like machines, need to learn how to respond to them [15].

The wave of epidemics that has swept the world since 2020 has affected many areas. During the widespread epidemic of the coronavirus (COVID-19), the market was in a double position. On the one hand, there is a reduction in advertising costs during the general crisis, on the other hand, the presence of companies with online trading. The pandemic has forced the whole world to go online: schools and universities have switched to distance learning. Conferences, festivals, performances, concerts and even parties have moved to the Internet. During the epidemic, almost all offline activity lost its meaning, and the sales market was no exception. Although the industry is in a general slump, there has been no stagnation in the online advertising market. This does not mean that this segment will come out of the crisis. Most digital marketing service customers use online quarantine apps.

Zoom has grown in popularity and has become one of the premier student learning tools. Zoom's founders responded immediately to the crisis by extending video chat timelines for affected areas in Yuan, China and other countries. Zoom has become one of the most remote tools for the economy today. Later, other online video communication programs became relevant. For example Microsoft Teams, TeamViewer, Cisco Webex Meetings, etc. E-commerce is one way to stave off an economic downturn in the COVID-19 era. With the development of advertising and marketing, this problem can be overcome by increasing the import and export of products.

There are numerous articles on the role of artificial intelligence in advertising and marketing. In the article "Development of an Effective Method of Data Collection for Advertising and Marketing on the Internet" Hashimova K. K. reviewed all the collected information about the product. Here, an efficiency model was created by conducting transactions based on the concurring views of customers. Artificial intelligence has played a special role in data collection.

7. Conclusion

In marketing, SI has a positive effect on customer satisfaction and overall revenue growth. Marketers have more sales opportunities. They optimize marketing campaigns by studying customer relationships and can predict sales more accurately and faster by controlling prices. Over time, marketing has moved from traditional digital marketing to smart marketing. Information technology companies continue to develop smart apps (like Siri, Cortana, Alexa). Smart billboards, chatbots, robots, and other SI apps have many marketing benefits. Recently, new terms have emerged such as marketing intelligence and neuromarketing. With new versions of networked AI algorithms, smart marketing applications are personalized and reflect the needs of customers. The AI revolution in the industry is gradual, and

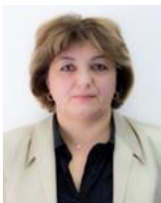
advertising uses modern marketing and smart billboards. Artificial Intelligence will completely change our way of life in the coming years and will help us make the right decisions as we understand how information affects our lives. To improve the effectiveness of advertising and marketing, the prospects for the use of artificial intelligence technologies should be widely studied. Some of Amazon's marketing products are classified. It was classified by NaiveBayes, MultilayerPerceptron and iBK methods. More can be done by increasing attention to the possibilities of artificial intelligence, increasing the development of the economy by expanding the audience of buyers in the field of advertising and marketing. Therefore, in order to be among the leaders of Industry 4.0 and marketing, it is necessary to start mastering Industry 4.0 from this moment. This article discusses the main benefits of using a smart billboard network in SI marketing.

Currently, research in the direction of creating AI is being conducted in the field of computer science, advertising, marketing, natural language processing, knowledge description, robotics, robot training, planning their activities, etc. is aimed at. Promising research is planned to be developed in the direction of finding strategies based on programming. AI algorithms provide software mining, testing and decision support. These smart tools focus on software development methods, process support and development. Automated Intelligent as hardware is used, their use in software is one of the daily innovations of information technology.

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