DEVELOPMENT OF MODERN INTELLIGENT SYSTEMS AND THEIR FIELDS OF APPLICATION

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Annotation: This article delves into the dynamic landscape of modern intelligent systems, offering a comprehensive overview of their development and exploring their diverse fields of application. With advancements in artificial intelligence and machine learning, intelligent systems have witnessed rapid evolution, transforming the way we interact with technology and solve complex problems.

Keywords: artificial intelligence, classification, intelligent systems, adaptive, expert systems, technological processes, system prototype, knowledge, subsystem.

INTRODUCTION**.** Today, all industries are dynamic and are characterized by the globalization of absolutely all processes, the intensification of the fight against competitors, the introduction of constant innovations that require the use of optimal methods and management tools.

In the modern world, progress in programmer productivity is practically achieved only when computers take over part of the intellectual load. One of the ways to achieve maximum progress in this area is "artificial intelligence", when the computer takes on not only the same type of repetitive operations, but can also learn itself. In addition, the creation of a full-fledged "artificial intelligence" opens up new horizons of development for humanity.

The current stage of development of information systems can be designated as the stage of their intellectualization. The development of information systems without intellectualization is a thing of the past. What intellectual properties an information system should have, what structural parts should be intellectual - these are modern topical problems.

The main problem of the effective application of these methods and means is the organization and processing of knowledge about the abilities and potential, which become its intellectual capital.

Nowadays, the knowledge management system, which is gaining momentum in management, implies the use of modern intelligent information technologies, based on the success of the scientific direction "Artificial Intelligence".

MATERIAL AND METHODS. The use of intelligent technologies is intended to regulate all kinds of tasks in the face of uncertainty.

The concept of artificial intelligence includes not only technologies that allow you to create intelligent machines. AI is also one of the areas of scientific thought.

Intelligence is the mental component of a person, which has the following abilities:
• adaptive;
• learning through the accumulation of skills and knowledge;
• the ability to apply experience and skills to manage the environment.

Intelligence combines all the abilities and capabilities of a person. With the help of it, a person thinks, remembers new information, perceives the environment, etc.

At the moment, work on artificial intelligence is carried out by creating new programs and algorithms that solve problems in the same way as a person does.

An intelligent information system is based on the concept of using a knowledge base to generate algorithms for solving applied problems of various classes, depending on the specific information needs of users.

Classification of intelligent systems

Intelligent information systems are characterized by the following features:

• developed communication skills;

The communicative abilities of the IS characterize the way of interaction (interface) of the end user with the system, in particular, the possibility of formulating an arbitrary request in a dialogue with the IS in a language as close as possible to natural.

• ability to solve complex poorly formalized tasks;

Complex poorly formalized tasks are tasks that require the construction of an original solution algorithm depending on the specific situation, which may be characterized by uncertainty and dynamism of the initial data and knowledge.

• the ability to self-learning is the ability to automatically extract knowledge to solve problems from the accumulated experience of specific situations;

• adaptability - the ability to develop the system in accordance with objective changes in the model of the problem area.

In accordance with the listed features, IS are divided into (Figure 1.1)::
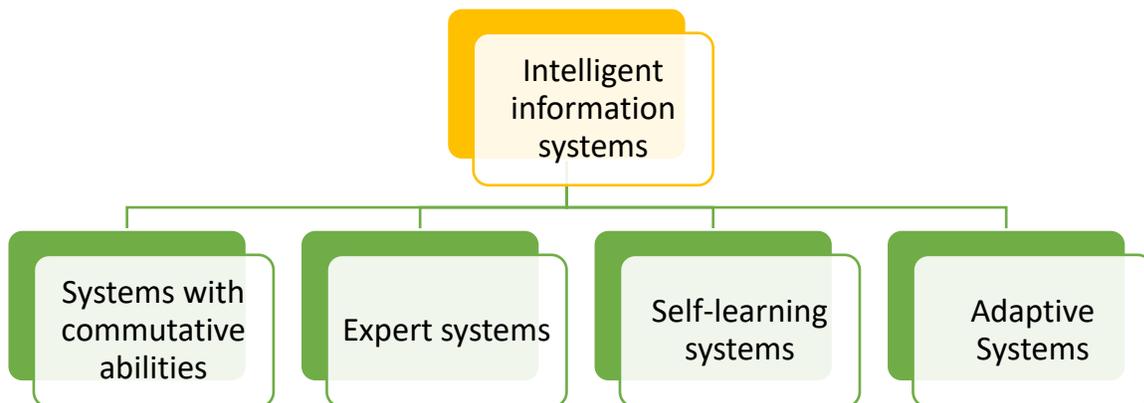
Figure 1.1 - Classification of intelligent information systems by types of systems.

If we consider intelligent information systems from the point of view of the task being solved, then we can distinguish control systems and reference systems, computer linguistics systems, recognition systems, game systems and systems for creating intelligent information systems (Figure 1.2).
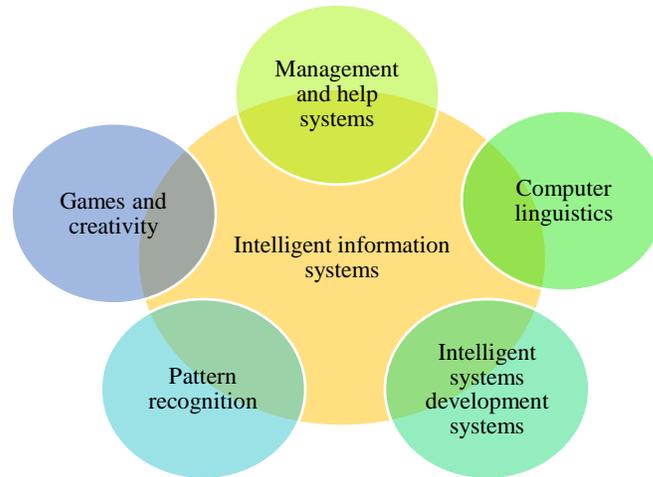
Figure 1.2 - Classification of intelligent information systems according to the tasks to be solved.

At the same time, systems can solve not one, but several problems or, in the process of solving one problem, solve a number of others. For example, when teaching a foreign language, the system can solve the problem of student speech recognition, test, answer questions, translate texts from one language to another, and support a natural language interface.

If we classify intelligent information systems according to the criterion "methods used", then they are divided into hard, soft and hybrid (Figure 1.3).
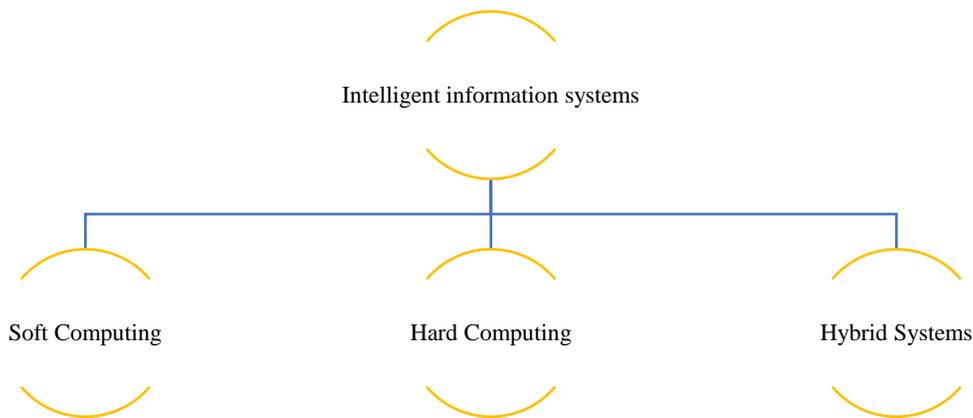
Figure 1.3 - Classification of intelligent information systems by methods.

In addition, this scheme reflects another variant of classification by methods: systems using knowledge representation methods, self-organizing systems, and systems created using heuristic programming. Also in this classification, music generation systems are classified as communication systems.

RESULTS. Intelligent general-purpose systems include systems that not only execute given procedures, but also generate and execute procedures for solving new specific problems based on search metaprocedures.

Specialized intelligent systems solve a fixed set of tasks predetermined during system design.

The lack of a clear classification is also explained by the variety of intellectual tasks and intellectual methods, in addition, artificial intelligence is an actively developing science in which new applied areas are mastered daily.

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Today the problem of intellectualization of the computer is raised. And this requires a completely different approach, which includes the intellectualization of the interface, the possibility of using and accumulating expert knowledge (accumulation of experience), the issues of learning and self-learning, which are based on the ideas of neuroinformatics, the accumulation of not only knowledge from a narrow subject area, but also metasubject knowledge in general. . It is necessary to separately consider the following methods of intellectualization of information systems:

- ✓ intellectualization of the interface of information systems;
- ✓ information systems for enterprise management;
- ✓ information systems for managing technological processes, production;
- ✓ information technologies for information protection and security of networks and communications;
- ✓ information systems for recognition of symbols, images, speech, translation;
- ✓ intellectualization of geoinformation systems;
- ✓ intelligent IS for medicine.

The solution of intellectualization methods for all the listed information systems and their structural parts will make it possible to approach the creation of an intelligent computer.

Consider the features of the implementation of the intellectualization of information systems. For the intellectualization of enterprise management information systems, it is necessary to implement a control cycle:

- accumulation of information
- information analysis
- decision-making
- bringing the decision to execution.

The architecture of an intelligent information system is primarily understood as the organization of a structure in which knowledge is applied and problems are solved in a certain field of science. The selection of the appropriate structure, features, and functions of IIS system components is determined and guided by established knowledge engineering principles.

The production system of an intelligent information system organizes and directs its functioning in accordance with the architectural design principles embodied in it. Each control scheme may require its own knowledge base and corresponding inference engine that works with knowledge. Typically, intelligent systems interact with end users, an expert, a knowledge engineer, external databases, application software.

In order to fully and in detail reveal the process of designing an intelligent information system, we will consider some important steps associated with the creation of a number of functional modules.

A detailed list of works on the design of intelligent systems is as follows:

- o obtaining knowledge from a specialist and transferring it to the system;
- o choice of the method of representation of knowledge in the system;
- o choice of production strategy (management);
- o choice of explanatory subsystem;
- o choice of subsystem of interaction with the user;
- o selection of adequate means of implementing the system.

As already noted, the content of the work, the number of stages in the design of intelligent systems, the sequence of their implementation depend on a number of objective and subjective factors. However, many stages and content of work are common and necessary for almost all types of intelligent systems. Below is a list of these stages and their components:

1) Description of the problem area - the definition of the problem area, showing the importance of the problem for the entire organization; identification of problematic experts wishing to transfer expertise (knowledge) to the knowledge base; preparation and announcement of the development plan.

2) Personnel - definition of a group of designers and related tasks; appointment of a qualified project manager; establishment and implementation of a firm line of management.

3) Acceptance of the project - holding an organizational meeting;

discussion of the main approach to the problem; preparation of a special development plan; preparation for the installation of the necessary technical means and tools.

4) System prototype - development of a system prototype: testing; obtaining additional information about the problem area based on the test results.

5) Development of a complete system - expansion of the knowledge base of the prototype; evaluating the structure of the user interface; combining user training and documentation tools.

6) Verification of the system - involvement of experts and potential users in the verification process; ensuring the functioning of the system in accordance with the project.

7) System integration - implementation of the complete system as planned; ensuring compatibility and interaction of the system with existing ones.

8) System support - providing continuous system support; updating the knowledge base in case of new information; maintaining responsibility for the system.

9) Documentation - preparation of complete system documentation; preparation of a user manual; organization of user consultations.

The stages of creating intelligent systems are not clearly outlined and regulated in detail. Between some of them it is difficult to draw a temporal and meaningful boundary. But these steps almost exactly describe the standard process of designing intelligent systems.

CONCLUSION

Summarizing the studied topic, we can say that intelligent technologies that allow you to create practically useful intelligent systems are in continuous development. Currently, for the implementation of expert systems technology, there are quite powerful tools. They are rapidly being improved by adding software packages and hardware implementation design tools. New technologies are being developed in the field of neuromorphic systems that model some brain structures, in the field of parallel computing and quantum computers. These technologies should significantly raise the level of intelligence of systems in the future.

However, the creation of intelligent systems with human intelligence is still far away. The study and development of new approaches and intellectual methods for solving difficultly formalized problems of information processing and management will bring this time closer. The prospects for such development are the creation of intelligent systems capable of processing information like a person, or artificial nervous systems of humanoid robots, real helpers and friends of a person in the near future.

Thus, the development of this direction will make it possible to create trainable intellectual systems with elements of thinking and conscious behavior. The addition of some creative abilities related, for example, to the automatic construction of hypotheses and models, as well as self-learning to solve new problems, will further increase the efficiency of intelligent systems.

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