

A. Safonov

The impact of AI (Artificial Intelligence) on SEO



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HOW SEARCH ENGINES WORK



WORK OF SEARCH ENGINES

There are hundreds, even thousands of search engines in the world nowadays. These are not only the classic Google, Bing or Yahoo search engines: the category also includes search engines for social networks (YouTube), marketplaces (Amazon) and similar large and smaller resources.



HISTORY REFERENCE

The look and search engine mechanics have changed over the past 30 years. For a long time, there was no automation at all in this process:

- Late 1980s: The first prototype of search engine called Archie appeared. Instead of searching in real time, the system offered a large archive with links to various files. Similar catalog archives were produced until 1993.
- 1993: The world's first search bot World Wide Web Wanderer was developed by Matthew Gray of the Massachusetts Technical University, as well as the Wonder search base.
- 1993: emerging of Aliveb with manual introduction of sites for indexing.
- 1993: appearance of Yandex (Russia) prototype, which was originally a file indexer on a hard disk. The search application of the same name was launched in 1995.
- 1994: appearance of a more or less known Yahoo! search engine.

YAHOO!

Yahoo! was developed by Stanford University graduate students Jerry Yang and David Phil and for some time (about three years) was in little demand.

In 1996, Stanford University students Larry Page and Sergey Brin created an educational project called BackRub. Initially, the system was intended to modernize a unified student digital library, and on this basis, the topic of Page's scientific work was the study of the patterns and mathematical properties of the World Wide Web.

Soon Brin joined the study, and a search robot was created that analyzed the data using the author's algorithm called PageRank.

As many have probably guessed, this is how Google was invented. The system received its current name in 1997, and at the same time it moved from the university website to its own, unique google.com domain.

Google

Google was much more progressive than its contemporaries, although similar ranking principles had been studied before. Then later analogues began to appear:

- Microsoft's current Bing search engine, formerly known as MSN, Windows Live Search and Live Search, 1998.
- Portal Mail.ru, which also offered a catalogue, 1998.
- The Chinese Naver system, which is used by about 70% of the local population, 1999.
- Chinese company Baidu, 2000.

None of these companies could seriously compete with the rapidly developing system Google. Constantly offering technical innovation and expanding its influence, Google has become a monopoly: in 2019, it accounted for more than 91% of the market.



SEARCH ENGINE MARKET STATISTICS

The table below provides statistics on the popularity of search engines.

Despite the diversity of companies providing services in this niche, some of them have clearly monopolized the market, also due to their technical superiority.

NAME	SHARE
Google	91,65%
Bing	2,7%
Yahoo	2,1%
Baidu	1,3%

Search Engines in the world, 2019/2020



TECHNICAL BASICS OF SEARCH ENGINES

Any search engine is a complex set of mechanisms for identifying, sorting and analyzing digital content. It can process text, link content, media and entire pages, and the ultimate goal of any search engine is to quickly and accurately give the user what he came for.

The entire search process consists of four global stages:

SCANNING

The ongoing process of finding and evaluating the content of new pages. In 2021/2022, the analysis becomes more difficult because of uniqueness of content.

RANKING

Sorting pages by relevance in accordance with a particular user request.

INDEXING

At this stage, the search engine adds the page to its database, organizes the information received and brings it into a readable form.

SEARCH RESULTS

Providing a relevant result in response to a user request.

Search engines are constantly improving in order to provide the user with accurate and useful results, as well as developing promotion tools for webmasters, including contextual advertising, paid placement in maps and analytics services.



STEP BY STEP SEARCH PROCESS

From the point of view of an ordinary user, the search process with a stable Internet connection takes a matter of seconds. In fact, everything is much more complicated.



SEARCH QUERY

The user formulates and enters a search query into the line. For example, "Buy wallpaper in Moscow".

The robot starts to analyze the intention. For a person, this is an absolutely simple and understandable process, but it took years of development in order the process could be carried out quickly and automatically by a machine.

The system can do the following within a fraction of a second:

1. Determines the language of the language query and analyzes the characteristic arrangement of characters in the line in case if the user wrote in a different layout.
2. Divides the entire query into groups of keywords, analyzes their meaning and selects synonyms to expand the search results. Ultimately, the results will include not only Moscow wallpapers, but also websites of hardware stores and salons in other cities, wallpaper sticking instructions and description of different types of wall coverings.
3. Matches pages with the purpose of the request: they analyze the content of applicants first of all for keyword relevance, and then for the quality of the site in other ways. These include the novelty of the site and the update of the content, as well as popularity and the availability of the required language version.
4. Localizes the search. The process takes into account the user's personal data, his region and other valuable data that will help you choose the best site. Even without specifying a region in the request, a Muscovite will be offered stores in the capital and the region, while a resident of the regions will get a completely different result.

Then the list is formed in descending order. In the first place in it are those sites that, in the opinion of the search engine, will be more useful for the user than the rest.



SEARCH PERSONALIZATION

In order to localize the search, robots use some data about the user. These include:

1. Search and views history. Not only visited sites are taken into account, but also visit duration, as well as some behavioral factors. Thanks to this, the system determines what might be of most interest to the user when sending a request.
2. Region. A user from Belarus looking for articles on the tax system for business on Google would not be interested to read an article about the tax policy of Ukraine or Monaco. For this reason, the region is taken into account among the first.



COOKIES

Do not confuse personal data taken into account by the search engine with cookies. The latter are requested and used by specific sites to improve the process of interaction between the resource and the visitor.

Roughly speaking, cookies can be called a tool for personalizing local search. By agreeing to their transmission in the online store, the user also:

1. Saves his browsing history;
2. Gets the opportunity to see individual advertising;
3. Saves authorization until the next visit to the page, and so on.



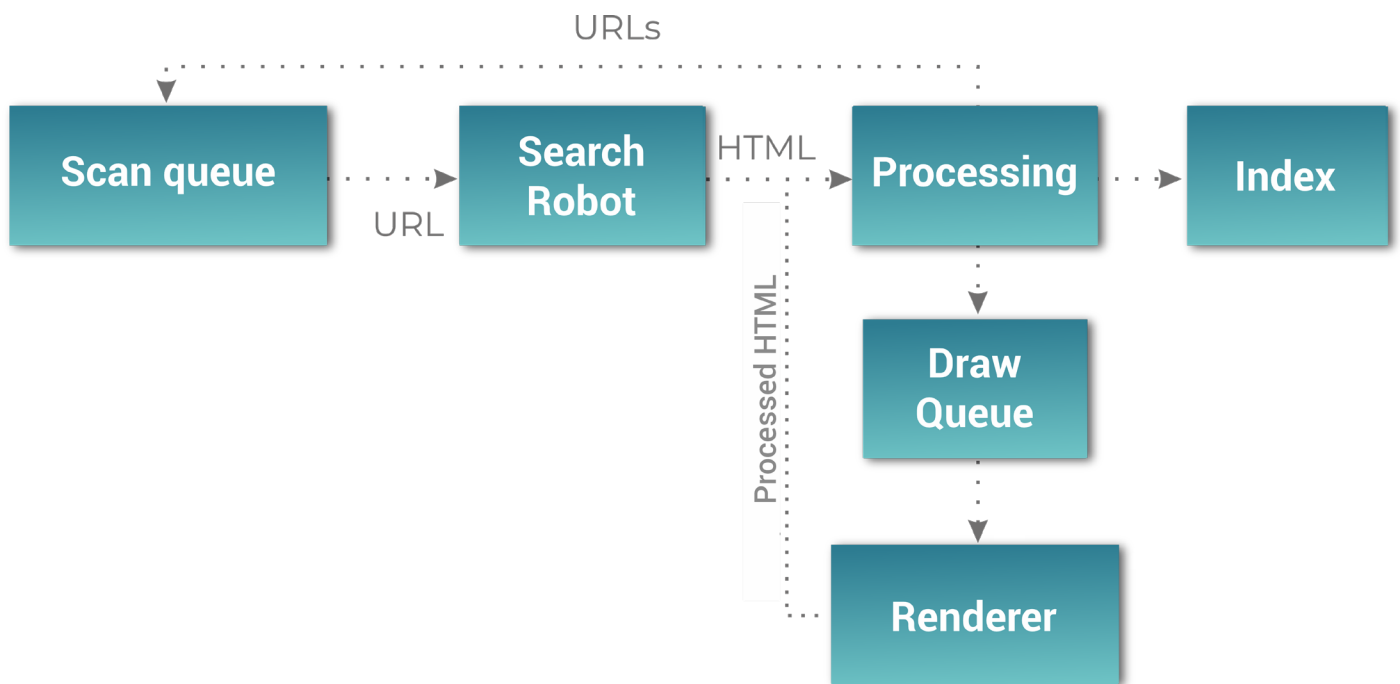
SCANNERS

Search engine crawler robots are also called scripts. In the Google system, their role is performed by Googlebot.

Steps of the scanning process in Google:

- Forming a queue of pages for scanning and rendering.
- Sending HTTP request to get URL of each of the pages in the queue.
- Reading the robot.txt file containing indexing permission data.
- Forming a queue for rendering pages.
- Analysis of the HTML code received from the system.

The company offers the following scheme which illustrates the whole scanning process:



Source: <https://developers.google.com/search/docs/advanced/javascript/javascript-seo-basics?hl=ru>



INDEXING

After finding and scanning the desired page, the search robot begins to study its content, and then sorts it into the categories. Not only the content format is taken into account, but also CSS, HTML, the presence and number of keywords. This data forms a comprehensive picture of the page in a digital equivalent that is understandable to the bot.

The received information is entered into the database of the search engine and remains there. To handle the database of large companies, a large amount of energy and thousands of computers are needed to maintain the continuity of the process.



RANGING

Retrieving one or another page from the database, the search robot evaluates the compliance of the previously analyzed content with the search query. All information is sorted every time when the user is trying to find something.

Ranking results directly determine the position of the page in the search results.

Factors taken into account in PageRank are the following:

1. The presence and number of keywords. Their absence will not allow the robot to consider the content relevant, while excessive spam will give a signal of uselessness and focus on promotion, for which the system can impose sanctions.

2. Novelty and credibility of the site. The longer a resource works, the more trust it inspires in the search engine. An older site is more likely to rank on the first page of the search results compared to a younger site with similar metrics.

3. Ease of navigation and design. General usability is also taken into account - whether the user will feel comfortable on the page.

4. Page loading speed. Slow speed can significantly lower the position of the site in the search results, this factor can be influenced by media content, provider features, or the lack of cache.

5. Availability of an adapted mobile version of the website. Mobile traffic continues to grow: in 2021, more than 62% of online resource visits came from smartphones and tablets. The user needs comfortable conditions, regardless of his device in view of statistics.

Also, the technical indicators of the website, its link profile and other factors can affect the ranking. Their influence is not equal.



GLOBAL AND LOCAL SEARCH ENGINES

Search engines can be conditionally divided into two categories:

1. GLOBAL

Global search engines are traditional, familiar search engines, thanks to which it is possible to search for information on the World Wide Web. They are focused on heavy loads and are able to process the corresponding data arrays.

2. LOCAL

Local search engines work within the same site, application or system. Their criteria for evaluating and issuing search results are less flexible, and the function itself is used for a narrow range of queries.

This way, the YouTube search engine is designed to search for specific videos and authors within the network. At the same time, the robot takes into account not only the morphology of the request, but also additional criteria: the number of views, the novelty of the content, the popularity of its author, user behavioral factors on the channel and the like.

Amazon has search tools similar to those of eBay and AliExpress. Almost any site with a local search option has filters that make the process easier.

For online stores, the following search filters are most commonly used:

- Type of product,
- Price,
- Color, size,
- Manufacturer.

When using them, the robot specifies the request by adding additional parameters of the desired product to the main phrase.



SPECIFICS OF SEARCH ENGINES FOR THE USER

Modern search engines are constantly being upgraded and improved for user comfort. Today, even a child who sends a request of two misspelled words can find what they need.

However, in some situations, when searching for specific content, there is a need for maximum specification. To obtain more accurate issuance results, the following measures are applied:

1. Literacy and precise wording. Search engines are able to determine the desired layout language, analyze requests with indefinite forms of verbs and a certain number of minor grammatical errors, however, in combination, these factors can interfere with the correct search.

2. Narrowing the request. In order to search for educational materials, it is recommended to add a source of information to the definition of the topic. Thus, for example, you can find data for course work and theses: if the query phrase contains the words "textbook", "manual" or "article", sources will appear in the output that can be referred to.

3. Use of special characters. Google provides techniques for effective search, which for some reason have not been widely adopted by the audience. To search for an exact phrase, you can exclude synonyms and similar results from the query by enclosing the query in quotation marks. "+" and "-" are used to add what should be in the search results and identify minus-keywords that are not needed for the search.



SEARCH SUGGESTIONS AND RELATED QUERIES

To help the user find the necessary information and expand the search, almost all popular systems use search suggestions and similar queries.

Search suggestions are offered at the stage of entering a query, taking into account the specified groups of keywords. This allows not only to more accurately formulate an idea, but also to start searching faster, saving time on writing a phrase. In addition to the keys, the previously mentioned personal factors are also taken into account:

1. Search history;
2. Region;
3. Social criteria and others.

Unlike tooltips, search suggestions related queries are displayed after the results are returned, but they don't always match the original intent of the requester.



THE SPECIFICS OF SEARCH ENGINES FOR BUSINESS

The whole mechanics of SEO-promotion is based on the principles of functioning of search engines. In order for a business to develop effectively in an online environment and withstand fierce competition, a webmaster and marketer have to do a difficult job:

- **Scanning stage.** For successful scanning (and subsequent indexing), it is necessary to develop a site architecture that is convenient for search robots, use internal links (the so-called linking) and prepare a site map in XML.

- **Indexing stage.** The webmaster can influence which pages of the website are included

in the indexing. For the correctness of the process, it is necessary to configure the Robot.txt file, which indicates the list of pages available and closed for indexing.

- **Ranking stage.** The most complex and time-consuming, it includes a set of internal and external optimization measures. The goal of the webmaster is to take into account all the ranking factors offered by the search engine in which it is promoted.

Full optimization of the website in accordance with the requirements of the search engine can take up to several years if all recommendations are followed.

CONCLUSION

Search engines are one of the greatest inventions of the last century, allowing to quickly find, view and save the information you need among huge amounts of data. Nowadays their work process takes less than a second and is available to every user, and business owners can be provided with additional tools for promotion.

SEO SPECIALIST



THE PROFESSION OF AN SEO SPECIALIST

A large number of professions related to technology, IT and media provide a lot of opportunities to choose from. In particular, the area of SEO is in high demand.



WHAT IS SEO

SEO is a set of strategies and techniques aimed at increasing a website's visibility by improving its position in search engine rankings, in non-paid results called «clean» or «organic» issuance. Abbreviation "search engine optimization" translates as «optimization for search engines.»

There are a lot of such practices, and they relate to various aspects of a website: optimizing the structure, HTML code, text content, managing inbound links (in other words, links from other sites to your site) and outbound (that lead from your site to other resources).

Since Google is the most used search engine in the world at the moment, much of the search engine optimization activity is related to the study of its algorithm and periodic updates.



WHAT DO SEO SPECIALISTS DO?

An SEO specialist is a professional whose goal is to attract quality traffic to a client's website, positioning it for strategic keywords on the first pages of search engines (Yandex, Yahoo, Bing, and Google in the first place), as well as adjusting it to the ranking requirements. Safe and up-to-date methods are used in order to complete this assignment.

This person is a fundamental figure in the operation of the website: it is simply impossible to conduct online activities without him. Due to the large number of sites of similar topics, it will not naturally get into the TOP of the search engine results page; moreover, the page will not receive traffic and conversions since the user simply will not be able to find it.



SEO SPECIALIST AND SEO MANAGER

Most often, all the tasks of search promotion are performed by one person, but sometimes in large companies, an SEO manager works separately.

An SEO consultant or manager performs, as the name implies, a consulting activity (usually as a freelancer from an external resource) and is able to draw up an effective optimization plan by proposing measures for a specific resource.

An SEO specialist is a person who, in addition to drawing up a plan of action, is able to put into practice what is required for effective promotion in the search engines.

Finally, the SEO manager, in addition to planning and working skills, also has a goal of supervising and coordinating the team that deals with SEO; he usually also takes care of the efficient allocation of the budget in the SEO campaign.

The confusion arises from vacancies in the labor market, often confusing the duties and responsibilities of the specialists.



CATEGORIES OF SEO SPECIALISTS

Gradation of specialized professionals came to search engine optimization from the field of IT and development:

1. Junior (possible names: junior, jun);
2. Middle;
3. Team Lead (also Team Leader);
4. Senior.

The beginners are usually not included into any of the categories. They usually take the position of trainees, less often assistants, and perform only some tasks on their own. In fact, a beginner is a person who has moved from the theoretical to the practical part of the training, during which he can collect a basic case for subsequent employment.

Junior SEO can handle simple projects on his own. He does not only perform basic assignments, but is also competent enough to conduct technical audits and interpret the results. Knowledge of basic analytics tools is expected. The specialists of this level are most of all on the market today.

A Middle-level specialist is considered quite experienced and receives a correspondingly high salary. He manages complex projects and can run several campaigns at the same time, usually covering all stages of promotion, from analytics to results evaluation and preparation of a report. At the same time, he also carries a great responsibility.

Top-level specialists have all the skills of SEO-promotion, compose complex business development strategies in the search engine and manage projects. A team works under their control.

Among other things, additional skills are often expected from **Team Lead and Senior SEO**: knowledge of various programming languages, ability to work with BI-systems, and others.



WHAT DOES A SEO SPECIALIST DO

Here is the list of some professional duties that a specialist in this profile should deal with:

1. Reading and interpreting search results, using appropriate monitoring tools to analyze user intentions and features of a competitive niche in order to determine a further promotion strategy in accordance with the results obtained.

2. Working out the structure of the website and its pages, the ability to create paths that are easily read by search engine crawlers during the appropriate analysis for further indexing and display in search results. Elaboration of navigation in terms of user friendliness.

3. Working with technical aspects, searching for and identifying possible errors that can negatively affect the results of search promotion.
4. Drawing up a semantic core for filling and promoting the website.
5. Drawing up an editorial plan for writing optimized content that will be published on the website.



REQUIRED SKILLS

Professional and technical skills that a specialist must possess follow from these responsibilities:



PROFESSIONAL SKILLS

1. Ability to work with tools for technical analysis of the website;
2. Audit of the search visibility of the site;
3. Work with the tools for analyzing and selecting keywords and a semantic core selection;
4. Work with analytics and statistics tools to evaluate the results of promotion Metrika, Webmaster, Google Search Console, Analytics and others;
5. Ability to work with HTML and / or CSS;
6. Ability to work with various CMS, including Bitrix;
7. Work with the links, drawing up a plan for link promotion;
8. Formation of technical specifications for developers and copywriters;
9. Ability to work with contextual advertising tools;
10. Ability to compile reports on the results of search promotion.

Skill requirements vary from company to company, but more versatile professionals are usually offered appropriate pay.



PERSONAL SKILLS

Personal skills or so-called soft skills are also important for any SEO specialist and job seekers pay attention to them. The list of important character traits includes the following features:

1. Literacy, communication skills and developed diplomatic skills. In the work process, the specialist communicates not only with possible management, but also with the clients and numerous colleagues: webmasters, designers, developers and copywriters. Without the ability to find a mutual language, negotiate and clearly formulate the goals, it is extremely difficult to achieve a good result.

2. Observation and concentration. In order to better read and interpret search results, a specialist must have intuitive skills, as well as be able to ask themselves relevant questions to determine the real search intent of the user and potential website visitor.

3. Ability to learn. This is another basic skill which is important for everyone who works in IT and media. The whole process of website development depends on it: the inability to timely identify and correctly implement the next innovation of the search engine not only slows it down, but can also lead to decline of the issuance and other sanctions.

4. Analytical mindset. An SEO specialist has to constantly work with numbers, but the best promotion strategy is not based on them. In order to determine a resource development plan for several years, it is necessary to conduct a comprehensive study of all the factors inherent in business, a competitive niche and modern promotion mechanics semantic core.



DETAILED DESCRIPTION OF WORK STAGES OF WORK OF SEO SPECIALIST

The average scheme, according to which a self-employed or employed SEO specialist works, is as follows:

1. Analytics. A comprehensive analysis of the competitive niche is carried out in accordance with the region as it allows to identify several main competitors and study the specifics of their site in detail: design, navigation, available metrics and other factors.

2. SEO and technical audit of the client's website. This is a time-consuming and complex process, during which the specialist needs to detect possible problems. These include, among other things, duplicate pages, so-called broken links, slow loading speed, the position of the site in the search engine results page and an assessment of the presence of search engine filters, as well as determining the reasons for their appearance which are not always obvious.

3. Collection of the semantic core. With the help of special tools, keywords are selected for the necessary search engines. Taking into account their frequency, cost and competitiveness, a balanced semantic core is compiled, which is used later when filling pages.

4. Study of the structure. At the structure developing stage, a specialist evaluates it and provides the client with recommendations on adding additional pages, some changes in the navigation, corresponding to the specifics of the goods and services provided.

5. Drawing up a search strategy. In accordance with the results of the analytics and the wishes of the client, a promotion strategy is made up. It takes into account, among other things, the expected position in the search results and determines possible additional campaign objectives.

6. Content preparation. From the point of view of an SEO master, it consists in preparing a technical task for the authors. Text content is created by the interaction of two specialists, which makes it possible to achieve a balance between optimization and quality of the material.

7. Internal site optimization. This is rather extensive set of assignments, which includes addition of meta tags, internal links and micro-markups. At the same stage, it can work out usability, which affects behavioral factors. Sometimes design is also taken into account, as well as commercial factors when it comes to sales.

8. External site optimization. According to the developed link building strategy and the results of the analysis of the competitors' link profile, a list of links and a plan for their placement on external independent resources are compiled.

A professional can work with the whole complex or deal with one thing. Both in the

freelance market and in agencies, the practice of providing individual services is common: it can be a technical audit, compiling a semantic core, or preparing content.

Turnkey SEO takes a lot of time: promotion can take six months or even a year and the audit and updating of the semantic core must be carried out regularly.



WHAT TOOLS DO SEO SPECIALISTS USE?

The market offers many tools for SEO analysis, and most of them are paid. There are free options in Google and Yandex search engines, and they are considered basic. They are most often found in the requirements of employers.

Here is an up-to-date list of popular free SEO tools:

1. Google Analytics
2. Google PageSpeed Insights
3. Google Search Console
4. Microsoft Excel
5. Google XML Sitemaps

The list of frequently used paid services is below:

1. Netpeak SEO Spider
2. Netpeak Checker
3. Key Collector
4. Bright Local
5. Linkpad

Netpeak is a comprehensive service for assessing factors and parameters that are significant for SEO promotion. It is paid, but offers automated and easy-to-use analytics features. Bright Local is an expensive but effective tool for local SEO.

The Key Collector service is used for in-depth search and analysis of keywords. The Linkpad service is used as part of the link promotion of the site.

For text content, the following tools are used:

- Grammarly.com
- DupliChecker.com
- Check-plagiarism.com and more

With their help the SEO indicators of texts can be evaluated and adjusted, including keyword frequency and spam score. Text.ru is ideal for checking the uniqueness of materials: 10,000 characters with spaces per day can be checked for free, and paid rates are provided on the platform for purchasing additional characters.



SEO SPECIALIST EMPLOYMENT

The profession of an SEO specialist is quite in demand in 2021. The Covid-19 pandemic has brought online services and sales sector to the forefront, and against this backdrop, already tangible competition has only intensified.

Today, each web resource needs to deal with search engine promotion issues in a timely manner in order to get traffic and conversions. This assignment is handled by an experienced SEO specialist.

Today, Indeed.com recruiting platform offers over 6,000 SEO-related and promotion-related jobs. Among them, there are enough offers of remote work.

Also, an SEO specialist can work as a freelancer, independently looking for a client base. For these purposes, so-called freelance exchanges, own blogs on social networks or individual websites are used.



SALARY

The salary of a specialist in this niche depends on the following factors:

1. The scale of the employer's company and the requirements for the specialist;
2. Experience and skills that a specialist can offer to an employer;
3. Market and country. In the future, cooperation with foreign partners can bring more income.

According to Glassdoor.com data for 2021, the distribution of vacancies by salary range was as follows:

- Minimum salary - \$32,000/year
- Average salary - \$48,000/year
- High salary - from \$72,000/year



ADVANTAGES AND DISADVANTAGES OF THE PROFESSION

Summarizing, we list the main advantages and disadvantages of the profession of an SEO specialist:



HERE ARE MAIN PROS

1. Demanded niche, the relevance of which will probably only grow in the next few years;
2. Relatively high salaries and the possibility of rapid career growth;
3. Availability of resources for self-education and advanced training.



SOME CONS

1. Mandatory training. For a guaranteed employment, it is highly desirable to undergo high-quality training: today there are quite a lot of self-taught specialists providing basic services, and some dumping can be noted in the category of beginners.
2. High level of responsibility. The client's business depends on the actions of the SEO master: gross mistakes can lead to losses and even website blocking.

Nevertheless, those who wish to work in this area will be able to master an interesting creative profession.

GOOGLE RANKING FACTORS

Ranking factors are parameters of the page and the website as a whole that affect the promotion in the search results. According to them, search engine algorithms determine the following:

1. If the resource is relevant to the search query;
2. If it is user-friendly;
3. If the resource is safe for the user, etc.

When developing a promotion strategy, an SEO specialist needs to take into account as many ranking factors as possible. In this article, we will talk about their specifics in Google search engine as of 2021.

GENERAL FACTORS

This category includes the most significant general factors regarding the functionality and technical characteristics of the website.

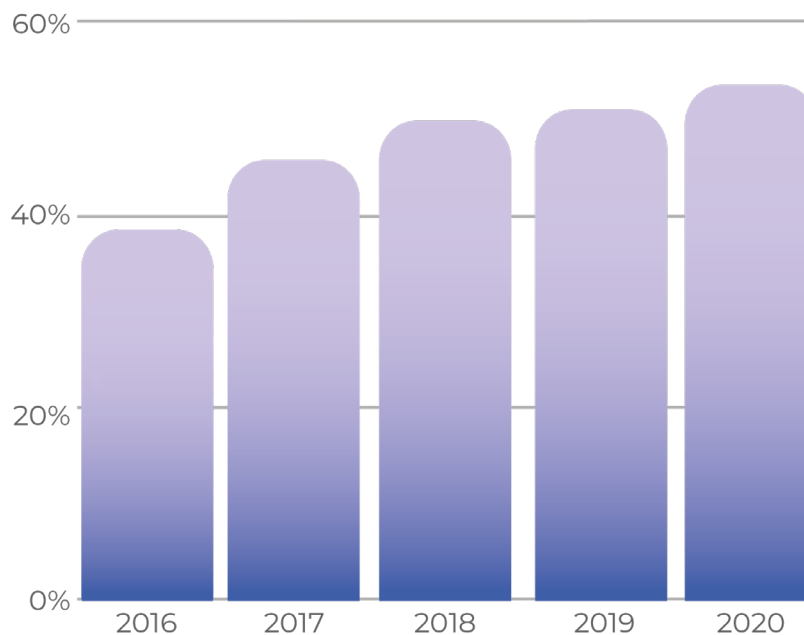
CONTENT UNIQUENESS

The uniqueness and quality of the text content of the website is analyzed by Google Panda search algorithm, first introduced in 2011. Resources with illiterate, useless content have a lower chance of reaching the top of the search results, and the system imposes filters for non-unique content.

To check the uniqueness, you can use third-party services, the maximum allowable share of non-unique content is about 10%.

MOBILE OPTIMIZATION

Since September 2020, Google has announced a mobile-first innovation in indexing. This means that the adaptability of the website is not the only, but one of the decisive factors in ranking. According to statistics, at the beginning of 2021, more than 66% of the world's population used mobile devices, and about 53% of traffic comes from mobile.



Mobile traffic indicators by the year

Search engines have begun to pay special attention to mobile traffic and creating a comfortable environment for smartphone users against the background of this trend.



SSL CERTIFICATE

Over the years, Google has changed its policy regarding the communication protocols used by various websites present on the Internet. In fact, it has become almost mandatory for some time to have more than just HTTPS as a network communication protocol, to the detriment of plain and old HTTP.

Since this new policy was introduced, all websites that do not use an SSL (Secure Socket Layer) certificate yet may incur penalties in search engine results because they are declared «NOT SECURE.» Also, a new entry, that appears in the address bar («NOT SAFE») prevents users from accessing or viewing these sites.

Availability of service content.

The so-called service content is placed on service pages and helps the user to understand the use of the site, obtaining its services and other key issues.

The service pages category includes the following sections:

1. Information about the company
2. Pages with information about delivery and payment
3. FAQ section

Content is created according to the principle of relevance to the request. The information content and benefit for the visitor are put in the first place.



OTHER FACTORS

Here are the factors that affect ranking:

- The architecture of the site, which affects the indexing and analysis of the content of all pages.
- The presence of Sitemap files, which also affects indexing.
- Site downtime due to technical errors, hacks, hacker attacks, updates, and others can negatively affect rankings.



DOMAIN FACTORS

Some domain factors have minor effect on rankings.

- Domain age. Older websites are considered authoritative by the search engine and may receive a marginal advantage in the ranking process compared to younger websites. It is assumed that there is a so-called Sandbox, in which all new websites fall: during the first six months of the existence of the resource, its positions are deliberately underestimated. However, Google representatives deny the existence of an algorithm of this type.
- The presence of keywords in the domain name and top-level domain. It may have an indirect impact on the assessment of the relevance of the page and the content posted on it.
- Duration of domain registration. If a domain is paid for a long time, the Google algorithm receives a signal about its reliability: short-term contracts are usually used on fake websites and doorways.
- Number of owners. If the domain is old and changes owners, as well as if renewing the lease of the domain, the search robot will reduce the weight and authority of the website to zero, and also removes backlinks.



PAGE FACTORS

A separate category of factors is taken into account when evaluating the pages.



URL

There are certain criteria related to the URL of the page:

1. URL Length: Shorter and simpler page addresses are likely to take precedence over longer ones.

2. The presence of keywords. It is possible to organically enter keywords into the page address, thereby increasing its relevance.

3. Category assignment. Some CMSs allow to assign a category to a page, which makes it easier to identify from a search engine's point of view.



GOOGLE PAGE EXPERIENCE

In 2021, Google introduced a new ranking algorithm for mobile devices and announced the launch of a similar algorithm for computers in the spring of 2022. Page usability analysis takes into account the following factors:

1. Page optimization for mobile devices (in addition to the mobile-first principle);
2. Support for the HTTPS protocol for the security of the website and its users;
3. The absence of interstitial ads that complicate access to content (hard-to-close banners, notifications and feedback forms);
4. Large content rendering, input lag and layout shift on page load.

Large content rendering refers to the loading speed of the main content of the page, or LCP. The maximum indicator should be no more than 2.5 seconds: the smaller it is, the better for the user and for ranking.

Input latency, or FID, displays the amount of time it takes to wait for a response when interacting with site content. The indicator should not exceed 100 milliseconds.

Finally, layout offset on page load or CLS reflects the visual stability of the page. An unstable interface worsens the user experience, and since it is decisive for Google, the algorithms will simply stop promoting such a site in the search results. The CLS value must not exceed 0.1.

The above parameters can be measured using the Google PageSpeed Insight tool.



TEXT CONTENT

From the point of view of text content, the following factors are taken into account in ranking:

1. Regular updates. Frequent posting of relevant content increases the page's chances of promotion in search results.

2. No duplicate content. Even if the texts are unique, they should not be repeated on different pages of the same site.

3. Structured text content can not only have a beneficial effect on ranking, but also simplifies the perception of the text by the user and, in the long run, increases the time of his stay on the page.

4. Use of headings of different levels and keywords, as well as LSI words in them.

5. Literacy and lack of spelling errors. It is not the most important, but relevant parameter.

6. Text length. Longer texts, from the point of view of the search algorithm, reveal the topic more deeply and may be more useful to the user. However, this factor should not be manipulated: the volume should correspond to the given topic.

So, an example of an attempt to manipulate the volume of the text can be materials that are irrelevant to the request: a recipe for a dish in which the history is described before the recipe itself, traditional variations, cooking customs of different people, and others.

Keyword abuse in the body text of a page is recognized by the previously mentioned Panda algorithm. The indicators can be evaluated using third-party services. The interpretation of the result depends on the principle of analysis of a particular system.

- copywritely.com
- seoreviewtools.com
- smallseotools.com and more

It should also be remembered that posting auto-generated content is in most cases completely useless and also counterproductive, and for this reason there is a risk of penalties. Posting auto-generated content, as well as duplicate and hidden content, indicates to Googlebots that the website owner doesn't care at all about posting relevant and useful material to online users.



OUTGOING LINKS

The ranking process takes into account the quantity, quality and relevance of outbound links.

When placing links to third-party resources, it is necessary to take care of the following factors:

1. Excessive and frequent adding of links to a page can reduce its rating, so webmasters are advised to use moderation.
2. It is better to give preference to links to relevant resources, websites of similar subjects.
3. On websites with the commenting option, you should control and, if necessary, limit the placement of links by users.

Links to double sites should not be posted, sites with prohibited content or spam resources.



ADDITIONAL FACTORS

Additional factors that have or are expected to have an impact on the position of the site in the search results are:

- The presence of keywords in titles and meta tags. This is the first impulse that informs the search robot about the relevance of the content posted on the site.
- The presence of keywords in the texts. It is still taken into account when ranking, however, an overabundance of key phrases and words can lead to website pessimization in search results.

Caution is advised.

- The presence of LSI queries or words that form the subject.
- Page loading speed. AMP is not a ranking factor, however, between two equivalent pages higher in the SERP, there will be one with a higher loading speed.
- Image optimization. Using tags, descriptions, and titles for images can have a beneficial effect on ranking results.
- Availability of additional tools. Additional tools or widgets added as needed can add value to the page for the user and the search engine.
- Multimedia. Diluting the content on the website with videos and images also has a positive effect on page ranking.
- Page age. Older but frequently updated pages may rank higher than newer ones.



LINK FACTORS

Link promotion is one of the most controversial topics in SEO. However, some link factors directly affect the promotion result.



PAGERANK AND EXTERNAL LINKS

PageRank is one of the oldest and most important link ranking algorithms. In 1995, Larry Page and Sergey Brin started a student project to study backlinks and their use in online searches.

In 1996, BackRub appeared, which laid the concept for the future of PageRank, and later this system was renamed Google. The first description of PageRank appeared in 1998.

The principle of this algorithm is that the importance of a web page is determined by the number of links leading to it. Over time, it has been improved, and now a number of factors are taken into account in link ranking:

1. Number of backlink source domains. The more of them, the more impressive the link profile of the acceptor site looks. However, an overabundance of low-quality links can cause pessimization and even site blocking.

2. The number of pages of the same website that host a backlink.

3. Trust and authority of the website placing the backlink. If it's a trusted resource with good tags and an appropriate position in the SERPs, the link will carry a lot of weight.

4. Age of the donor website. Older websites are more valuable donors than newly created ones.

5. PageRank of the donor website. This is another important ranking factor.

6. Variety of links. What matters is the type of link profile, the presence of eternal and temporary links, different IP donors and nofollow tags. The addition of anchors and types of websites are also taken into account: forums, social networks, shops and others.

7. 301 redirect can be used, but with caution. Back in 2013, it became known that excessive redirects in a link reduce its value and importance in the link profile.

8. Natural links. One of the most valuable and important indicators is the presence of natural backlinks. Today, SEOs create a link building strategy that mimics organic link building.

Backlinks from low-quality donor websites can negatively affect search positions.

These include resources with poor metrics, irrelevant resources that have fallen under the influence of search sanctions and filters for spam, and other violations.

It is worth paying attention to the tactics of exchanging backlinks that are loved by many. Under certain circumstances, it can really give an effect, but it can also be perceived by the search robot as an attempt to artificially increase the link profile. Exchange of links between websites of the same network is allowed.



INTERNAL LINKS

In addition to external links, internal links are also important for Google. They are the links that are placed directly on the website and lead to its own pages. In the process of search engine optimization, it is important to carry out the so-called relinking, including placing secondary pages on the main one in order to contribute to their promotion.

In addition, in the case of internal links, the following factors are taken into account:

1. Broken or so-called broken links. Such ones are detected and removed during the technical audit of the website, as they may indicate that it is neglected and negatively affect the page rank. They can form spontaneously, therefore it is recommended to initiate regular checks.

2. Location of the link on the page. They can be in the menu or footer, but links placed in the body of the text in the middle of the page get the most value.

3. The presence of text in the link. Anchor or so-called anchor text is the text that the user can see instead of the page address in the hyperlink. It may contain keywords (an outdated and ineffective technique), and characterizes the description of the page to which it refers. It should be used with caution.

4. The presence of text around the link. Presumably, the content of the text surrounding the link affects its analysis by search robots.

5. Link authorship. Links posted by website users may carry more weight than links posted by an administrator.



BEHAVIORAL AND SOCIAL FACTORS

Finally, here is a number of factors that depend on user behavior on the resource:

- Attendance of the resource;
- Duration of stay on the website;
- Returns to the website of the same user;
- Viewing depth, that is, the number of viewed additional pages and transitions between sections of the website;
- Bounce rate, that is, exit from the main page immediately after the transition from the issue;
- User engagement: this factor refers to clicking on various buttons, using the forum, widgets and other tools.

These parameters can be measured using Google Analytics.

CONCLUSION

To summarize the above mentioned, it is worth making several important conclusions about ranking factors:

1. They change. Some factors lose their relevance completely or partially, and new parameters appear that must be taken into account.
2. Not all factors that are popular among SEO specialists are actually of great importance in the search engine promotion process.
3. The main task of Google is to satisfy the needs of the user, and the specialist can use this fact in the process of optimization and promotion.

SEO ASSESSOR



SEARCH ENGINES ASSESSORS AND THEIR ROLE IN THE FORMATION OF SEARCH RESULTS

The main job in website analysis and generating search results is done by robots. Artificial intelligence technologies and machine learning automation processes make the systems more perfect. However, the capabilities of machines are imperfect, and companies have to use human resources to maximize the efficiency of services. The so-called website evaluators or assessors are directly involved in this.



UNDERSTANDING THE MAIN PRINCIPLES OF THEIR WORK IS VERY HELPFUL FOR SEO SPECIALISTS

The main job in website analysis and generating search results is done by robots. Artificial intelligence technologies and machine learning automation processes make the systems more perfect. However, the capabilities of machines are imperfect, and companies have to use human resources to maximize the efficiency of services. The so-called website evaluators or assessors are directly involved in this.



DEFINITION

Assessor is a person who examines the search results for compliance with the needs of the user. The Google Assessor Guide provides the following definition: "As a search quality evaluator, you will work on many different types of ranking projects. The general guidelines first take into account the Page Quality Rating (PQ) and the Needs Satisfaction Rating (NM); however, these concepts are important for many other types of rating tasks as well."



ASSESSORS` GOALS

Search engine algorithms are not always capable of 100% assessing the relevance of content to a query. From time to time, low-quality sites, sites of other topics or doorways get into the TOP of the search results. The goal of assessors is to reveal such websites and report that there is a resource in the TOP that does not correspond to the main ranking factors of the search engine or directly violates its rules.

Such specialists may have other assignments depending on the specific search engine: work with media content, advertisements study posted on the website, assessing the functionality of service tools etc.



ASSESSORS` IMPACT ON RANKING

- Assessors` impact on rankings depends on the search engine.



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Google.

Assessors of this search engine do not have a direct impact on rankings. In accordance with the terms and definitions of the Google Guidelines: "As a search quality evaluator, you

will help evaluate the quality of search engines around the world. Good search engines produce results that are useful to people who speak their language and are located in their particular region. Your ratings will not directly affect how a particular web page, website or result appears in Google Search, nor will they move them down or up in search results. Instead, rankings will be used to measure the performance of search engine algorithms for a wide range of search queries."

Google representatives in one of the interviews also told that the website is not the subject to "pessimization" after the moderator's message about low quality or rating. However, improved algorithms due to assessors, will mark a website for sure that violates the rules of the search engine.



GOOGLE WEBSITE EVALUATION CRITERIA

The actual specifics of the work of the assessor and the criteria for evaluating sites are determined by the Manual, which is updated annually.

The overall score in 2021 is as follows:

- The purpose of the page or a website. Most resources are created specifically to help the user or satisfy a need. Websites that do not meet the criteria should not be in the search results. This category includes, for example, doorways.
- Potential risks. The assessor determines whether the page or the site as a whole poses a threat to the user. Ads, spam, malicious content are taken into account. At this stage, it is decided whether it makes sense to examine the page further.

Based on the results of the examination, the resource is rated in accordance with the scale proposed by Google:

1. Lowest score, lowest +
2. Low score, low +
3. Average score, average +
4. High score, high +
5. Top score, top +

Lowest	Lowest +	Low	Low +	Medium	Medium +	High	High +	Highest	Highest +
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The rating is given after the specialist checks the following detailed criteria:

- The quantity and quality of the main content posted on the page, its authority and compliance with the key request for which the issue was generated. Data about the reputation of the website and its content creators.
- Compliance with E-A-T requirements. E-A-T is a new algorithm that stands for "expertise, authoritativeness and trustworthiness": expertise, authority and reliability. The specifics of the analysis of the criteria depends on the subject of the site: more attention is paid to resources that can affect the life and health of the user - for example, news resources or news web platforms.

Low and lowest ratings are given primarily to websites that contain questionable content. However, if a website mentions something traumatic as part of a useful introductory article, it does not fall into this category.

Examples of potentially traumatic topics for which it is possible to get a low score:

1. Physical violence and mutilation threats;
2. Distribution of people personal data with malicious intent and without their permission;
3. Violence propaganda or instructions on the same topic;
4. Promoting suicide, as well as eating disorders, self-mutilation and the like;
5. Advices that carry a potential threat to the life and health of the user;
6. Fraudulent content, content designed to mislead users, containing suspicious links in order to download malicious software.

This category also includes content that can injure limited groups of people: combatants, representatives of sexual minorities, different national and racial groups, diasporas, people with disabilities and others.



KEYWORD MATCH

Compliance with the key query and user intent is evaluated both from computers and mobile devices. Websites that contain a query, but do not offer relevant information for it, will be marked as low quality.



SPAM

Each website in search results is checked by assessors for spam presence. Google allows certain amounts of safe ads and offers tools for ad integration, but excessive spam can be seen as a sign of poor website quality. The low-quality category includes websites that are fraudulently included in the search results and function only to attract advertising traffic without taking into account the user's comfort.



HACKED WEBSITES

A low score from an assessor does not always depend on the website owner. It can be assigned to a resource that has been compromised by attackers and is used to steal user personal data, host malicious content, or spam.



AUTO-GENERATED CONTENT AND NON-UNIQUE CONTENT

A low or lowest score is awarded to sites with automatically generated content that has not been manually reviewed and edited. Google believes that such sites are created for promotion, and not for the needs of the user, and should not be in the TOP of search results.

The same applies to copied texts. If the algorithm did not notice plagiarism on the website, it will be noticed by a professional assessor.



IMAGES

The media content on the website is subject to rigorous scrutiny. You can get a low score if the picture shows shocking content or child pornography.



MOBILE USERS

Another goal of Google assessors is to understand the intent of mobile users. This search engine is initially much more focused on mobile traffic and releases an update for it, which is the reason for the presence of such criteria.

Understanding the mobile user's intent as a criterion is used to determine the relevance of the found content to the mobile search category.

The functionality of units with quick results is also taken into account: whether they work correctly from different devices, whether it is convenient to open the links and whether they open at all, and so on.



REPUTATION

Google offers methods to check and evaluate the reputation of the website owner or the author of the main content. Monitoring can be quite global: taking into the account reviews, surveys, opinions and news about the website and its founders, also paying attention to awards, licenses and other factors.

Despite the fact that documentation focuses on checking the criteria, there is no evidence that each assessor (by some estimates, the staff of these specialists consists of 5,000 people) actually conducts such a deep study for each website. However, resources that have been involved in high-profile conflicts are likely to receive a low score.



FINDING AND HIRING ASSESSORS ON GOOGLE

At the moment Google is not engaged in an independent search for employees, so the appropriate vacancies can only be found through third-party services.

Despite the absence of a requirement for specific knowledge or specialized education, those wishing to get a job in such a position should meet the following requirements:

1. Be fluent in English (level B2 and above, allowing to speak and understand English fluently);
2. Pass an interview with theoretical and practical assignments.

Apparently, there are no criteria and ratings for evaluating the work of employees in this niche, or verification of specialists is carried out, but is not a priority for the company.



ASSESSORS FOR SEO SPECIALISTS

Despite the fact that officially in some systems the work of assessors does not have any effect on the position of the website in the search results, it is still desirable for an SEO specialist to take into account the principles and criteria for evaluation. If they are checked, then they definitely matter to the search engine and can even be one of the ranking factors.

The table below lists the measures that are significant for a website and how it ranks in most search engines, in descending order of importance.

1. Green is very important
2. Orange represents the average importance
3. Yellow is important

FACTOR	EVALUATION
Unique relevant content	Green
Restrictions on the number of keywords used	Green
Advertising Restrictions	Green
Usability	Orange
Reputation	Orange
Media quality	Orange
Commercial Information	Yellow
Mobile Convenience	Yellow

This is a suggested gradation based on known data about ranking factors and evaluation criteria. A website with poor usability can still be considered relevant and useful, while a website that publishes off-topic, copied or auto-generated content and/or spam will get the lowest score even with good usability and design.

CONCLUSION

The services of assessors are and will be in demand for search engines in the nearest future due to the introduction of artificial intelligence and machine learning technologies. Each search system assigns them a different role and offers different, regularly updated instructions.

However, the general principle and the goal of assessors is the same in any system. Such specialists help to modernize the technology of search robots, introduce new efficient algorithms and make the search system more convenient and useful for the end user.

Assessors do not always affect the ranking of the website, however, known information about the principles of their work can be used as a reference for improving and safely optimizing the website in addition to other tools.



ARTIFICIAL INTELLIGENCE AND ITS IMPACT ON SEARCH ENGINES

Artificial intelligence technologies were in special demand in 2020. During this period, there was a massive hype around the possibilities of such an approach, but subsequently it naturally declined.

Despite the decline of public interest in the possibilities of AI, the niche continues to develop actively and is already being used in many areas, including optimization and modernization of search engines.



DEFINITION

Artificial intelligence is an experimental field in computer science that studies the theoretical foundations, methodologies, and practical techniques for designing software that can imitate human features and capabilities.

AI technologies in the future are able to provide the computer with exceptional capabilities and provoke a leap in the IT niche. At the same time, the goal and objectives are not a complete copying of the human intellect, but only an imitation of it. The machine is capable of reproducing some of the capabilities of human intelligence, using specific mechanisms that differ from or exceed human thinking.

Today, in addition to search engines, artificial intelligence is actively used in other areas, for example, in social networks. Creation of recommendations in the feed based on the recorded history of the activity of a particular user can serve as an example from everyday life.



HISTORY OF TECHNOLOGY

Artificial intelligence technology originated around the 1950s. It was during the period that there was a great scientific interest in computers and their intellectual capabilities: numerous studies were carried out on this topic.

The first postulates of artificial intelligence technologies were formulated at a scientific conference in 1956 at Dartmouth College, New Hampshire. Representatives of the emerging IT niche shared their first theoretical developments and feature articles.

A fundamental role during the conference was given to the work of the English mathematician Alan Turing.

Alan Turing - (1912-1954) was a British scientist, cryptographer, one of the developers of the world's first computer. Author of valuable scientific papers in the field of cryptography, morphogenesis and artificial intelligence, including the Turing test for assessing the intellectual potential of a machine.

Alan Turing founded the ground for computing concepts back in 1936. A few years before his death, in 1950, he wrote the work «Computing machines and intelligence» to compare the behavior of man and machine.

Thanks to the work of Turing, the topic of artificial intelligence attracted close attention of the scientific community and subsequently provoked the emergence of various scientific approaches, including mathematical logic and neural networks.

Over time, expectations for artificial intelligence technologies began to grow: in 1957, Herbert Simon, an American generalist and pioneer in the field of AI, estimated that within ten years the scientific community would develop an artificial intelligence that could compete with chess champions.

The imperfection of the equipment and the lack of sufficient computing power of the

computers of that time led to the differentiation of the discipline. Separate directions have emerged based on completely different theories and approaches. In this context, two main paradigms appeared: strong and weak artificial intelligence.

STRONG ARTIFICIAL INTELLIGENCE

The theory of strong artificial intelligence claims that machines are capable of developing self-awareness. As a basis, principles from the field of artificial general intelligence research were taken.

This approach is not very popular in the scientific community. It is believed that human intelligence is too complex to reproduce, so the assumptions about machine self-awareness do not look too realistic.

WEAK ARTIFICIAL INTELLIGENCE

Unlike the first theoretical approach, the principle of weak artificial intelligence suggests the possibility of creating machines that can solve specific problems by analogy with the human brain. The probability of complete inheritance of the functions of the latter is not taken into account.

Against the background of strong intelligence, weak AI machines do not reproduce cognitive functions and do not have self-awareness, but they are capable of some actions: for example, a virtual chess game.

MACHINE LEARNING

Separately, it is worth highlighting the technologies of the so-called machine learning. This is just one branch of the development of artificial intelligence, which actually represents a significant step in this area.

The concepts of machine learning are based on the principle of using learning algorithms, using which computer receives some behavioral experience and can reproduce it in the future.

Thanks to modern achievements in this discipline, computers are able not to only recognize objects and speech, but also to build their own analytical models without human intervention. A person also does not have to conduct training on his own does not practically take part in the processes of adaptation and forecasting. However, it is impossible to predict the result of the learning process for sure.

MACHINE LEARNING AND WEAK ARTIFICIAL INTELLIGENCE

Machine learning works using the principles of weak artificial intelligence. Within its framework, systems are created that can imitate some of the functions of human thinking thanks to the studied data and given algorithms.

However, even though machine learning does not give computer the ability to self-awareness, it is able to learn on its own, which already exceeds the expectations of some supporters of the concept.

NEURAL NETWORKS

A neural network is one of the technologies of machine learning, a mathematical model created in the image and likeness of neural connections in the human brain: a mechanism that ensures the thinking process of a living organism.

The complex and expensive technology is based on the principle of formation of so-called artificial neurons, which are responsible for computing processes and data evaluation.

A neural network can perform different tasks, but nowadays it is most common to talk about the following functions:

1. Recognition of objects;
2. Analysis and forecasting;
3. Decision making.

Attempts are being made to train the neural network in human communication as well as writing texts, but today they do not bring the expected result. GPT-2 is one of the most famous Artificial intelligence services that can create more or less meaningful syntactic constructs. It was GPT-2 which was used for the subsequent development of the BERT algorithm from Google.

Neural networks as a method have also become widespread in the training of search engine algorithms.



ARTIFICIAL INTELLIGENCE IN SEARCH ENGINES

Artificial intelligence is widely used in search engines. Already today, it is used primarily for deep query processing and document analysis, analysis, matching, and other tasks of this type.

The introduction of technologies is driven by growing needs and requirements: today's amount of data is almost impossible to process efficiently manually. Automated self-learning systems can solve this problem.



ARTIFICIAL INTELLIGENCE AT GOOGLE

In 2015, Google launched Rank Brain. This is the first mechanism of the company that tried to recognize the intentions of a person and satisfy his need.

A deep learning system called Rank Brain has drastically changed the way the search engine works. In many cases, it handles search queries better than traditional algorithmic rules hand-written by human engineers, and Google has long understood that the future of their search platform lies with artificial intelligence.

In simple terms, this technology attempts to make sense of a query, understand the user's intent, and then provide personalized results based on what the system already knows about the person. At the same time, unlike primitive search algorithms, an AI machine can select relevant sites even when there is no main query on them.

The issue is quite diverse: it offers several options for attractions and general articles about the city. So the robot assumes and satisfies different user intentions.

In addition to query analysis, the artificial intelligence system also takes part in the ranking of search results.

The artificial intelligence engine is deeply integrated into Google services and the average user does not even know about it.

For example, Google Assistant is an artificial intelligence-based voice assistant for smartphones, smart home devices, cars, TVs, and so on. Like other virtual assistants, Google Assistant can control device tools (such as notes or calendar entries), check the weather, turn on music or find nearby objects on a map as requested.

A virtual assistant's technology relies heavily on its ability to understand what someone saying, which is why Google uses machine learning to reduce language delays that can impact the service's usability.

Other tool features include:

1. Google Assistant can learn to accurately pronounce the names of contacts stored on the device without having to record the voice.
2. Artificial intelligence helps the assistant understand the context and process the

words in relation to all other words in the sentence so that they can respond to the request with almost 100% accuracy.

3. The Google Assistant uses previous interactions to understand context and answer relevant follow-up questions, allowing the user to have a more natural and productive conversation.

Google Maps navigation has also been transformed by artificial intelligence. Using previous location data and recent searches, Google Maps driving predicts the user's destination and helps to get there using the fastest route.



BERT

In 2019, the Rank Brain algorithm was supplemented with the BERT algorithm, which also uses machine learning and artificial intelligence technologies. Like its predecessor, it explores keywords, but more deeply and completely.

The goal of BERT is the study of the entire query array, regardless of location and order of words, the study of the meaning of phrases in voice search, preparation of snippets, and the like.



ARTIFICIAL INTELLIGENCE AND SEARCH ENGINE OPTIMIZATION (SEO)

The final question is: can artificial intelligence and machine learning technologies in search engines affect SEO?

The answer will be that rather yes than no. In previous articles, the topic of websites classified as good by search system algorithms was already touched. Their content and usability are focused on the user and satisfy his need for high-quality and informative features as much as possible:

1. Unique texts written in natural language that correspond to the key request and reveal the topic of the texts.
2. Convenient and easy to use interface.
3. Optimal page loading speed and the like.

The user is a priority for all search engines, and artificial intelligence developments are tailored specifically for this factor. There are several aspects that have changed under the influence of new technologies:

- **A new approach to the formation of the semantic core.** Google BERT algorithms, powered by machine learning technology, focus more on mid-, low-, and long-tail keywords to better recognize user intent. From this point of view, there is a need to reconsider the approach to the ratio of different types of keys in semantic core. It is also recommended to select keys more consciously in terms of the message.

- **Text optimization.** The algorithms mentioned above also determine the principle of text optimization. Preference is given to LSI (subject-forming words), the use of a variety of keys and tails to fully disclose the topic. It is worth refusing to repeat the same key in a direct entry - it will tell little about search robots.

- **Voice search.** Voice search tools have become especially popular in the last year. Search engines effectively recognize and work with these types of queries, and ignoring this trend deprives the website owner of organic traffic. The need for optimization for voice queries is especially acute in the niche of local businesses, content aggregators, news services, and the like, but all the websites, regardless of their subject matter, should pay attention to the fact that the turnover of voice assistants is expected to grow to 8 million by 2023.

It can be assumed that in the future the requirements of artificial intelligence and search engines using these technologies may still change. However, the main optimization trends for new requirements already exist.

INTERNET MARKETING



INTERNET MARKETING, ITS TRENDS AND TENDENCIES

In the past five years, as users have become more engaged with the Internet, the digital approach in doing business has become fundamental. Competition has also intensified: according to research, the online sales market at the beginning of 2021 grew by 44% compared to the same previous reporting period.

In the current environment, business representatives need to use various measures and techniques in order to stay afloat and find their audience. This is where web marketing helps.



DEFINITION

Web marketing is a set of traditional promotion methods typical for classical marketing, but used in an online environment to sell certain goods or services.



DIFFERENCE BETWEEN MARKETING AND INTERNET MARKETING

The goals and objectives of both directions are similar however, the specifics of online business make some adjustments to marketing, against which there are some differences between it and the classical approach.

The industrialization process of the 1900s in the United States gave way to the first concept of marketing, which, however, was focused only on the analysis of processes that affected the company's profit, and only 50 years later the principles of studying the competitive market and the preferences of the customer base made an appearance.

Today, traditional marketing is an advanced process that, through the complex study of variables, gives the company the experience of growth and fame, which ultimately also increases its income.

While even in traditional marketing we can talk about «tools» (or strategies), in web marketing the use of PCs has led to significant improvements in both the analytics process and results. Technology has brought automation and new opportunities to this area.

There are few significant differences:

1. Web marketing involves building a model in the conditions of information noise and tighter competition;
2. It also allows to reach a large audience;
3. Offers more channels.



RELEVANCE OF WEB MARKETING

Web marketing tools used to be in demand before, but nowadays the need for them has increased many times. This is partly due to the Covid-19 pandemic, mass quarantines and changing the needs of the population. The Internet has become the only source for obtaining goods and services, and businesses have had to adapt to it even faster.

INDICATOR	2017	2018	2020
Amount of Users	4 billion	4.3 billion	4.6 billion
Social Networks	3.1 billion	3.4 billion	4.2 billion
Screen Time	6h 46min	6h 48min	6h 54min

Comparison table of Internet usage in 2018 and 2021 based on data from We Are Social

Even the elderly who are usually not inclined to use innovative technologies, have been forced to use online services to buy all kinds of goods (including food) and arrange delivery.

It was Internet marketing that allowed us to adapt to new conditions, find our customers and satisfy their needs. Today, the trend has continued, and online audience is likely to only grow.



ADVANTAGES AND DISADVANTAGES OF INTERNET MARKETING

Like almost any other business approach and tool, Internet marketing also has some disadvantages that should be kept in mind.

- Potentially difficult to learn and use analysis tools.
- Large advertising budget costs, which can increase over time and require constant replenishment.

Difficulties in creating and using a targeted strategy that must be used constantly in order to achieve the desired result.

At the same time, there are more advantages for business:

- Web marketing is able to provide accurate competitor data and real-time promotional results.
- The budget for organizing advertising campaigns is still less if to compare with traditional marketing.
- The use of a funnel marketing system can automatically attract new customers.

The use of methods of interaction with potential customers that are not provided in traditional marketing, and the subsequent increase in loyalty on their part.



COST OF WEB MARKETING TOOLS

It is extremely problematic to designate exact budgets for online promotion. This is due to the abundance of channels, methods and tools that have different cost and duration of use.

Advertising in search networks or on partner websites will obviously cost less than creating a landing page for sale of a product or service. Guerrilla marketing techniques, although not as effective, are classified as low-budget or completely free.



PROFILE SPECIALISTS

Online marketing is performed by marketers - specialists who help the brand with analytics, implementing strategy, running campaigns and recruiting support staff.

In addition, the following are involved into advertising:

1. Content managers;
2. SMM specialists;
3. SEO specialists and others.



PROMOTION STRATEGY

It is the first and most important component of any web marketing campaign and is about defining business goals:

1. ROI (return on investment);
2. The number of unique visitors per month;
3. Number of orders;
4. Conversion rate;
5. Medium basket and others.

After defining these goals, it is necessary to outline a plan for marketing actions and their implementation in order to achieve the expected results. It is important when setting the goals to focus on indicators that can be quantified as this will allow to compare the result with past metrics and evaluate the effectiveness of the campaign.

Another important factor is the realism of the goal. If a company receives approximately 3-4 conversions per day, this indicator will not grow to 5 thousand in a month, regardless of the tools used and the budget involved. The following are defined:

1. **Submission formats** (own content, text advertising, images, videos that need to be created or ordered from a specialist);
2. **Placement channels** (partner websites, social networks, blogs, mobile applications, videos on video services, and the like),
3. **Leverage and techniques** (search engine optimization, email marketing or mailing, advertising banners, and others).



COMPONENTS OF INTERNET MARKETING

Nowadays, there are several basic elements of web marketing that are used in most businesses most often.



SEO AND MARKETING

Many representatives of online businesses make their efforts into promotion of search engines, and this is done for a good reason since the majority of the traffic is absorbed from them. Improving the visibility of the website in search results (Google, Bing, Yahoo, etc.) is done using a number of methods:

1. Website optimization for queries;
2. Increasing the reference (preferably natural) mass;
3. Posting interesting and useful content;
4. Technical optimization and elimination of critical malfunctions in the operation of the website and others, in accordance with the current ranking factors.

SEA or Search Engine Advertising is advertising in search engines that is placed in accordance with the key queries of users. It is also called contextual advertising. For its placement, built-in search engine tools such as Google AdWords or Bing Webmaster Tools are used: they can set up an advertising campaign, specify a payment model and leave ads displayed at any moment.

For the accuracy of such marketing, it is necessary to work out in detail the portrait of the target audience. Not only a list of key queries is determined by which a potential client can find a product or service, but also, for example, regional settings.

Advertising from Google AdWords is placed on the first positions of the issue and is suitable for most business categories. For an additional fee, one can be placed not only in search results, but also on partner network websites.



SOCIAL NETWORKS

The social network audience grew by 13% in 2020. The total number of active users in them as of January 2021 amounted to more than 4 billion people: among them there are representatives of different age and social groups.

In view of this circumstance, social networks have become an excellent platform for business: the developers of some of them have adapted the website interface for this function. One of the latest Instagram updates (not available for all countries) has radically changed the look of the social network. In the place where the section with activity was previously located, a showcase of goods appeared.

There are several methods of advertising on social networks: for example, cooperation with influencers - users with a large audience, whose opinion is considered socially important for at least one group of people. However, the so-called targeted advertising is in great demand.

It represents the purchase of ads (posts, stories) directly from the social network. Payment is variable, you can choose a model at your discretion: for clicks, impressions, link clicks, and so on. To set up an effective campaign, you need to clearly define the group of the target audience that will receive the ad in the feed, as well as prepare the so-called creative ad layout, usually consisting of a photo or video and accompanying text.



RETARGETING (OR REMARKETING)

The purpose of retargeting as a marketing tool is to remind the user of the products that he or she wanted, but for some reason postponed the purchase. It represents banners that appear on websites visited by users after viewing the catalog of a particular online store.

So, if a potential buyer studied the assortment of a shoe store for 15 minutes and even added a pair to the cart, but then left the page, in the future, ads for these products will be displayed on other websites, as if reminding of the former intention.

The solution is quite effective and it is used everywhere.



MAILING LISTS

Mailing list is one of the most effective and relevant sections of marketing. However, when organizing a campaign, it is important to take into account current trends and compose letters in accordance with them, not forgetting about the characteristics of the target audience.

Email marketing is suitable for a variety of tasks:

1. Attracting new customers whose contacts are collected, for example, using a landing page. Such letters are sent out on a regular basis;
2. Increasing loyalty. Letters may contain a request to leave a review, remind about promotions or wish a happy birthday.
3. Sales. This category of emails is used to tell customers about new products and services on the website.

For email marketing to work effectively, it's important to strike a balance against spamming, as well as regularly review the contact list, refusing to send emails to addresses that do not open emails on a regular basis.



PRICE COMPARISON WEBSITE

There has been an increase in the number of websites offering price comparisons in recent years. They allow to view offers from various online stores: this method is especially often used for hotels and airlines, services for the sale of mobile equipment.

Companies can be listed on these types of sites to increase brand awareness, strengthen their image and attract new customers. Similar functionality can be noted in the Google Shopping section.



PLACEMENT ON MARKETPLACES

Working with marketplaces is suitable for both the sale of goods and the sale of services: Ebay, Amazon and others.

The company places its catalogs on such sites, in the event of a successful sale of a product or service, the service, as a rule, charges a certain commission. The method is relevant for increasing the number of direct sales, increasing brand awareness and, in general, is a useful additional channel of interaction with the target audience.



PRESS RELATIONS

We are talking about the issuance of press releases and custom articles with their subsequent placement on websites. This is a fairly popular method, close enough to traditional marketing techniques, however, it can be expensive if a reputable media with a large audience is chosen for advertising.

To prevent budget drain, it is necessary to involve not only a marketer, but also a copywriter who specializes in creating commercial texts for the preparation of such advertising. Together, specialists will be able to prepare high-quality material that will not only increase the loyalty of potential customers, but also bring certain benefits.



LANDING PAGES

Landing pages are small, usually one-page websites, the task of which is to push the user to perform the target action. The latter can be:

- 1. Newsletter subscription**, which is organized to collect contacts and arrange another form of marketing - mailing.
- 2. Application for a consultation.** Such pages are also focused on collecting contact information and warming up potential customers.
- 3. Direct sales.** Sales of promotional goods (but not more than one) or services.
- 4. Registration** for a course, webinar or other event.

Landing pages should carry a specific idea and smoothly warm up the user on the way to the target action. Usually, they consist of a capacious and attractive offer (commercial offer), blocks with a description of the product / service / company, opportunities, benefits and / or tariffs, action buttons, reviews and contacts.

For each advertising campaign it is necessary to create a separate landing page.



ONLINE MARKETING TRENDS 2022

By 2022, several interesting trends have formed in the Internet marketing niche, which are definitely worth paying attention to. They are shown in the Deloitte report



INCLUSIVE MARKETING

One of the main trends highlighted in the report is aimed at the younger generation who make up the majority of online consumers. This group expects brands to work with different audiences. The audience is really different: there are representatives of different nations, genders and social status among consumers.

In other case the inclusiveness is taken into account and used at different levels. In 2018, the fashion house Chanel introduced a collection of decorative cosmetics for men, expanding its target group in this segment.

Also, a brand promotion strategy may include touching on important social, political or environmental issues - this technique is actively used today.



OPTING OUT OF COOKIES

Back in 2020, Google announced the planned refusal to use personal data and cookies. Initially, the measure was planned for the end of 2022, but then was postponed to 2023.

This means that representatives of online businesses have more time to prepare for this event. The abandonment of the concept will make marketing campaigns more difficult to run and track, so companies will have to look for new approaches. A potentially effective solution is self-collection of data, partnership and exchange with other companies.

CONCLUSION

Online marketing is a global field that offers a lot of useful tools for businesses to promote. The task for the companies is to select the best methods and, through testing / comparing the results, develop a plan that will solve the goal set at the stage of strategy formation.

Using some trends will improve the effectiveness of the campaign.

NEUROMARKETING

NEUROMARKETING: IS IT REALLY POSSIBLE TO READ OTHER PEOPLE'S MINDS?

In an effort to effectively promote products and services in the market, business representatives and marketers are using new, more complex methodologies. This is how neuromarketing appeared.

Despite the fact that some companies already offer full-fledged services in this niche, it is not fully explored. However, some methods can really help a business.

DEFINITION OF NEUROMARKETING

Neuromarketing is one of the areas of classical marketing. It is a discipline that studies the user's behavioral response to advertising, a product, a service (mainly before they are launched on a wide market) or a business as a whole, as well as methods of influencing his behavior.

The main purpose of neuromarketing is to help the creatives and marketers learn more about their audience, customer experience, and the buying process. Through the study of behavior, values and arguments, neuromarketing is able to identify winning and effective strategies that can push the consumer to familiarize himself with a product or service, and then to buy it.

Neuromarketing originated from the need of companies, brands, organizations, academic and university research centers to deepen their knowledge about people, their behavior and how they make certain decisions. Neuromarketing defines a new field of research, strategic assessments, and operational applications that has emerged from the integration of neuroscience, neuroeconomics, and cognitive psychology with traditional marketing, internet marketing, and communications.

It is used in the following cases:

1. To evaluate the response to already existing products;
2. To evaluate the response to something new and improve it before the launch;
3. To influence behavior with the help of psycho-emotional stimulus.

HISTORY OF NEUROMARKETING

The starting point in the origin and development of this niche can be 1960. It was then that Herbert Krugman, a researcher and employee of General Electric, first identified the spontaneous dilation of the client's pupils as an indicator of his interest in a product or service.

However, the first developments applied in this area appeared much earlier. Here are some of them:

1. In 1849, German psychologist Emile du Bois Reymond discovered that human skin is electrically active.

2. In 1888, the French physician Charles Fehr stated that all electrical activity in the skin can be caused by emotional causes.

3. In 1889, the Russian-Georgian physiologist Ivan Tarkhanov described the so-called galvanic skin reflex, which is still used in various fields.

4. In 1924, Hans Berger carried out the first ever electroencephalographic measurement.

5. In 1930, the first non-invasive eye movement meter was developed and became popular by 1970 when it was used as a research tool.

6. In 1980, Antonio Damasio emphasized that emotions are part of the solution, and already in the era of the 90s, a leap was made to neuroimaging, where functional magnetic resonance imaging arises.



WHEN NEUROSCIENCE AND BIOMETRICS COLLIDED WITH MARKETING

- In the 90s of the last century specialists in studying the market and neuroscientists began to conduct all kinds of research. Biometric technologies in this process acted as an additional opportunity for the market research. They were used, among other things, by world-famous brands such as Coca-Cola and Ford.
- In 2002, Dutch researcher Ale Smidts formulated the term “neuromarketing” thanks to research performed in Rotterdam School of Management. He also headed the marketing management department there, which allowed the researcher to explore new possibilities and implement innovative systems to understand the consumer’s brain stimuli.
- It wasn’t until 2003 when some American companies began offering consulting services and conducting research based on neuromarketing methods. This trend reached the CIS countries later, but nowadays it is quite in demand.
- In 2012, the Neuromarketing Business and Science Association (NMBSA) was founded, whose goal was to further promote and popularize science in the world.



USE OF NEUROMARKETING

Multinational corporations have shown interest in neuromarketing over the past few years due to the inability of traditional marketing methods used to determine the mechanisms of preference and purchase decision of consumers to meet the business needs. These methods, which can be defined as classical, often ignore significant aspects such as emotions and memories.

Neuromarketing has the ability to integrate the economic principles of traditional marketing with aspects of medicine (neurology), behavioral sciences (psychology), and semiotic linguistic and visual interpretation. Its main goal is to understand, decode and illustrate in a simple way what happens in people’s brains in response to precise stimuli coming from a wide variety of media, such as traditional advertising presented on paper products or various types of digital advertising.

It is believed that this communicative action should always be ethical, aimed at intercepting latent needs that the public at the moment cannot yet express, nevertheless, marketers often use it to awaken new desires.



PROBLEMS AND SOLUTIONS

Neuromarketing techniques answer a number of questions:

- What accents should commercial promotion have in order to have a greater impact on consumers?
- What sensory stimuli should the product contain in order to trigger the memorization mechanism and subsequently satisfy the needs of consumers?
- How often do you need to duplicate the same action in order for the advertising campaign to be effective?
- What is the best commercial strategy to stand out from the competitors?



MAIN METHODS OF NEUROMARKETING

There are various factors that in one way or another affect the perception, which the person himself does not even suspect. New methods of neuromarketing do not replace the old ones, but complement them: they offer an explanation of why the user performs some action, from the point of view of his brain and mind.

Discipline theory suggests that product choice is determined not by rationality but by multiple mental processes in which emotions play a fundamental role. The existence of these cognitive accelerators that influence purchases has been proven based on scientific evidence.

It is important to mention that the consumer will be focused not on what will objectively be the best product, but on what he himself considers as such.

Based on these studies, neuromarketing methods have been improved through the use of tools such as:

1. Electroencephalograms: measure which areas of the brain are activated when viewing an advertisement or presentation of a particular logo or product.

2. Eye tracking neuromarketing: these methods help to understand what grabs a shopper's attention by measuring the subject's eye movements and the points they look at when making a purchase, whether in a brick-and-mortar store or online.

3. Associative images. It is also a fairly effective method by which it is possible to find out the attitude of the consumer to a product or service.

4. Neuromarketing with facial expressions. Based on observation of the respondent's facial expression.

5. Sensory neuromarketing. using external stimuli to influence consumer behavior.

6. MRI. Like in electroencephalogram, magnetic resonance imaging studies are used to assess the state of the brain and its response to certain stimuli.



ELECTROENCEPHALOGRAMS

Electroencephalograms or EEGs involve the use of electrodes that are attached to the subject's head. The device reads the activity of the brain during a certain process: for example, when viewing an advertisement for a certain brand.

This method is considered to be one of the most objective. The fact is that it relies directly on the activity of the brain and the analysis of its sections during the experiment. In this way, study organizers can understand whether the demonstration material attracts the attention of a person and what kind of reaction it causes.

Only large organizations that have sufficient capital to pay specialized specialists and are confident that the interpretation of the result can positively affect advertising campaigns or new product launches can afford to use this method.



EYE TRACKING

Eye tracking is a technique that tracks the direction of the consumer's gaze while examining a product. Pupil size is also taken into account, a factor mentioned in the paragraph above.

Eye tracking is also a valuable tool when developing websites. It checks which areas of the home page the visitor views first, where he stops, for how long, and what he does not pay attention to at all. On the one hand, it is possible to determine in which positions the decisive elements should be placed when purchasing, and on the other hand, how they should be designed. For example, a shopping cart button that is highlighted in bold provides a higher conversion rate than one that is invisible.

In addition, the structure of the website should be as intuitive as possible so that the potential buyer does not have to think about it, but rather make spontaneous decisions, as most consumers do. This is due to the peculiarities of the human brain.

The method can really be useful for packaging design or website page layout development. However, it also has disadvantages: obviously, the user is far from being always mentally focused on the objects on which his gaze stops.



ASSOCIATIVE IMAGES OR MNEMONIC METHODS

A mnemonics is a set of rules and methods used to quickly and easily memorize information that is difficult to remember by conventional means. It is based on the natural ability of the brain to remember information better if it is associated with specific images, stories, paradoxical events or emotions.

Characteristically, mnemonic techniques can be used not only to memorize material, but to influence the memory of other people. This technique is one of the most accessible.

It is possible to consider it on the example of the Coca-Cola company. For many years the company has been building the concept of the relationship between the branded drink and holidays, including New Year's in its promotions. Thanks to this, a corresponding association has been formed among some consumers.

Methods in this category include:

1. Memorable, easy-to-pronounce names;
2. Rhyming advertising slogans.



FACE READING

Theoretically, the direction of reading facial expressions allows to determine what emotions a particular product, service or advertising layout evokes in the respondent. Obtaining information occurs in the process of an interview or survey, followed by a decoding of the result.

However, this method has its drawbacks:

1. Difficulties in interpreting the results, the need for qualified personnel with sufficient knowledge to conduct such interview;
2. Low efficiency if the respondent manages his facial expressions well.

It is also worth taking into account the correlation between the reaction specifically to advertising and personal circumstances that can influence it and distort the results of observation.



SENSORY NEUROMARKETING

Sensory neuromarketing techniques are also among the most common. This approach is based on the assumption that consumer behavior can be influenced by external factors:

1. Musical accompaniment;
2. Smells;
3. Goods packaging materials;
4. Color design and so on.

Color design is also applicable in online promotion strategies. Brands can choose a corporate color, which is subsequently used to design logos, promotional products, websites, and even pages on social networks, and evokes certain emotions in a potential client.



MAGNETIC RESONANCE IMAGING

The advertising industry has long understood that discounts stimulate consumption. Presumably, this fact is proven by the results of brain scans: studies of this kind have demonstrated that discount symbols lead to a decrease in activity in the control area of the brain.

“Life & Brain Center” at the University of Bonn, one of the neuromarketing research centers, found that models with ideal figures also activate the reward center in many subjects, which is responsible for desire and for feeling happy. Another result of the experiments of “Life & Brain Institute” proves that faces are remembered better than logos. According to the researchers, faces are much more active in areas of the brain associated with feelings and memory formation.

Another interesting experiment was conducted in 2004 by Reed Montague, a neuroscientist at the Houston College of Medicine, which showed how brand and image affect the perception of a product. Participants in the control group were offered to drink Coca-Cola and Pepsi drinks in unmarked containers, and according to the results of the survey, the majority of respondents decided to choose a second drink.

However, when the experiment was repeated with the name of each drink and the brand logo displayed, the results were different. The majority of respondents considered the taste of Coca-Cola more pleasant. The scientists saw on their computers, that in this case, an area of the brain was active, in which a person's self-esteem also developed. Taste, obviously, was of secondary importance, and the image was decisive.

However, according to scientists` opinion, the “buy button” sought by many entrepreneurs cannot be found in the brain. According to the current understanding of the science of human nervous system, decision-making processes are too complex to determine one specific point that could be responsible for it.



MINOR NEUROMARKETING TECHNIQUES

In addition to global methods, there are more accessible methods in neuromarketing that allow to understand potential client a little better, partially predict their actions and provide additional incentives.

If to take psychology of behavior as a basis, the following can be distinguished:

- Feedback reaction mechanism. Most companies actively use it to influence the decision of the client as many customers see reviews as a marker of public approval, quality, and purchase worthiness. Users are great at recognizing false and custom reviews, so it is very important to be careful when working with them.
- Benefit response mechanism. Discounts, sales, profitable and unique offers have long been known to marketers and still work flawlessly, only in a slightly modified form. These methods are based on the fear of missing out on a savings offer.



APPROPRIATENESS OF METHODS

Nowadays, neuromarketing methods, individually or in combination, are used by most large corporations. They are especially relevant before launching new complex products in niches where errors and omissions are not noticed on time lead to significant budget losses.

Small businesses can also use some of more accessible techniques in this area, such as eye tracking or mnemonic techniques, as well as many variations of psychological impact.

However, most experts are inclined to believe that neuromarketing alone does not allow to fully look into the consumers brain and predict their behavior, despite the fact that it works well in combination with other strategies.

THE FUTURE OF IT INDUSTRY

The 21st century can be definitely called the century of information technology. Development of technology advances rapidly: a little more than 20 years have passed from the first computers to implement of artificial intelligence techniques. Nowadays the society can use the digital goods in everyday life. In the future, the IT industry will provide even more developments that today are even hard to imagine.



ARTIFICIAL INTELLIGENCE

From a technical point of view, artificial intelligence is a section of computer science that allows to program and design both hardware and software systems, endowing machines with certain characteristics, which are usually considered human, such as, for example, visual perception, space-time perception and decision making.

One of the major advances in the history of artificial intelligence was made when it became possible to restore the legitimacy of algorithms capable of higher legacy machines (the ability to act and make decisions) that can learn from experience similar to humans. Development of algorithms capable of learning from their mistakes is necessary to create intelligent systems in which programmers are powerless. The human resource is limited, and it's impossible to always foresee all ways of development and contexts with its help.

Thanks to the so-called machine learning, a machine is able to independently master the algorithm of certain actions, even if they were not originally programmed. A fairly large role in all this is played by the so-called neural networks - an artificially recreated analogue of the human nervous system. In 2021, the AI technology market in 2020 reached \$291 million. According to experts, its volume will grow to \$500 million by 2023. The need for these technologies will be significant in the healthcare industry as well as in analytical business processes, development of the Internet of things, which will be mentioned further in the article, and other areas. It can be assumed that future IT companies will put a lot of emphasis on software and artificial intelligence services.



INFORMATION SECURITY

The emergence of new digital technologies and massive involvement in the online space have led to an increase in cybercrime rates in CIS countries and the world. There is also a significant economic damage from hacker attacks. In accordance with the study by Positive Technologies, in the second quarter 2021 alone, the number of cyberattacks increased by 0.3% compared to the first quarter. Businesses are also hit hard, with a 16% increase in ransomware attacks.



SOME OF THE MOST COMMON CYBERATTACKS INCLUDE

- Malicious software, applications aimed at causing damage to the victim by intercepting information, with malfunctions of the devices on which they are present, encryption of files in order to request a ransom (ransomware);
- Social engineering, cyberattack methods based on collection of information by learning and interacting with the subject;
- Advanced Persistent Threat (APT), advanced methods that research the target for a long time and involve the use of special tools and malware;
- Distributed denial of service (DDoS): attacks aimed at making certain types of services unavailable which are spread through a network of devices that make up the botnet from which the attack on the target can start;
- A zero-day attack that exploits software vulnerabilities.



THE MOST COMMONLY USED ATTACK GOALS ARE

- Fraud (for example, phishing, corporate e-mail hacking);
- Extortion;
- Invasion for espionage purposes;
- Service interruption.

One of the most high-profile cyberattacks and data breaches was the March 2020 Facebook hack. As a result, about 267 million users were affected, and the company pledged to pay about \$5 billion in fines.

The need for both large and small companies and private users for personal data and device protection services is increasing. There is no reason to believe that the situation will change in 2022 significantly, and this need will disappear by itself: most likely, quite the contrary.



DECENTRALIZED FINANCE

DeFi solutions are Dapps (decentralized applications) that directly address end consumers and offer financial products accessible to everyone; directly related to the use of cryptocurrencies, therefore, they involve accessing related tools, such as a cryptocurrency wallet.



DECENTRALIZED FINANCIAL APPLICATIONS HAVE SOME SPECIFIC FEATURES

- 1. They do not require permissions:** anyone can create them, and anyone has the right to use them.
- 2. They are transparent:** usually such products are developed in open source, which can also be viewed by anyone.
- 3. They are global:** the absence of territorial restrictions and structures that could limit the use of services for other reasons.
- 4. Immutability:** they are stable enough and do not change over time, not amenable to outside influence.
- 5. Compatibility:** As a rule, decentralized finance services are compatible with each other.

The last feature is perhaps the most underrated, but at the same time one of the most innovative.

In the DeFi ecosystem, new projects launch various financial instruments, which, however, are in many cases interconnected, forming a network of integrated protocols. For this reason, we are often talking about the so-called «money Lego»: financial services represented by smart contracts that can be combined to create more complex structures, overbuilding like in a children's constructor.



AT THE MOMENT, THE MAIN DEFI SOLUTIONS ARE DIVIDED INTO FOUR GROUPS

1. The so-called stable coins, which are tied at a rate to a specific asset.
2. Decentralized exchanges for trading cryptocurrencies.
3. Services designed for lending using cryptocurrencies and various tokens.
4. Solutions for the tokenization of financial assets.

It is possible to relate to the cryptocurrency industry in different ways, but one way or

another, this niche was in demand in 2021. There are also so many reasons to believe that in the future the trend will continue and intensify due to a number of technical advantages of projects of this type.



INTERNET OF THINGS

The term «Internet of Things» was first introduced in 1999 by an English engineer Kevin Ashton, co-founder of the Center of Automatic Identification in Massachusetts, in close connection with RFID (Radio Frequency Identification) devices. The Internet of Things (IoT) refers to the path of technological development, on the basis of which, through the digital environment, each object from the world around us acquires its own identity in Internet.

Initially, the concept was based on the idea of interconnected intelligent objects, including in order to exchange the information. Today, the meaning of IoT goes far beyond a simple definition and translates into a whole network that connects these objects with each other.

In 2021, this technology began to be increasingly introduced into critical niches and processes. Moreover, its further growth is predicted: presumably the size of the Internet of Things market by 2025 will be about \$1 trillion.

This technology can be used not only in production processes: it is also suitable for healthcare (according to IoT Analytics forecasts, the greatest demand for IoT will be observed specifically in this niche in the USA), smart agriculture (monitoring, solving environmental issues), smart home (it is relevant today, solutions for automated remote control), smart car (data collection and transmission systems in real time, accident prevention) and others.



CLOUD PLATFORMS

Cloud platforms are a solution that is optimal for both business and the average user. From a commercial point of view, they can significantly reduce costs: information technology becomes a service purchased based on the real needs of the company and paid for on the basis of actual consumption. The risk associated with IT projects is significantly reduced as you move to variable operating costs.

Currently there are several types of cloud services, the main of which are:

- **SaaS.** Also defined as «software as a service»: the end user gains access to various types of on-demand services through online technologies, paying costs in accordance with actual consumption. The provider offers ready-made applications managed via the cloud. He is also responsible for the quality of services provided, computing power, storage process and network resources. An example of such services is OneDrive or DropBox.

- **PaaS**, platform as a service. Operating systems, security and database systems, application servers, integration services, business process management tools and software development environments. The core infrastructure is managed by the service provider. Also, it is suitable for using machine learning technologies and Big Data analytics.

- Globally, **PaaS and SaaS** differ even in terms of target audience: the former are aimed at developers and large companies, the latter are mainly aimed at the private user, but can also be used in business (for example, to organize the workflow process).

Separately, niche of IaaS solutions should be highlighted as well, infrastructure as a

service, designed to save expenses on the creation and maintenance of new infrastructures for business needs. They provide larger storage, backup services, and accessible virtual servers (as opposed to platform as a service, where servers can be used but not affected).

According to forecasts, the cloud solutions market will grow by 20%-30% annually.



METAVERSES

In the summer of 2021, Mark Zuckerberg first shared the concept of the metaverse on social network Facebook, and then renamed it to Meta. After that, they started talking about the metauniverses especially actively, although in fact they were invented quite a long time ago.

The term «metaverse» was first used by writer Neil Stevenson in 1992. The science fiction writer defined the digital world with this word, in which the protagonist of the novel «Snow Disaster» existed in virtual world.

Nowadays the metaverse is conceived as a virtual space applicable to optimize various aspects of personal and work daily life, allowing users to save large amounts of resources for the performance of certain duties and tasks (for example, virtual meetings, including business ones). This format differs from standard and familiar videoconferencing by augmented reality technologies and the use of avatars. This perspective also opens up limitless possibilities for marketing.

In fact, with the help of 3D avatars, you can not only communicate and interact with other users, but also monetize your online activities, earning real income. Smart glasses, augmented reality helmets and gloves with tactile sensors will become a tool for connecting to the metaverse. Thanks to this technology, social interactions will develop in a virtual environment with the following features.

In this environment, a free, open and interoperable space will be formed, the purpose of which is to simplify and accelerate cooperation between companies, developers, creators and politicians.

The experts note that it is not worth expecting the full implementation of technologies of this level in 2022 because of technical complexity and high costs. However, IT companies will gradually make small steps in this direction, especially if the current interest in this area continues.



BIG DATA ANALYTICS

Companies of all sizes constantly have to deal with big data analytics: this is a process in which significant flows of business-critical information are processed: customer personal data, reports on behavioral factors, marketing campaign results, and others.

As the information technology industry develops and businesses move online, the need for effective solutions is growing.

The main trend in the field of big data at the moment is the hybrid cloud, that is, the ability to connect a private business environment to one or more public cloud systems. A hybrid cloud environment provides even more flexibility, limits data movement, and enables analytics to be performed where the data is stored. Thus, it is possible to achieve cost optimization, simplify the process of interaction (including between employees) and ensure compliance with the requirements of the privacy policy.

Large companies recognize these benefits and actively use such hybrid environments.

Along with them, the topic of edge computing, that is, an architecture with distributed resources, is of a great interest. It supports centralized cloud systems, bringing the process of data processing and analysis closer to the place where the information is actually collected. In this way, you can increase efficiency by avoiding the movement of large amounts of data between the edge and local or public cloud systems.

Developing machine learning algorithms means both extracting value from new data sources (mostly unstructured) and using traditional sources in new ways. The use of machine learning algorithms can lead to:

- Predicting the potential loss of customers;
- Increasing the efficiency of fraud protection systems;
- Analysis of media data sources where necessary.

The effectiveness of such solutions makes them in demand. According to forecasts, by 2028 this market will be valued at \$115.13 billion.



5G

5G is a new progressive mobile communication standard, which is a whole infrastructure for more efficient use of digital devices. One of the first and main characteristics is a revolutionary high network connection speed, reaching up to 20 Gbps or more.

In 2021, 5G has proven to be one of the most controversial technologies and has met with a wave of backlash from the public. The reason for this was the spread of myths about the potential danger of radiation arising from the work of communication towers.

Despite this, 5G will be implemented and actively developed in the near future. There are a lot of areas of use for 5G:

1. Surveillance and security. In this case, the solutions concern the use of intelligent surveillance systems capable of automatically detecting and reporting suspicious activity within the surveillance radius. The latter are ideal for remote monitoring and control of crowded places, as well as traffic situations.

2. Unmanned vehicles. It cannot be affirmed that this technology will become common, especially in everyday life in the coming year, but the use of 5G makes progress in this niche easier.

3. High quality network connection. The main feature and advantage of the technology lies in the fact that solutions aimed at improving connectivity involve the combined use of existing network developments and 5G. The main goal of these applications is to provide a network with the same performance as optical fiber, and even in countries and territories where it is difficult or expensive to build a classic infrastructure.

CONCLUSION

The development of the IT sector promises the modern society new opportunities in various areas: from business to healthcare. Some projects may take several years to complete, but developers have already achieved impressive results in some innovative niches, such as artificial intelligence or augmented reality.

According to the forecasts of the research company Gartner, the total volume of the IT market will grow by 5.5%, and the volume of sales will be more than \$4 trillion in 2022.

ABOUT THE AUTHOR

Hello everyone!

My name is [Alexander Safonov](#).

I am an IT specialist with a master's degree of Science in Information Technology. I am the founder and CEO of an IT company called the [IWEBI.GROUP](#). I have more than 20 years of experience in the IT industry and during this time, I developed a unique method to optimize websites according to Google's algorithm, founded 2 IT companies, and completed dozens of successful Internet projects. In 2014, my family and I moved to the USA, where I continued to develop my Internet business. I spent many years developing new startups in addition to founding the iWEBi.GROUP company. My company specializes in developing software, SEO site optimization, and search engine promotion.

I am a contributor and an SEO expert in the international [SEO association](#), which I discuss more in detail on my IWEBI.GROUP website blog. The «IWEBI Blog» contains a ton of useful resources for all questions regarding SEO. In addition to the blog, I offer a free information source (IT News) on the [IWEBI.GROUP](#) website.