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Aspects of Implementation of Competencies by Smart Ethical Artificial Intelligence in Different Environments

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ABSTRACT

Smart artificial intelligence has psychological, analytical, research, language, professional and behavioral competencies. Its psychological competencies are communication, self-regulation, adaptability during changes, motivation, empathy - identifying the needs of the environment. Psychological competence determines his psychological intelligence - the ability to adequately use his own capabilities, the ability to find solutions and choose adequate ways of communication. Ethical competencies of intelligent artificial intelligence are determined by ethical standards. Each competence is exercised by an intelligent agent with a competent functional professional manner. Intelligent agents form an ensemble with intelligent ethical artificial intelligence. The use of an ensemble with smart ethical artificial intelligence in various environments is carried out by synergistic tuning of the interaction of intelligent agents based on data of specific environment obtained by an analytical competent intellectual agent. The interaction of the analytical competent intellectual agent with the environment is carried out through the smart interface of the ensemble.

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Introduction

In various areas of life, systems with artificial intelligence with analytical and communication competencies are used. Chat bots with analytical and communication competencies based on artificial intelligence are able to conduct a dialogue with a candidate for work and further evaluate its potential effectiveness. The chat bot is able to interpret the applicant's indirect response. A newly arrived employee can ask a bit about the schedule, company structure, benefits and other issues important in the first months of work. Chat bots are developed by Mya Systems, Paradox, and Text Recruit. In Russia - Robot Vera and Yandex.Talents.

By analyzing data using artificial intelligence, you can find an action that is really related to efficiency in a particular company and form a really working competency model. DEEP allowed, on the basis of HR analytics, to form a universal competency model for Russian companies.

Artificial intelligence systems with analytical and communication competencies are also used to assess the effectiveness of training. The link between learning and improving performance is analyzed.

Today, more and more enterprises are using IBM Watson's truly unique technology platform and cognitive cloud services to solve their business problems. One of Watson's most striking possibilities is to build and evaluate hypotheses: the system uses advanced analysis tools to compare and evaluate groups of responses based on only significant facts. Watson also supports dynamic learning - during the process, the system learns itself, which allows it to improve results with each iteration, while becoming smarter and smarter. The IBM Watson platform is unique both in depth of capabilities and in the coverage of already known applications. Customizable enterprise solutions are combined into a common portfolio of IBM Cloud Business Solutions. Its users are provided not only with cloud applications, but also with cloud infrastructure, as well as consulting, analytics and technical support services. In the portfolio of IBM Cloud Business Solutions there are both horizontal solutions - in particular, for marketing, finance, personnel management, operations management, and vertical ones - for customers from the financial sector, transport industry, healthcare, telecommunications companies, electronics manufacturers, consumer goods, retail networks.

This is the time when cognitive computing steps in to facilitate and back these daily interactions. These theoretical predictions are not the only proof of the success that cognitive computing promises. According to a survey of early adopters conducted by IBM Cognitive, companies that have embraced the capabilities of cognitive computing have already noticed considerable return on their investment: 65% of respondents said the technology became crucial to the overall success of the business; 58% said it was pivotal in the company-wide digital transformation; and 58% said it would remain an important competitive advantage in the future.

Cognitive systems are at their core, highly adaptive, quickly adjusting to the digital transformation strategy of the company as it evolves and changes over time.

One important question that usually arises is in regards to the major overlap between cognitive computing and artificial intelligence and it's in the purpose and goals of the technology.

AI technologies largely imply the combination of such technology

as machine learning, neural networks, NLP and deep learning.

The article considers the implementation of analytical, psychological, research, language, professional and behavioral competencies of smart ethical artificial intelligence in various environments [1-4].

Requirements of Competencies of Smart Ethical Artificial Intelligence

Smart artificial intelligence has psychological, analytical, research, language, professional and behavioral competencies. Its psychological competencies are communication, self-regulation, adaptability during changes, motivation, empathy. Competencies are defined by a set of requirements.

Psychological competencies are determined by a model with psychological requirements. Psychological requirements are functional states of the system. Psychological requirements are states that play an appropriate role in the functional organization of the system. Each state is independent in communications. Adaptation is the state of optimal system operation in a variable environment. Empathy is a functional identification of the needs of the environment. The psychological competencies of intelligent ethical artificial intelligence are functional in terms of conceptual apparatus and methods.

The research competence of artificial intelligence requires learning and gaining new knowledge of the proposed problem, working with various sources of knowledge, investigating proposed topics, conducting experimental observations, proposing ways to solve the proposed problem and looking for the most rational solutions to proposed projects. Research competencies develop in the course of research activities according to the model of their formation. For example, the formation and development of research competencies for project activities. The development of research competencies is carried out on the basis of key competencies. Key competencies are various universal tools and tools, formalized methods, methods and techniques such as comparison, analysis, systematization, generalization, classification, causation, etc. Key competencies allow you to achieve results in uncertain, problematic situations. They allow you too independently and in cooperation with a specialist to solve problems, that is, to cope with situations for which there is never a complete set of available funds. Key competencies are interdisciplinary, manifested in various areas. Their availability is necessary for productive research, building communications with the environment

Communicative ethical competencies are a component of culture. Its core is values and principles, which are implemented in some norms and rules. Rules and regulations are specific recommendations, regulations on communications. It is important to follow these rules and regulations in business communications. The ethics of business communications is a set of moral norms, rules and ideas governing relations in the process of their production activities. The ethics of business communications should be taken into account in its various manifestations: in the relationship between the enterprise and the social environment, between enterprises and within the same enterprise.

Analytical competencies define the requirements to turn ad hoc improvements into systematic key performance indicators through information analysis. This requires knowledge and activity data, strong data management skills, excellent statistical skills, and the ability to assess the positive and negative aspects of the proposed actions. Analytical competencies involve a consistent analysis of data and situations in order to see the cause and effect and use this to make effective decisions. Situation is laid out into components (A, B, C). List items, tasks or activities without setting priorities. Review data and identify key priorities. Determines the cause and effect of "if A..., then B." and use this to prioritize. They analyze complex situations, considering several possible causes and consequences. They conduct a comprehensive analysis of complex data, and by solving complex situations, they track the impact of solutions on efficiency and quality of work.

Comprehensive Implementation of the Competencies of Smart Ethical Artificial Intelligence

The complex implementation of the competencies of smart ethical artificial intelligence is carried out by an ensemble of intellectual agents with competent professional images [4-6]. Professional images of intellectual agents indicate belonging to a certain profession. Professional images are a cognitive component of intelligent agents. Meaningful components of professional images are labor functions, subject and goals of activity, process and results of professional activity, criteria for assessing achievements; norms, rules and reference model of profession. Professional images include an owl of evaluation characteristics and associated behavioral actions. The component composition of the professional image is mainly the unity of three components: cognitive, affective assessment and behavioral adaptation.

In the process of educational and professional activity, the intellectual agent acquires the skills of the future profession through the inclusion of the environment and conditions of professional activity. The manifestation of an intellectual agent as a subject of labor is revealed most fully in achieving a professional position that integrates professional situations, communications and a professional image, which characterizes his identity, certainty and integrity. The profession acts as a socio-objective component of the professional continuum of intellectual agent activity, professional readiness arises as a formal reality, and professional identity as an informal, semantic, subjective reality. From this perspective, profession and professional identity are linked by causal dependence as a cause and consequence.

Ensembles of intellectual agents with professional images will allow him to have various required professions and competencies through diversification and mobility. An intelligent ensemble is a complex of compatible intelligent agents interacting through an intelligent interface, implementing either technological process, social services, multidisciplinary interdisciplinary research, or a production cycle. Diversification extends the functions of the intellectual ensemble and its development of a new type of functionality in order to increase efficiency, quality and its functional diversity. Mobility contributes to the rapid functional retraining of intellectual agents and the development of professional intelligence of the ensemble. Diversification and mobility will align the life cycle of intelligent agents as a common benchmark for linking them to the environment. The environment is perceived through images and scenes. Scenes consist of a number of images. Scenes are static (paintings) and dynamic. Dynamic scenes are characterized by patterns of behavior of objects and objects. The patterns are either described by formulas or presented in a graph (numerical way). Ethical activity is ensured within the boundaries of the similarity of images in the environment. The ethical activity of intellectual agents depends on spatial, temporal, substantive, visual and sound sensitivity, the ability to acquire, process, apply and diversify knowledge based on previous experience in solving specific problems related to the processing of data attributes and the mobility of the intellectual ensemble.

Functional Modeling of Communication with Environment

The environment state is set to S = {s_t, $s2$, ...} environment states. At any given moment, the environment is in one of these states. The agent's ability to act is represented as set of actions $A = \{a_t, a_2,...\}$.

The interaction of the agent with the medium is described functionally as a sequence of medium states on actions. Such an agent decides what action to perform based on experience, that is, his own experience gained to date. This experience is presented as a sequence of environment states in which the agent managed to visit. If the result of performing an action in any state is unique, then the environment is deterministic and its dynamics can be accurately predicted.

Let us present the experience of interaction of the agent with the medium as a sequence of state-action pairs:

$$h: (s_0, a_0) \rightarrow (s_1, a_1) \rightarrow (s_2, a_2) \rightarrow (s_u, a_u) \rightarrow ... \rightarrow (s_{u+1}, a_{u+1}) \rightarrow ...,$$

where s_0 is an initial condition of the environment;

a_u — action which was chosen for performance by the agent is able su , which is possible result action performance the a_{u-X} in condition $s_{w\_}j$.

We will enter functionality *see*, which defines ability of the agent to watch the environment, and the function *action*, which represents process of decision-making by the agent the functionality see is implemented hardware in case the agent is in the physical world. In a virtual environment the functionality *see* is implemented by system teams which analyze information on a virtual environment. An exit of functionality see is percept perception. The functionality see connects state of environment and their perception *percept* by data attributes. Through the function *action* the sequence of perceptions and action communicates by data attributes.

Attributes of data: objects, objects, materials, things, processes, the phenomena and other aspects of the physical world have various properties and characteristics. Properties are represented by qualitative attributes. Characteristics appear to be meaningful attributes. The qualitative attribute can be visual or sound. The meaningful attribute may be represented by a number, a language sense, a visual or sound image, a mathematical or behavioral action, or an algorithm. Meaningful qualitative attributes are big data of smart artificial intelligence, connected in time, space and subject area. The attributes of the fields of economics, industrial industries, technologies and professions help to build and train the ensembles of intelligent agents to manage, make decisions and make recommendations to specialists and managers.

Smart artificial intelligence, possessing psychological (self-regulation, adaptability motivation and empathy), analytical, research, language, professional and behavioral competencies helps intellectual agents adequately perceive various states of different environments and take correct effective actions. Functional environment modeling allows you to study environmental states by intelligent agents based on empathy and adaptation to the environment by smart artificial intelligence and identify optimal connections of perceptions and actions.

Adaptation is the process of changing the parameters and structure of an ensemble of intelligent agents, and possibly control influences, based on current information about the states of a new environment in order to achieve communication with it. The empathy of smart artificial intelligence allows you to recognize and control the states of the environment. Empathy is accomplished by perceiving the environment. Perception (understanding) is formed by observation (study) of the environment. The result of studies of environmental states is a concrete rational solution. Adaptive intelligence, combining skills for quick and comfortable adaptation to new conditions, helps make the right decision. Adaptive intelligence allows you to not only adapt quickly and act in unforeseen circumstances, but also create changes in parameters and structure and start processes that lead to positive solutions [1].

Parametric adaptation is associated with correction, adjustment of ensemble parameters. The need for such adaptation arises due to drift in environmental characteristics. Adaptation allows you to adjust the ensemble at each step of observation, moreover, the initial information for it is the mismatch of responses of the environment and the ensemble, the elimination of which implements the adaptation process.

When the structure of the environment changes, there is an inadequacy of communication between the ensemble and the environment. Then the adaptive system responds to changes, explores the new structure of the environment. Finding itself in a new environment, it builds similar and similar communications based on new structure data, an adaptable system is alternatively and compositionally adapted to perform its functions in a new environment in the best possible way. Parametric adaptation is also performed automatically.

Functional environment modeling helps to accumulate attributes in real time and at the same time use them for deep training of multilayer artificial neural networks of intelligent agents for making decisions and making recommendations. Modeling determines the environment and perception states of intelligent agents and the limits of the attributes of professional images. Perceptions of intelligent agents within the values of the attributes of professional images contribute to their ethical communications with various environments.

5. Communications of Robotic Intelligent Agents with Environment

Interaction with the environment of ensembles of intelligent agents with professional images is carried out through digital doubles, cognitive robots. Recently, the world has become interested in robotization in the service sector. Night tours of the London Tate gallery were driven by robots. Rather, only humanoids moved around the halls of the museum, and viewers could consider works of art and listen to the explanations of smart guides on the screens of computers. We went even further in South Korea. At the Daegu National Museum, robots collect entire groups of excursionists and conduct them on permanent display.

The wide use of intellectual agent ensembles with intelligent ethical artificial intelligence is carried out on the basis of an ethical standard, so that their use does not harm or harm. Standard case "Application of ensemble of intelligent agents" contributes to the formation of an ethical digital environment with smart artificial intelligence [4]. Ethical standard improves safety of application of robotic systems with smart agent ensembles [7]. Robots have already tried on the aprons of waiters, stood at the racks in hotels and settled in stores, galleries and airports.

More and more high-tech cognitive robotic systems are emerging [8]. A framework for designing compassionate and ethical artificial intelligence and artificial consciousness [9]. Expandable cognitive AI architectures for large-scale multi-agent human-

robot collaborative learning [10]. Cognitive assistant robots for reducing variability in industrial human-robot activities [11]. Cognitive Robots Augment Human Intelligence [12]. Emerging Technologies for Autonomous Behavior Generation at Run-Time by Cognitive Robots [13]. Brain-Inspired Active Learning Architecture for Procedural Knowledge Understanding Based on Human-Robot Interaction [14]. Software Testing: Issues and Challenges of Artificial Intelligence & Machine Learning [15]. Third Millennium Life Saving Smart Cyberspace Driven by AI and Robotics [16].

In the social service sector, cognitive robots occupy more and more jobs.

Automated Robotic Shop and Restaurants

A smart robot begins to issue goods and products in the store with imitative thinking and adaptive behavior through machines (Figure 1).

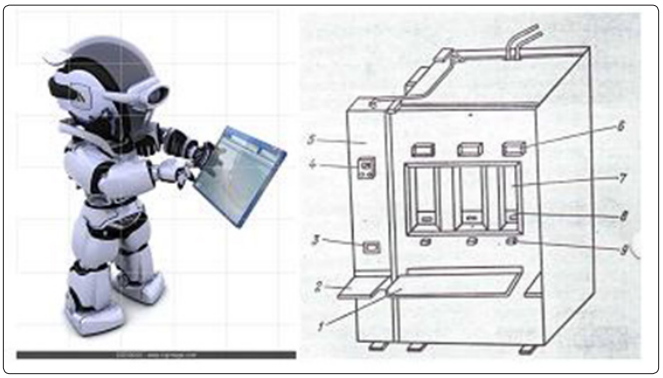

Figure 1: Robotization of Service

The robot communicates with customers through an order receiving system. The buyer through the electronic money reader is calculated by a plastic card. The buyer informs the robot of the list of goods and products the order. The robot, through the receiving system and the software multidisciplinary controller, activates trays of goods and products according to the order. The customer inserts the plastic card into the electronic money reader. When the order is formed by the machine, the robot reads the electronic money from the plastic card of the customer, at the prices of the goods. The buyer receives a set of goods the order from the machine and picks up a settlement plastic card.

The smart robot controls behavior through a multifunctional hierarchical system of controllers. Behavior occurs under the influence of the need of the visitor, which causes orientation in the situation according to models of the environment and behavior. The orientation is completed by selecting the appropriate program of the hierarchical controller system, the execution of which leads to the implementation of the behavior. The robot has devices for interacting with the environment. They receive information from the environment through sensors: phototransistor, microphone, contact sensor [17].

A hierarchical approach allows you to formalize the requirements for mobility of robot behavior and develop all possible algorithms for responding to changes in the state of the environment. For example, when moving on the street, using satellite navigation technology, and surrounding objects, detecting using cameras, rangefinders and spectroscopic vision. That is, the approach allows autonomous robotic systems to be designed for the implementation of many social spheres of life.

The smart cognitive architecture of the robot, using the criterion for improving functional activity, is capable of recurring self-improvement. Cognitive architecture includes artificial neural networks, machine learning algorithms, the smart big data cognitive system, and a high-quality selection system. The smart cognitive architecture of the robot determines step by step how best to achieve the given goals and realize preferences through the actions of the utility function based on high-quality selection. Self-improvement is carried out by machine retraining according to the preference criterion on the basis of extensive statistics of high-quality selection of skills and competencies. Intelligent cognitive architecture of robot strives for development by machine retraining based on accumulated professional and behavioral skills [18].

The use of robots in an automated store does not require registrations, code scans and other manipulations. All that is necessary to make purchases is to install the application on smartphone.

After that, you can safely go to the store, choose goods, fold them as convenient and where convenient. Everything - after taking the necessary, the customer simply leaves the store, without visiting special zones, frames or scanners. Money is automatically debited from the card, and the receipt instantly comes to the owner's smartphone.

But, of course, in reality, not everything is as rosy as in theory and advertising. Already on the first day of work, it turned out that artificial intelligence could count customers by counting them goods that they decided not to take; does not always recognize theft and may not take into account the purchase if the visitor takes the goods too quickly.

The store's artificial intelligence system uses the required number of cameras and special algorithms. They record the speed, movement, gaze and pitch length of visitors to understand exactly what the buyer is going to take, as well as to calculate a potential thief. At the same time, they do not collect and store biometric data of customers.

Microsoft has developed a universal intelligent system that will allow companies to independently open automated supermarkets without personnel. Through the introduction of modern deep learning methods, they improved the experience of retail. Getting rid of slow, bulky lines of machine sales.

Electronic stores with multi-agent systems appear [5]. An electronic multi-agent store is a community of electronic store agents (sellers, managers, cashiers, security) and customers who can communicate and exchange information through electronic means of communication in the absence (or minimum) of personal direct contact. A store virtual agent is a representative office implemented by creating a Web server on the Internet to sell goods and services to other users of the Internet. He must provide the customer with information about the goods (service) and receive an order for the goods (service) from the customer. The cashier agent receives payment when using online payment systems. The agent manager will ship the paid item if the buyer does not pick up the item himself. The robot agent consultant greets customers in the store, helps them find a specific product on the entire sales window, and answers general questions. An electronic agent security guard monitors store customers through a review system. In case of violation, he blocks the door until the police arrive, which serves the store.

A robot consultant appeared in the Tokyo department store Mitsukoshi in April 2015. Outwardly, the humanoid, developed by Toshiba, looks like a real girl: dark hair, light skin, a pink jacket for the color of lipstick. In addition, she knows how to nod, move her lips and talk. True, only in Japanese. The robot was given the name Aiko Chihira. By contacting the consultant, you can find out about available goods, special promotions and sales.

Robot waiters are introduced in restaurants around the world. Artificial intelligence serves visitors at Bangkok's Hajime Robot Restaurant. A humanoid with a height of a person, dressed in national armor, is separated from the guests of the institution by a glass partition. On the tables in the restaurant hall there are tablets on which customers order. He goes to the robot, which collects dishes on a tray and takes it to visitors. Along the way, he sings songs and winks friendly.

Robotic Hotels

In mid-July 2015, the first hotel opened in Japan, a significant part of whose employees are robots (Figure 2).

Figure 2: Japanese robotic hotel

In a hotel called Henn-na in Nagasaki Prefecture, four humanoid doormen, three receptionists, two maids and one dressmaker carry watch. The rest of the employees are living people, but gradually they will yield jobs to robots.

Humanoids from the Henn-na Hotel were developed by Koroko. Engineers gave them a human appearance. So, inanimate reception employees look like cute young Japanese women. They know how to breathe, blink and make eye contact. And they speak four languages: English, Japanese, Chinese and Korean.

In addition to service personnel with artificial intelligence, the hotel is "stuffed" with numerous high-tech devices. For example, a facial recognition system works at the entrance to the rooms, so someone else will definitely not pass. And in the rooms themselves there is a system for determining the body temperature of people, knowing which you can set the desired degree in the room.

Living among robots is a pleasure quite affordable. The cost of a night in the hotel starts from $60 for a single room and reaches $150 per room for three.

In the Hotel Aloft in American Cupertino, a robot employee appeared even earlier than in the Japanese hotel Henn-na. A humanoid named Botlr joined the butler service in the summer of 2014. Outwardly, it resembles a R2R2 robot from Star Wars. Botlr is able to travel along the corridors of the hotel at a speed of up to 6 km/h and not collide with guests or luggage. The robot will fulfill any customer wishes. For example, deliver a sandwich, fresh towel or new toothbrush to the room.

Conclusions

Smart ethical artificial intelligence with analytical, research, psychological, linguistic, professional and behavioral competencies approaches human intelligence. Its psychological competencies (communication, self-regulation, adaptability during changes, motivation, empathy - identifying the needs of the environment) allow you to fully interact with a person in many areas of life. The analytical and research capabilities of smart ethical artificial intelligence and the ability to process big data can help solve the pressing problems of mankind with powerful supercomputers. The creation of cognitive robotic multi-agent systems with intelligent ethical artificial intelligence requires the development of tools, new criteria, methods, functional approaches and interdisciplinary model of hybrid intelligence to ensure synergy of its competencies in different environments. The interdisciplinary direction of "hybrid smart ethical intellectual systems" will bring together scientists and specialists investigating the applicability of several competencies from various specialties, and will attract them to create smart cognitive robots to solve complex problems in environments inaccessible to humans. Cognitive smart robots with hybrid intelligent ethical artificial intelligence will be able to perform a large number of various tasks that humanity poses. Robots will gradually fulfill the complex competencies of humans. People will ensure the humanity of life with robots.

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