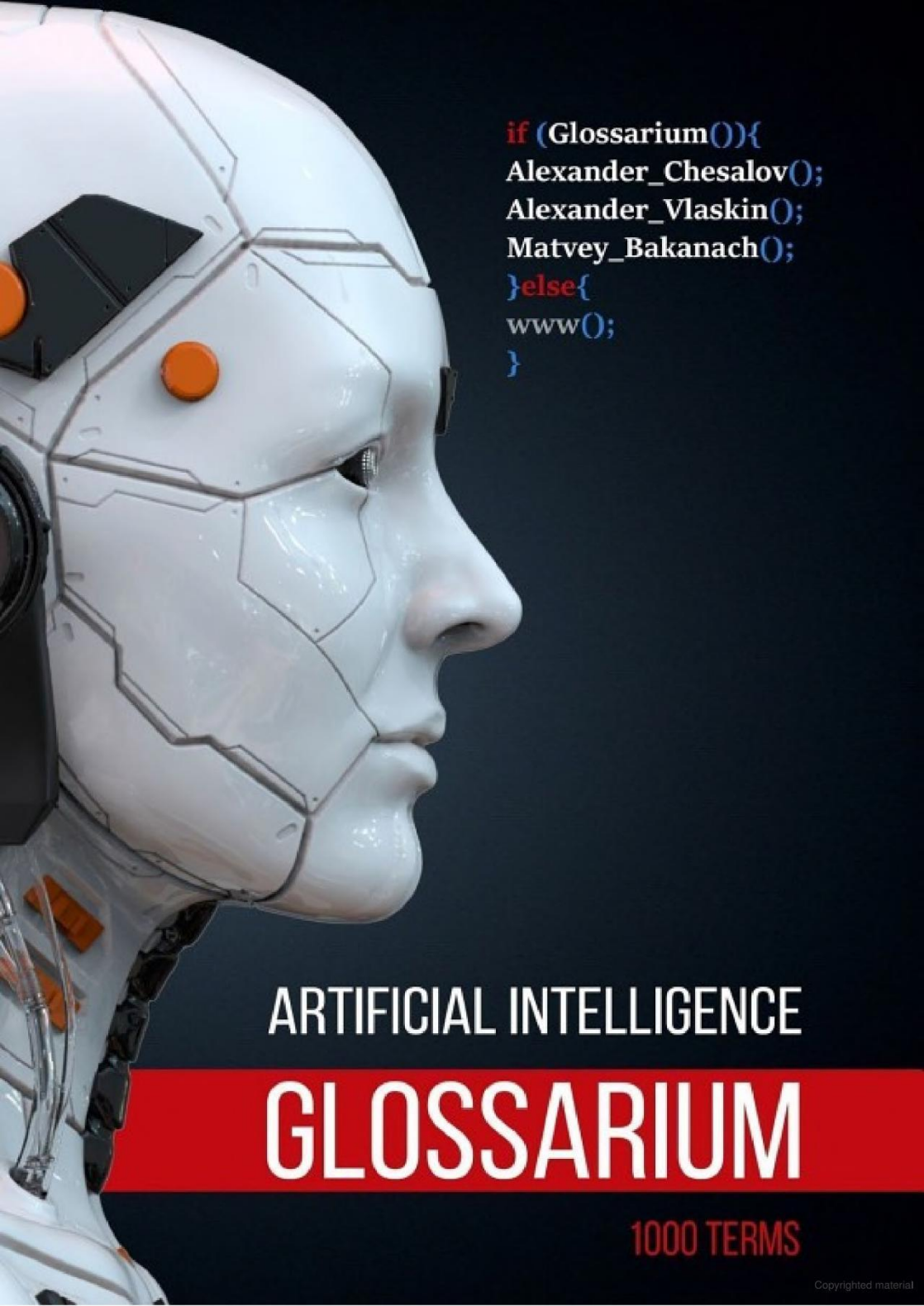

ARTIFICIAL INTELLIGENCE

GLOSSARIUM

1000 TERMS

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Experts in information technology and artificial intelligence, developers of the program of the Center for Artificial Intelligence, the programs "Artificial Intelligence" and "Deep Analytics" of the project "Priority 2030" of the Bauman Moscow State Technical University in 2021—2022.

Good afternoon, dear Friends and Colleagues!

The last couple of years for us, the authors of this book, have been not only "hot", but also generous with various events and activities.

Undoubtedly, the most significant event for us that took place in 2021 is participation in the Competition held by the Analytical Center under the Government of the Russian Federation for the selection of recipients of support for research centers in the field of artificial intelligence, including in the field of "strong" artificial intelligence, trusted artificial intelligence systems and ethical aspects of the use of artificial intelligence. We were faced with an extraordinary and still at that time unsolved task of creating a Center for the

Development and Implementation of Strong and Applied Artificial Intelligence of the Bauman Moscow State Technical University. All the authors of this book took a direct part in the development and writing of the program and action plan of the new Center. You can learn more about this story from Alexander Chesalov's book How to Create an Artificial Intelligence Center in 100 Days. You can also find information about it on the chesalov.com blog and ridero.ru website.

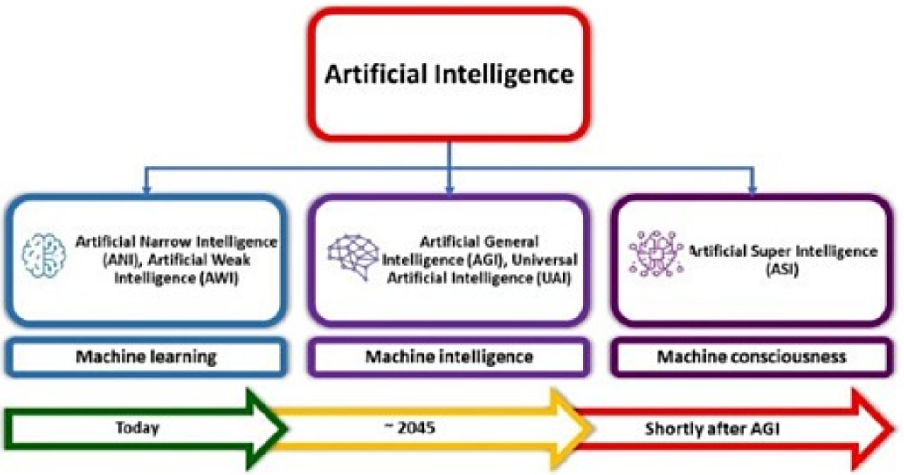
The first international forum "Ethics of artificial intelligence: the beginning of trust", which took place on October 26, 2021, and within the framework of which the solemn signing ceremony of the National Code of Ethics of Artificial Intelligence was organized, which establishes general ethical principles and standards of behavior that should guide the participants in relations in the field of artificial intelligence in his activities, also had a certain influence on us. In fact, the forum became the first specialized platform in Russia, where about one and a half thousand developers and users of artificial intelligence technologies discussed steps to effectively implement the ethics of artificial intelligence in priority sectors of the economy of the Russian Federation.

We did not pass by the AI Journey International Conference on Artificial Intelligence and Data Analysis, within which, on November 10, 2021, IT market leaders joined the signing of the National Code of Ethics for Artificial Intelligence. The number of conference speakers was amazing – there were more than two hundred of them, and the number of online visits to the site was more than forty million.

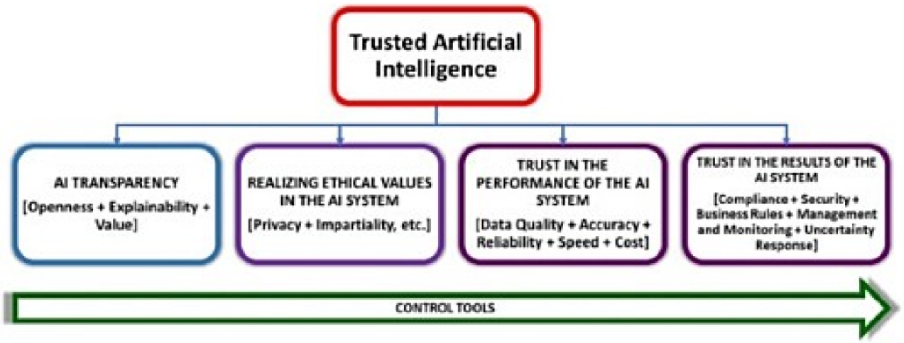
Summarizing our active work over the past couple of years, the experience that has already been accumulated, we can say that wherever we discuss the topic of "artificial intelligence", there have always been heated debates among the participants of certain events, among various specialists and scientists, what is, for example, "strong artificial intelligence" ("Artificial general intelligence") and how to translate and interpret the word "general" – ("strong" or "general", or maybe "applied"? There have been many disputes over the definition of the term "trusted artificial intelligence" and many others.

Undoubtedly, we have found answers to these and many other questions of interest to a wide range of specialists.

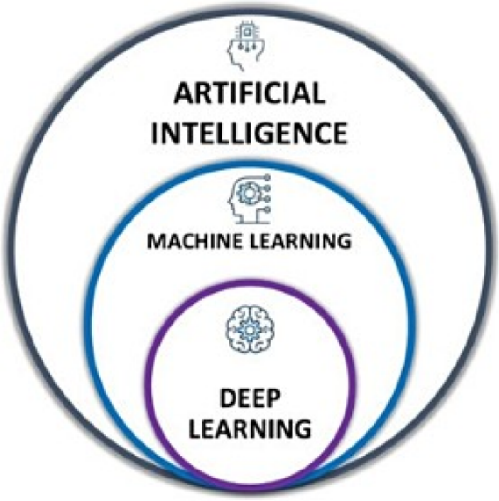
For example, we have defined for ourselves that Artificial Intelligence is a computer system based on a complex of scientific and engineering knowledge, as well as technologies for creating intelligent machines, programs, services and applications (for example, machine learning and deep learning), imitating human thought processes or living beings, capable of perceiving information with a certain degree of autonomy, learning and making decisions based on the analysis of large amounts of data, the purpose of which is to help people solve their daily routine tasks.



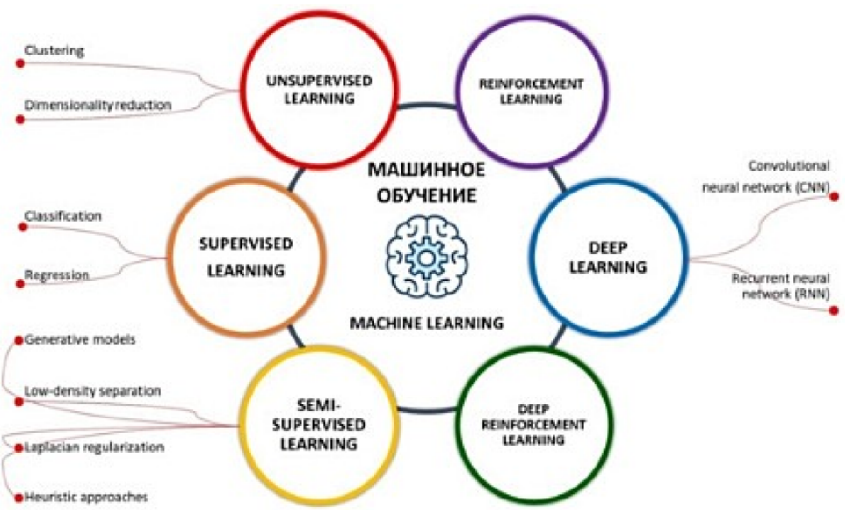
Or, one more example. We have determined that the Trusted Artificial Intelligence System is a system that ensures the fulfillment of the tasks assigned to it, taking into account a number of additional requirements and / or restrictions that ensure confidence in the results of its work:



And also the fact that Machine learning is one of the areas (subsets) of artificial intelligence, thanks to which the key property of intelligent computer systems is embodied – self-learning based on the analysis and processing of large heterogeneous data. The greater the amount of information and its diversity, the easier it is for artificial intelligence to find patterns and the more accurate the result will be.



And the fact that machine learning is a very interesting, multifaceted and relevant area of science and technology:



Have you ever heard of “Transhumanists”?

On the one hand, as an idea, Transhumanism is the empowerment of man through science. On the other hand, it is a philosophical concept and an international movement, whose adherents wish to become “post-humans” and overcome all kinds of physical limitations, illness, mental suffering, old age and death through the use of the possibilities of nano- and biotechnologies, artificial intelligence and cognitive science.

In our opinion, the ideas of “transhumanism” intersect very closely with the ideas of “digital human immortality”.

Undoubtedly, you have heard and, of course, you know who a “Data Scientist” is – a scientist and data scientist.

Have you ever heard of “data-satanics”? :-)

Data Satanists is a definition invented by the authors, but reflecting modern reality (along with, for example, the term “infogypsyism”), which developed during the period of popularization of the ideas of artificial intelligence in the modern information society. Data Satanists are people (essentially scammers and criminals) who very skillfully disguise themselves as scientists and specialists in the field of AI and ML, but at the same time use other people’s merits, knowledge and

experience, for their own selfish purposes and for the purposes of illegal enrichment. Their actions can be interpreted under Article 159 of the Criminal Code of the Russian Federation Fraud, Article 174 of the Criminal Code of the Russian Federation Legalization (laundering) of money or other property acquired by other persons by criminal means, Article 285 of the Criminal Code of the Russian Federation Abuse of official powers, Article 286 of the Criminal Code of the Russian Federation Abuse of official powers, etc.

How do you like the term “bibleoclasm”?

Biblioclasm is a person who, due to his transformed worldview and overly inflated ego, out of envy or some other selfish goal, destroys the books of other authors.

You won’t believe it, but there are a lot of people like “data-satanists” or “biblioclasms” now.

We can give many more such examples of “amazing terms”. But in our work, we did not waste time on the “harsh reality” and shifted the focus to a constructive and positive attitude.

In a word, we have done a great job for you and have collected more than 1000 terms and definitions on machine learning and artificial intelligence based on our experience, data from Internet articles, books, magazines and analytical reports.

Also, this book includes basic terms and definitions from the books of one of the authors-compilers – Alexander Chesalov: "Glossary on artificial intelligence and information technology", "Glossary on the digital economy" (distributed free of charge on Ridero.ru), "Digital transformation" [1], "The Digital Ecosystem of the Ombudsman Institute: Concept, Technologies, Practice" [2], as well as terms and definitions from the following additional sources:

– Decree of the President of the Russian Federation dated May 7, 2018 № 204 "On national goals and strategic objectives for the development of the Russian Federation for the period up to 2024" [3]

– Federal Law №149 of July 27, 2006 (as amended on May 1, 2019) "On Information, Information Technologies and Information Protection" [4].

– Strategy for the Development of the Information Society in the Russian Federation for 2017—2030 [5].

– National strategy for the development of artificial intelligence for the period up to 2030 [6].

– AI Code of Ethics [7].

– Strategy for the development of healthcare in the Russian Federation for the period up to 2025, approved by Decree of the President of the Russian Federation of June 6, 2019 №254 [8].

– Strategy for the development of the electronic industry of the Russian Federation for the period up to 2030 [9].

– Federal Law of July 27, 2006 №152 (as amended on April 24, 2020) "On Personal Data" [10].

– National program "Digital Economy of the Russian Federation" [11].

– State Program "Digital Economy of the Russian Federation" [12].

1000 terms and definitions.

Is it a lot or a little?

Our experience suggests that for mutual understanding it is enough for two interlocutors to know a dozen or a maximum of two dozen definitions, but when it comes to professional activities, it may turn out that it is not enough to know even a few dozen terms.

This book contains the terms, in our opinion, the most frequently used, both in everyday work and professional activities by specialists of various professions interested in the topic of "artificial intelligence".

In conclusion, I would like to add and inform the dear reader that we have tried very hard to make for you the necessary and useful "product" and "tool".

35th Moscow International Book Fair

The first version of the book was presented by us at the 35th Moscow International Book Fair in 2022.

This book is a completely open and free document for distribution. If you use it in your practical work, please make a link to this book.

Many of the terms and definitions for them in this book are found on the Internet. They are repeated dozens or hundreds of times on various information resources (mainly foreign ones). Nevertheless, we set ourselves the goal of collecting and systematizing the most relevant of them in one place from a variety of sources, translating and adapting the necessary ones into Russian, and rewriting some of them based on our own experience. In view of the foregoing, we do not claim authorship or uniqueness of the terms and definitions presented.

Links to primary sources are affixed to the original terms and definitions (that is, if the definition was originally in English, then the link is indicated after this definition). If the definition was given in Russian, translated into English and adapted, then the reference is not indicated (in this edition of the book). This book was written by Russian authors and therefore the translation of terms into Russian is given in brackets.

We continue to work on improving the quality and content of the text of this book, including supplementing it with new knowledge in the subject area. We will be grateful for any feedback, suggestions and clarifications. Please send them to aleksander.chesalov@yandex.ru

Happy reading and productive work!

Yours, Alexander Chesalov, Alexander Vlaskin and Matvey Bakanach.

09/22/2022

ARTIFICIAL INTELLIGENCE GLOSSARY

“A”

A/B Testing (A/B-тестирование) – A statistical way of comparing two (or more) techniques, typically an incumbent against a new rival. A/B testing aims to determine not only which technique performs better but also to understand whether the difference is statistically significant. A/B testing usually considers only two techniques using one measurement, but it can be applied to any finite number of techniques and measures [13].

Abductive logic programming (ALP) (Абдуктивное логическое программирование) – A high-level knowledge-representation framework that can be used to solve problems declaratively based on abductive reasoning. It extends normal logic programming by allowing some predicates to be incompletely defined, declared as adducible predicates [14].

Abductive reasoning (Also abduction) (Абдукция) — A form of logical inference which starts with an observation or set of observations then seeks to find the simplest and most likely explanation. This process, unlike deductive reasoning, yields a plausible conclusion but does not positively verify it. abductive inference, or retroduction [15].

Abstract data type (Абстрактный тип данных) — A mathematical model for data types, where a data type is defined by its behavior (semantics) from the point of view of a user of the data, specifically in terms of possible values,

possible operations on data of this type, and the behavior of these operations [16].

Abstraction (Абстракция) — The process of removing physical, spatial, or temporal details or attributes in the study of objects or systems in order to more closely attend to other details of interest.

Accelerating change (Ускорение изменений) — A perceived increase in the rate of technological change throughout history, which may suggest faster and more profound change in the future and may or may not be accompanied by equally profound social and cultural change [17].

Access to information (Доступ к информации) – the ability to obtain information and use it.

Access to information constituting a commercial secret (Доступ к информации, составляющей коммерческую тайну) – familiarization of certain persons with information constituting a commercial secret, with the consent of its owner or on other legal grounds, provided that this information is kept confidential.

Accuracy (Точность) – The fraction of predictions that a classification model got right.

Action (Действие) – In reinforcement learning, the mechanism by which the agent transitions between states of the environment. The agent chooses the action by using a policy.

Action language (Язык действий) — A language for specifying state transition systems, and is commonly used to create formal models of the effects of actions on the world. Action languages are commonly used in the artificial intelligence and robotics domains, where they describe how actions affect the states of systems over time, and may be used for automated planning [18].

Action model learning (Обучение модели действий) – An area of machine learning concerned with creation and modification of software agent's knowledge about effects and preconditions of the actions that can be executed within its environment. This knowledge is usually represented in logic-based action description language and used as the input for automated planners [19].

Action selection (Выбор действия) — A way of characterizing the most basic problem of intelligent systems: what to do next. In artificial intelligence and computational cognitive science, "the action selection problem" is typically associated with intelligent agents and animats – artificial systems that exhibit complex behaviour in an agent environment [20].

Activation function (Функция активации нейрона) – In the context of Artificial Neural Networks, a function that takes in the weighted sum of all of the inputs from the previous layer and generates an output value to ignite the next layer [21].

Active Learning/Active Learning Strategy (Активное обучение/ Стратегия активного обучения) – is a special case of Semi-

Supervised Machine Learning in which a learning agent is able to interactively query an oracle (usually, a human annotator) to obtain labels at new data points. A training approach in which the algorithm chooses some of the data it learns from. Active learning is particularly valuable when labeled examples are scarce or expensive to obtain. Instead of blindly seeking a diverse range of labeled examples, an active learning algorithm selectively seeks the particular range of examples it needs for learning.

Adam optimization algorithm (Алгоритм оптимизации Адам) – it is an extension of stochastic gradient descent which has recently gained wide acceptance for deep learning applications in computer vision and natural language processing [22].

Adaptive algorithm (Адаптивный алгоритм) – An algorithm that changes its behavior at the time it is run, based on a priori defined reward mechanism or criterion [23].

Adaptive Gradient Algorithm (AdaGrad) (Адаптивный **градиентный алгоритм)** – A sophisticated gradient descent algorithm that rescales the gradients of each parameter, effectively giving each parameter an independent learning rate [24].

Adaptive neuro fuzzy inference system (ANFIS) (Also adaptive network-based fuzzy inference system.) (Адаптивная система нейро-нечеткого вывода) – A kind of artificial neural network that is based on Takagi – Sugeno fuzzy inference system. The

technique was developed in the early 1990s. Since it integrates both neural networks and fuzzy logic principles, it has potential to capture the benefits of both in a single framework. Its inference system corresponds to a set of fuzzy IF – THEN rules that have learning capability to approximate nonlinear functions. Hence, ANFIS is considered to be a universal estimator. For using the ANFIS in a more efficient and optimal way, one can use the best parameters obtained by genetic algorithm [25].

Adaptive system (Адаптивная система) is a system that automatically changes the data of its functioning algorithm and (sometimes) its structure in order to maintain or achieve an optimal state when external conditions change.

Additive technologies (Аддитивные технологии) are technologies for the layer-by-layer creation of three-dimensional objects based on their digital models ("twins"), which make it possible to manufacture products of complex geometric shapes and profiles.

Admissible heuristic (Допустимая эвристика) – In computer science, specifically in algorithms related to pathfinding, a heuristic function is said to be admissible if it never overestimates the cost of reaching the goal, i.e., the cost it estimates to reach the goal is not higher than the lowest possible cost from the current point in the path.

Affective computing (Also artificial emotional intelligence or emotion AI.) (Аффективные вычисления) – The study and development of systems and devices that can recognize,

interpret, process, and simulate human affects. Affective computing is an interdisciplinary field spanning computer science, psychology, and cognitive science [26].

Agent (Агент) – In reinforcement learning, the entity that uses a policy to maximize expected return gained from transitioning between states of the environment.

Agent architecture (Архитектура агента) – A blueprint for software agents and intelligent control systems, depicting the arrangement of components. The architectures implemented by intelligent agents are referred to as cognitive architectures [27].

Agglomerative clustering (See hierarchical clustering.) (Агломеративная кластеризация) – Agglomerative clustering first assigns every example to its own cluster, and iteratively merges the closest clusters to create a hierarchical tree.

Aggregate (Агрегат) A total created from smaller units. For instance, the population of a county is an aggregate of the populations of the cities, rural areas, etc., that comprise the county. To total data from smaller units into a large unit. [28]

Aggregator (Агрегатор) A feed aggregator is a type of software that brings together various types of Web content and provides it in an easily accessible list. Feed aggregators collect things like online articles from newspapers or digital publications, blog postings, videos, podcasts, etc. A feed aggregator is also known as

a news aggregator, feed reader, content aggregator or an RSS reader. [29]

AI benchmark (Исходная отметка (Бенчмарк) ИИ) is an AI benchmark for evaluating the capabilities, efficiency, performance and for comparing ANNs, machine learning (ML) models, architectures and algorithms when solving various AI problems, special benchmarks are created and standardized, initial marks. For example, Benchmarking Graph Neural Networks – benchmarking (benchmarking) of graph neural networks (GNS, GNN) – usually includes installing a specific benchmark, loading initial datasets, testing ANNs, adding a new dataset and repeating iterations.

AI chipset market (Рынок чипсетов ИИ) is the market for chipsets for artificial intelligence (AI) systems.

AI acceleration (ИИ ускорение) – acceleration of calculations encountered with AI, specialized AI hardware accelerators are allocated for this purpose (see also artificial intelligence accelerator, hardware acceleration).

AI acceleration (Ускорение ИИ) is the acceleration of AI-related computations, for this purpose specialized AI hardware accelerators are used.

AI accelerator (ИИ ускоритель) – A class of microprocessor or computer system designed as hardware acceleration for artificial intelligence applications, especially artificial neural networks, machine vision, and machine learning.

AI benchmark (ИИ бенчмарк) – is benchmarking of AI systems, to assess the capabilities, efficiency, performance and to compare ANNs, machine learning (ML) models, architectures and algorithms when solving various AI problems, special benchmark tests are created and standardized, benchmarks. For example, Benchmarking Graph Neural Networks – benchmarking (benchmarking) of graph neural networks (GNS, GNN) – usually includes installing a specific benchmark, loading initial datasets, testing ANNs, adding a new dataset and repeating iterations (see also artificial neural network benchmarks).

AI Building and Training Kits (Комплекты для создания и обучения искусственного интеллекта) – applications and software development kits (SDKs) that abstract platforms, frameworks, analytics libraries, and data analysis appliances, allowing software developers to incorporate AI into new or existing applications.

AI camera (ИИ камера) – a camera with artificial intelligence, digital cameras of a new generation – allow you to analyze images by recognizing faces, their expression, object contours, textures, gradients, lighting patterns, which is taken into account when processing images; some AI cameras are capable of taking pictures on their own, without human intervention, at moments that the camera finds most interesting, etc. (see also camera, software-defined camera).

AI chipset (ИИ чипсет) is a chipset for systems with AI, for example, AI chipset industry is an industry of chipsets for

systems with AI, AI chipset market is a market for chipsets for systems with AI.

AI chipset market (ИИ рыное чипов) – chipset market for systems with artificial intelligence (AI), see also AI chipset.

AI cloud services (Облачные сервисы искусственного интеллекта) – AI model building tools, APIs, and associated middleware that enable you to build/train, deploy, and consume machine learning models that run on a prebuilt infrastructure as cloud services. These services include automated machine learning, machine vision services, and language analysis services.

AI CPU (Центральный процессор ИИ) is a central processing unit for AI tasks, synonymous with AI processor.

AI engineer (ИИ-инженер) – AI systems engineer.

AI engineering (ИИ-инжиниринг) – transfer of AI technologies from the level of R&D, experiments and prototypes to the engineering and technical level, with the expanded implementation of AI methods and tools in IT systems to solve real production problems of a company, organization. One of the strategic technological trends (trends) that can radically affect the state of the economy, production, finance, the state of the environment and, in general, the quality of life of a person and humanity

AI hardware (also AI-enabled hardware) (ИИ-аппарат) – AI hardware, AI hardware, artificial intelligence infrastructure

[system] hardware, AI infrastructure. Explanations in the Glossary are usually brief

AI hardware (Аппаратное обеспечение ИИ) is infrastructure hardware or artificial intelligence system, AI infrastructure.

AI industry (Индустрия ИИ) – for example, commercial AI industry – commercial AI industry, commercial sector of the AI industry.

AI industry trends (Тренды индустрии ИИ) are promising directions for the development of the AI industry.

AI infrastructure (also AI-defined infrastructure, AI-enabled Infrastructure) (Инфраструктура ИИ) – artificial intelligence infrastructure [systems], AI infrastructure, AI infrastructure, for example, AI infrastructure research – research in the field of AI infrastructures (see also AI, AI hardware).

AI server (ИИ сервер) – artificial intelligence server – is a server with (based on) AI; a server that provides solving AI problems.

AI shopper (ИИ-покупатель) is a non-human economic entity that receives goods or services in exchange for payment. Examples include virtual personal assistants, smart appliances, connected cars, and IoT-enabled factory equipment. These AIs act on behalf of a human or organization client.

AI supercomputer (ИИ суперкомпьютер) – a supercomputer for artificial intelligence tasks, a supercomputer for AI,

characterized by a focus on working with large amounts of data (see also artificial intelligence, supercomputer).

AI term (ИИ термин) – a term from the field of AI (from terminology, AI vocabulary), for example, in AI terms – in terms of AI (in AI language).

AI term (Термин ИИ) is a term from the field of AI (from terminology, AI vocabulary), for example, in AI terms – in terms of AI (in AI language).

AI terminology (ИИ терминология) – artificial intelligence terminology, is a set of special terms related to the field of AI (see also AI term).

AI terminology (Терминология ИИ) is the terminology of artificial intelligence, a set of technical terms related to the field of AI.

AI TRiSM (Управление доверием, рисками и безопасностью ИИ) is the management of an AI model to ensure trust, fairness, efficiency, security, and data protection.

AI vendor (ИИ вендор) – is a supplier of AI tools (systems, solutions).

AI vendor (Поставщик ИИ) is a supplier of AI tools (systems, solutions).

AI winter (Winter of artificial intelligence, Зима искусственного интеллекта) is a period of reduced interest in the subject area, reduced research funding. The term was

coined by analogy with the idea of nuclear winter. The field of artificial intelligence has gone through several cycles of hype, followed by disappointment and criticism, followed by a strong cooling off of interest, and then followed by renewed interest years or decades later [30].

AI workstation (ИИ рабочая станция) – a workstation (PC) with means (based on) AI; AI PC, a specialized desktop PC for solving technical or scientific problems, AI tasks; usually connected to a LAN with multi-user operating systems, intended primarily for the individual work of one specialist.

AI workstation (Рабочая станция ИИ) is a workstation (PC) with (based on) AI; AI RS, a specialized computer for solving technical or scientific problems, AI tasks; usually connected to a LAN with multi-user operating systems, intended primarily for the individual work of one specialist.

AI-based management system (Система управления на основе искусственного интеллекта) – the process of creating policies, allocating decision-making rights and ensuring organizational responsibility for risk and investment decisions for an application, as well as using artificial intelligence methods.

AI-based systems (Системы на основе ИИ) are information processing technologies that include models and algorithms that provide the ability to learn and perform cognitive tasks, with results in the form of predictive assessment and decision making in a material and virtual environment. AI systems are designed to work with some degree of autonomy through modeling and representation of knowledge, as well as the use of data and the

calculation of correlations. AI-based systems can use various methodologies, in particular: machine learning, including deep learning and reinforcement learning; automated reasoning, including planning, dispatching, knowledge representation and reasoning, search and optimization. AI-based systems can be used in cyber-physical systems, including equipment control systems via the Internet, robotic equipment, social robotics and human-machine interface systems that combine the functions of control, recognition, processing of data collected by sensors, as well as the operation of actuators in the environment of functioning of AI systems.

AI-complete (Сложный/завершенный искусственный интеллект) – In the field of artificial intelligence, the most difficult problems are informally known as AI-complete or AI-hard, implying that the difficulty of these computational problems is equivalent to that of solving the central artificial intelligence problem – making computers as intelligent as people, or strong AI. To call a problem AI-complete reflects an attitude that it would not be solved by a simple specific algorithm [31]

AI-enabled (ИИ-совместимый) is AI-enabled hardware or software that uses AI-enabled AI, such as AI-enabled tools.

AI-enabled (Оснащенный ИИ) – using AI and equipped with AI, for example, AI-enabled tools – tools with AI (see also AI-enabled device).

AI-enabled device (ИИ-совместимое устройство) is a device supported by an artificial intelligence (AI) system, such as an

intelligent robot.

AI-enabled device (Устройство, оснащенное ИИ) – A device supported by an artificial intelligence (AI) system, such as an intelligent robot (see also AI-enabled healthcare device).

AI-enabled healthcare device (ИИ-совместимое медицинское устройство) is an AI-enabled healthcare device.

AI-enabled healthcare device (Оснащенное ИИ медицинское устройство) – is an AI-enabled device for healthcare (medical care), see also AI-enabled device.

AI-optimized (ИИ-оптимизированный) is one that is optimized for AI tasks or optimized using AI tools, for example, an AI-optimized chip is a chip that is optimized for AI tasks.

AI-optimized (Оптимизированный для задач ИИ) – optimized for AI tasks; AI-optimized chip, for example, an AI-optimized chip is a chip optimized for AI tasks (see also artificial intelligence).

AlexNet (Нейронная сеть AlexNet) – The name of a neural network that won the ImageNet Large Scale Visual Recognition Challenge in 2012. It is named after Alex Krizhevsky, then a computer science PhD student at Stanford University. See ImageNet.

Algorithm (Алгоритм) – an exact prescription for the execution in a certain order of a system of operations for solving any problem from some given class (set) of problems. The term "algorithm" comes from the name of the Uzbek mathematician

Musa Al-Khorezmi, who in the 9th century proposed the simplest arithmetic algorithms. In mathematics and cybernetics, a class of problems of a certain type is considered solved when an algorithm is established to solve it. Finding algorithms is a natural human goal in solving various classes of problems.

Algorithmic Assessment (Алгоритмическая оценка) is a technical evaluation that helps identify and address potential risks and unintended consequences of AI systems across your business, to engender trust and build supportive systems around AI decision making.

AlphaGo (Программа AlphaGo) – is the first computer program that defeated a professional player on the board game Go in October 2015. Later in October 2017, AlphaGo's team released its new version named AlphaGo Zero which is stronger than any previous human-champion defeating versions. Go is played on 19 by 19 board which allows for 10171 possible layouts (chess 1050 configurations). It is estimated that there are 1080 atoms in the universe [32]

Ambient intelligence (AmI) (Окружающий интеллект) – Ambient intelligence (AmI) represents the future vision of intelligent computing where explicit input and output devices will not be required; instead, sensors and processors will be embedded into everyday devices and the environment will adapt to the user's needs and desires seamlessly. AmI systems, will use the contextual information gathered through these embedded sensors and apply Artificial Intelligence (AI) techniques to interpret and anticipate the users' needs. The

technology will be designed to be human centric and easy to use. [33]

An AI accelerator (Ускоритель ИИ) is a specialized chip that improves the speed and efficiency of training and testing neural networks. However, for semiconductor chips, including most AI accelerators, there is a theoretical minimum power consumption limit. Reducing consumption is possible only with the transition to optical neural networks and optical accelerators for them.

An integrated GPU (Интегрированный ГП) is an integrated graphics processing unit, integrated GPU, a GPU located on the same chip or on the same chip as the CPU, such as the one implemented in Apple's M1 processor.

Analogical Reasoning (Рассуждение по аналогии) – Solving problems by using analogies, by comparing to past experiences [34].

Analysis of algorithms (AofA) (Анализ алгоритмов) – The determination of the computational complexity of algorithms, that is the amount of time, storage and/or other resources necessary to execute them. Usually, this involves determining a function that relates the length of an algorithm's input to the number of steps it takes (its time complexity) or the number of storage locations it uses (its space complexity) [35].

Annotation (Аннотация) – A metadatum attached to a piece of data, typically provided by a human annotator [36].

Anokhin's theory of functional systems (Теория функциональных систем Анохина) – a functional system consists of a certain number of nodal mechanisms, each of which takes its place and has a certain specific purpose. The first of these is afferent synthesis, in which four obligatory components are distinguished: dominant motivation, situational and triggering afferentation, and memory. The interaction of these components leads to the decision-making process.

Anomaly detection (Выявление аномалий) – The process of identifying outliers. For example, if the mean for a certain feature is 100 with a standard deviation of 10, then anomaly detection should flag a value of 200 as suspicious.

Anonymization (Анонимизация) – The process in which data is de-identified as part of a mechanism to submit data for machine learning.

Answer set programming (ASP) (Программирование набора ответов) – A form of declarative programming oriented towards difficult (primarily NP-hard) search problems. It is based on the stable model (answer set) semantics of logic programming. In ASP, search problems are reduced to computing stable models, and answer set solvers – programs for generating stable models – are used to perform search.

Antivirus software (Антивирусное программное обеспечение) is a program or set of programs that are designed to prevent, search for, detect, and remove software viruses, and other malicious software like worms, trojans, adware, and more. [37]

Anytime algorithm (Алгоритм любого времени) – An algorithm that can return a valid solution to a problem even if it is interrupted before it ends [38]

API-AS-a-service (API-как-услуга) combines the API economy and software renting and provides application programming interfaces as a service. [39]

Application programming interface (API) (Интерфейс прикладного программирования) – A set of subroutine definitions, communication protocols, and tools for building software. In general terms, it is a set of clearly defined methods of communication among various components. A good API makes it easier to develop a computer program by providing all the building blocks, which are then put together by the programmer. An API may be for a web-based system, operating system, database system, computer hardware, or software library [40].

Application security (Безопасность приложений) is the process of making apps more secure by finding, fixing, and enhancing the security of apps. Much of this happens during the development phase, but it includes tools and methods to protect apps once they are deployed. This is becoming more important as hackers increasingly target applications with their attacks [41]

Application-specific integrated circuit (ASIC) (Специализированная интегральная схема) – a specialized integrated circuit for solving a specific problem [42].

Approximate string matching (Also fuzzy string searching.) (Нечеткое соответствие строк или приблизительное соответствие строк) – The technique of finding strings that match a pattern approximately (rather than exactly). The problem of approximate string matching is typically divided into two sub-problems: finding approximate substring matches inside a given string and finding dictionary strings that match the pattern approximately.

Approximation error (Ошибка **аппроксимации)** – The discrepancy between an exact value and some approximation to it.

Architectural description group (Architectural view, Архитектурная группа описаний) is a representation of the system as a whole in terms of a related set of interests.

Architectural frameworks (Архитектурный фреймворк) are high-level descriptions of an organization as a system; they capture the structure of its main components at varied levels, the interrelationships among these components, and the principles that guide their evolution [43].

Architecture of a computer (Архитектура вычислительной машины) is a conceptual structure of a computer that determines the processing of information and includes methods for converting information into data and the principles of interaction between hardware and software.

Architecture of a computing system (Архитектура вычислительной системы) is the configuration, composition

and principles of interaction (including data exchange) of the elements of a computing system.

Architecture of a system (Архитектура системы) is the fundamental organization of a system, embodied in its elements, their relationships with each other and with the environment, as well as the principles that guide its design and evolution.

Archival Information Collection (AIC) (Архивный пакет информации (AIC))

"An Archival Information Package whose Content Information is an aggregation of other Archival Information Packages" The digital preservation function preserves the capability to regenerate the DIPs (Dissemination Information Packages) as needed over time. [44]

Archival Storage (Архивное хранилище) Archival Storage is a source for data that is not needed for an organization's everyday operations, but may have to be accessed occasionally. By utilizing an archival storage, organizations can leverage to secondary sources, while still maintaining the protection of the data. Utilizing archival storage sources reduces primary storage costs required and allows an organization to maintain data that may be required for regulatory or other requirements. [45]

Area under curve (AUC) (Площадь под кривой) – The area under a curve between two points is calculated by performing the definite integral. In the context of a receiver operating

characteristic for a binary classifier, the AUC represents the classifier's accuracy [46].

Area Under the ROC curve (Площадь под кривой ROC) – is the probability that a classifier will be more confident that a randomly chosen positive example is actually positive than that a randomly chosen negative example is positive.

Argumentation framework (Структура аргументации или система аргументации) – A way to deal with contentious information and draw conclusions from it. In an abstract argumentation framework, entry-level information is a set of abstract arguments that, for instance, represent data or a proposition. Conflicts between arguments are represented by a binary relation on the set of arguments. []

Artifact (Артефакт) is one of many kinds of tangible by-products produced during the development of software. Some artifacts (e.g., use cases, class diagrams, and other Unified Modeling Language (UML) models, requirements and design documents) help describe the function, architecture, and design of software. Other artifacts are concerned with the process of development itself – such as project plans, business cases, and risk assessments. [47]

Artificial General Intelligence (AGI) (Общий Искусственный Интеллект) – is a hypothetical type of AI that is completely analogous to the human mind and has self-awareness that can solve problems, learn and plan for the future.

Artificial intelligence system (AIS, Система искусственного интеллекта) is a programmed or digital mathematical model (implemented using computer computing systems) of human intellectual capabilities, the main purpose of which is to search, analyze and synthesize large amounts of data from the world around us in order to obtain new knowledge about it and solve them. basis of various vital tasks. The discipline "Artificial Intelligence Systems" includes consideration of the main issues of modern theory and practice of building intelligent systems.

Artificial intelligence technologies (Технологии искусственного интеллекта) – technologies based on the use of artificial intelligence, including computer vision, natural language processing, speech recognition and synthesis, intelligent decision support and advanced methods of artificial intelligence.

Artificial life (Alife, A-Life, Искусственная жизнь) is a field of study wherein researchers examine systems related to natural life, its processes, and its evolution, through the use of simulations with computer models, robotics, and biochemistry. The discipline was named by Christopher Langton, an American theoretical biologist, in 1986. [2] In 1987 Langton organized the first conference on the field, in Los Alamos, New Mexico. There are three main kinds of alife, named for their approaches: soft, from software; hard, from hardware; and wet, from biochemistry. Artificial life researchers study traditional biology by trying to recreate aspects of biological phenomena [53].