RESEARCH AND ANALYSIS THE DISPLAY METHODS FOR ALGORITHMS IN COMPUTING TASKS ON THE STRUCTURE OF COMPUTER SYSTEMS

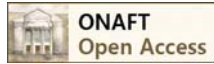**Antonova A.[1], Onoshenko O.[2], Snigur T.[3]**

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Анотація:У статті розглядаються питання технології та методології для автоматизації процесу пошуку та розробці нових способів застосування сучасних технологій комп'ютерного моделювання та сучасних методів обчислень, а потім розробки програмного забезпечення для автоматизації физико-техничних і технологічних досліджень та розрахунків. Оскільки, дані технології досить розвинуті самі по собі та мають велику базу знань, варіантів їх використання дуже багато, від навчальних до інженерних додатків, то не менш актуальною, є тема візуалізації планів, схем або дизайну майбутнього обладнання, а також складання графіків порівняння характеристик вже існуючих пристроїв та плануємих до розробки та виробництва. Для виконання самого дослідження була виконана інформаційна опрацювання (статті, доповіді, самі засоби автоматизації) етапів розвитку даної теми. В результаті авторами зроблені висновки про подальші напрямки розвитку по даної тематиці, виявлені переваги існуючих рішень і визначені області, які недостатньо опрацьовані.

Abstract: The article deals with the issues of technology and methodology for the automation of the process of searching for and developing new ways of using modern computer modeling technologies and modern computing methods, and then developing software for the automation of physical, technical and technological research and calculations. Because the given technologies are sufficiently developed in themselves and have a large knowledge base, there are many variants of their use, from educational to engineering applications, no less relevant, there is a topic of visualization of plans, schemes or design of future equipment, as well as drawing up charts of comparison of characteristics already existing devices and plans to develop and manufacture. In order to carry out the research itself, information processing (articles, reports, automation means itself) was carried out for the development stages of this topic. As a result, the authors draw conclusions about further directions of development in this subject, identify the advantages of existing solutions and identify areas that are underdeveloped.

Ключові слова: моделювання, програмне забезпечення, автоматизація інженерних розрахунків, порівняльний аналіз

Keywords: modeling, software, automation of engineering calculations, comparative analysis

Introduction

The purpose of the research is to study the automation technologies for calculations to help solve the problem of construction optimization of heat and mass exchange machines, optimize the parameters of operating modes of refrigeration and air conditioning systems, and develop a computer application that allows the user to test all the benefits of automated calculations. One of the important parts of the whole project is the user interface and the appearance of the calculation results, which will be given much attention and research time..

Analysis of the current state of the question

The current state of the development of computer systems for information processing and management is characterized by the expansion of the fields of application, much of which require elaboration in complex algorithms for the intensity of the flow of data on hardware and computer media that meet the limitations of dimensions, energy consumption, cost and time development [1].

Computer system - an information and technical complex for the purpose of processing, saving, input-output information. The computer system includes computers, printers, servers, etc. with software. Information is exchanged through the computer network, through the local or global data transmission system. When describing the systems, they use technical, organizational, documentary, functional, algorithmic, software and information structures. Problems solved in computer information systems, have a number of characteristic features that affect the technology of automated data processing. The computer system has the ability to integrate with other engineering technologies, expand the capabilities and create a single environment for management due to the diversity and unification of computer equipment.

Computer systems are very important in the modern world. They are used, practically, in all spheres of society, have become irreplaceable for modern managers (and not only). Thanks to the computer system it is possible to solve applied tasks in the subject areas of activity such as technological preparation, management, accounting, automation of processes [9].

The experience of solving research and application problems shows that regardless of their complexity, the ultimate goal can be achieved either by the formulation of an experiment or by the method of mathematical modeling. Each of these methods has its advantages and disadvantages. With the help of an experiment it is possible to solve even very complex tasks, while the reliability of the results is higher, the more thoroughly worked out is the technique of experiment. At the same time, the results obtained will relate only to the conditions under which the experiment was conducted, as a result of which the generalization of results to other conditions is not correct. In addition, we must take into account the economic side of staging a complex experiment. In this regard, the method of mathematical modeling with the help of computer technology is more likely when analyzing not a real task, but its model image. The process of mathematical modeling is depicted in the following sequence: the physical formulation of the problem; mathematical statement of the problem; mathematical study of the problem; analysis and comprehension of the mathematical solution and comparison of it with the experiment [2].

The process of mathematical modeling is depicted in the following sequence: the physical formulation of the problem; mathematical statement of the problem; mathematical study of the problem; analysis and comprehension of the mathematical solution and comparison of it with the experiment. Let's consider more mathematical formulation and mathematical study of the problem. The mathematical formulation consists in the formation of a mathematical model of the investigated problem, which is usually a system of equations of mathematical physics (differential, integral, integral-differential). The mathematical study of the problem actually reduces to solving the system of equations and analyzing the results obtained. We can solve the output for relatively simple problems: in the system of equations and the solution to submit as dependencies expressed through elementary and other known functions. If possible, then they say that an analytical (exact) solution of the problem has been found. However, the overwhelming majority of practically important problems do not have analytical solutions. These include, for example, the construction tasks: the determination of the stress-strain state of plates, foundations; stability problems, thermal conductivity for solids; directed diffusion, etc. In these cases, numerical methods are used which, by operating the system of algebraic equations (analogs of the equations of mathematical physics), make it possible to construct a certain sequence of arithmetic operations, increasing the number of which gives an exact solution. Since in practice there is a finite number of steps (operations), the solution found is approximate. And as computational operations are performed over numbers, then the corresponding methods are called numerical. The greatest development of numerical methods has recently been achieved due to the use of computer technology, which has high computational speed and a large capacity of RAM. However, the main role in this case is given, of course, to a person who should be able to formulate and assign a task, to describe its mathematical dependencies (to create a mathematical model of an object), to formulate an algorithm for solving a problem on computer technology, to write a program in algorithmic language, understood by computer, to solve the problem and to evaluate the results [3].

Regarding the evaluation of the calculation results, it should be noted that the combination of numerical methods and computer technology makes it possible to do it effectively and promptly, varying the most important parameters of the design scheme of the problem with the subsequent numerical analysis of their impact on the final result. In fact, it is a numerical experiment because the terms of the problem can be changed many times. Despite the differences in the methodology, a physical experiment and physical research are closely related to the numerical experiment, especially in the part where the evaluation of the reliability of the results is required. The mathematical model of an object is a set of equations that examines real physical objects (processes, phenomena). The mathematical model is not the same as the investigated object, but it is only its approximate description, since it is built with some simplifications and idealization. The model takes into account the most important moments and interrelationships that are most characteristic of the real object being studied. At the same time, due to the replacement of the real object with the corresponding mathematical model it became possible to formulate the problem as a mathematical problem and use it for solving it by one or another mathematical apparatus. The algorithm is an understandable and precise prescription (an instruction) for the performer to carry out a sequence of actions aimed at achieving this goal or solving the task. The accuracy of the solution is a measure of the proximity of the numerical solution to the analytic one. Convergence of the solution is a gradual approximation of it to the exact one. After choosing a mathematical model of an object and its description in algorithmic machine language, numerical implementation of the problem on computer technology is carried out. Recently, in the realization of practical tasks, for the most part, they use computer technology, which can perform from several hundreds to millions of operations per second. The greatest application in engineering calculations has acquired computer equipment, which have not only high-speed computing, modern software, but also an advanced service part

that allows you to quickly diagnose errors, to graphically display the results of calculations, to perform calculations in dialog mode. Great popularity among users also acquired Personal computers also acquired great popularity among users[4].

Analysis of analogic systems

Like any technological process, the processing of information on a computer is formed by a set of actions performed in a certain way and in a certain sequence. This specially organized process is carried out with the help of two main components of any type of computer technologies - its hardware and software**.**

Let us consider the existing software system of different application lines.

Applied computing solutions for logistic tasks

Managing logistics systems, product supply chains, or individual fragments of them is highly effective, with the use of modern tools for solving tasks that require optimization. It contains not only known mathematical methods and models with worked out algorithms for solving economic problems, but also so-called security tools. Without these two components, a modern specialist in the field of logistics is not able to provide an equilibrium state of the logistics system, the supply chain.

For this period of development of society, the computer, as a means of ensuring the successful work of professionals, is well known to all, first of all, as a calculating machine. Serious economic and managerial tasks are solved with its help. To succeed in their solution, now logistics provided modern software tools that combine a large arsenal of common various computing packages and special packages for processing various information. Here is a brief description of them.

1. The problem-oriented software package of numerical methods MERCURY is intended for the solution of various applied computational tasks, such as economic and managerial tasks. This package uses systems of linear and nonlinear algebraic equations, optimization of functions, analysis of properties of functions using graphs, etc. MERCURY can handle the relatively optimal level of managerial tasks that are relatively simple in size. Its main drawback is certain restrictions on the amount of information that needs to be entered into the database.

2. MathCAD combines a series of mathematical systems with a user-friendly interface. Different versions of this system are known today, which provide an opportunity to solve the problem of recording very complex mathematical expressions such as integrals, matrices, symbols of sums and products, systems of equations with constraints, etc., rather quickly.

The system makes it possible to visual work with graphics, especially two-dimensional. There is also implemented three-dimensional graphics and built-in capabilities for building animated charts, allowing you to see the process in dynamics.

3. With regard to a wide range of managerial tasks and office technologies that are widely used by managers and logists, graphic systems and image processing programs are of interest - Paintbrush, Paint, Ulead ImagePals, Adobe Photoshop, CorelDRAW graphics packages and more..

4. Tools for processing text information - modern text editors, which represent a software product that provides the user computer tools for creating, processing and storing documents of various nature and complexity. These include text editors (MultiEdit, Brief, Norton Editor, Quick, etc.), document editors (Lexicon, Ami Pro, Microsoft Word, etc.), publishing systems (Corel Ventura Publisher, Adode PageMaker, QuarkXPress, etc.) editors of scientific texts (TEK, Mathor, etc.).

5. Tables data processing tools – Microsoft Excel.

6. Integrated systems. Two systems of this class are widely known: MS-WORKS and Microsoft Office. They are, in essence, an integrated software package. The components included in the complex can be used both individually and together for the solution of business day-to-day tasks..

Network technologies - a kind of informational space that provides users with the means of information exchange and collective use of network resources: hardware, software and information. With the help of the network, different issues are solved regardless of the location of clients and partners, which is especially useful for logists with a large geography of communication..

To date, logistics is mainly used by three groups of networks:

• networks that connect personal computers directly to each other using regular telephone lines;

• UUCP-based networks (UNIX-to-UNIX Copy Program) and connecting large numbers of computers using both regular telephone lines and specialized high-speed channels.;

• networks that are part of the Internet community and provide not only the ability to transfer any information, but also access to seized resources in real time scale.

The following list of software used in logistics activities, along with mathematical methods, of course, promotes a quick solution to tasks that require optimization. However, this software is common for both logistics, for managers, for marketers, and for many professionals working in different fields. You can specify the following for a specific logistics area.

The rapid speed of development of information technologies allows us to obtain modern arithmetic tools for making logistic solutions, special computing or modeling packages. To date, they have been developed quite a lot and they are used quite effectively by European and American firms and companies. For example, standard sets of routing tasks such standard packages as PARAGON, CAST, OPTRACK, the referent model SCOR for managing supply chains, modern software program ORACLE for the management of logistics systems, including supply chains and many others have been widely used in Europe and America. Due to the impossibility of describing all existing packages for an example, let us consider only two, which are successfully used today by the logistics services of enterprises, companies and companies of Ukraine - these are the software product ORACLE and the reference model SCOR [7].

Applied computing solutions for engineering tasks

In [8] a mathematical model of dynamics with distributed parameters for a reflux absorber diffusion refrigeration machine is developed that describes the temperature distribution along its surface (temperature field) with a known temperature distribution of the vapor-liquid mixture. When receiving this model, a porous approach was used. According to it, the reflux was considered to consist of a set of interconnected cells of small length, each of which is described by a model with lumped parameters. The surface temperature of each i-th cell is determined by their initial values (at t = 0), the total heat flow to it is

1) heat flow from a steam water-ammonia mixture to a wall of a reflux condenser;
2) heat flux into the environment from the wall of the reflux condenser;
3) the heat flow along the reflux conduit) and at time t from the moment of change.

The system allows simulation and calculations at different values of distances and the different nature of the temperature change of a steam-liquid water-amine mixture in a reflux membrane.

Software for calculation of the developed algorithm of real-time calculation of the values of the temperature of the vapor-liquid mixture in the defluhemator of the absorption diffusion refrigeration machine. These temperature values are not available for direct measurement. This system creates a real basis for the creation of automatic optimization systems for the operation modes of absorption diffusion refrigeration machines on the criterion of maximum energy efficiency.

In [9] the following problems are considered:

- the problem of development of circuit solutions for multifunctional systems with direct (direct) regeneration of absorbent and improvement of heat-mass exchange devices of drainage and cooling circuits of solar systems of air conditioning are considered::

- theoretical and experimental development of a new class of gas-liquid-type solar energy converters for direct absorption of regeneration;

- creation of unified compact heat and mass exchange equipment (absorber-dehumidifier with internal evaporative cooling, solar desorber-regenerator, evaporative coolers), which ensures minimization of energy consumption;

- modeling of working processes taking into account the characteristics of film flows in heat-mass exchange machines and conducting research of solar regenerators of absorbent and evaporative coolers;

- obtaining the results and recommendations that provide the calculation and design of such systems on the basis of the completed cycle of theoretical and experimental work.

Conclusion

The research of the technology of creation of software for automation of engineering calculations and its application on the modern wide market, one of which is mechanical engineering, production of refrigerating technics, air conditioning devices, is carried out. To do this, the mathematical model for calculating heat loss in the middle of the channels of various heat-mass-exchange units was improved, a software product was constructed with the ability to set up individual calculation parameters.

To achieve the goals and objectives, the necessary tools and tools were first identified for each part of the project, which are models, program code, user interface. Development was started with the study of models of research objects, further using the environment and development tools created software implementation for models. The final task was to collect the results of calculations and visualize the results in the form of comparative graphs.

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ИССЛЕДОВАНИЕ ИСПОЛЬЗОВАНИЯ НЕЧЕТКОЙ ЛОГИКИ ДЛЯ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ИГРАХ

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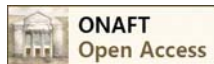[1,2,3] – Одесский национальный политехнический университет, Одесса, Украина

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Аннотация: В статье описывается использование нечеткой логики для решения задач искусственного интеллекта в играх. Представлены основные проблемы в создании искусственного интеллекта, а также основные методы реализации искусственного интеллекта в играх. Основное внимание уделено методу нечеткой логики. преимуществам и недостаткам его в практическом применении. Нечеткая логика представляет собой надмножество традиционной логики, которое было расширено для обработки понятия значений частичной правды между булевой функции истины и ложности. Нечеткая логика обычно принимает форму нечеткой системы рассуждений, а ее компоненты - это нечеткие переменные, нечеткие правила и механизм нечеткого вывода. Этот метод позволяет лингвистически сформулировать цели несобственного персонажа (NPC) и предоставляет возможность оценки ситуаций для принятия решения.

Основной целью работы представлена разработка интеллектуального агента, который реализует поведенческие реакции на основе правил с использованием нечетких множеств. В качестве практической задачи представлена задача описания поведенческой реакции NPC на интерактивные объекты, при достижении определенной цели. Для решения этой задачи введено понятие посторогонального пространства, которое позволяет описывать множество нечетких ситуаций и сравнить их между собой.

В результате была построена таблица правил поведения NPC, на основе которой можно спроектировать поведенческую реакцию NPC. . Основным преимуществом данной модели является задание нечетких ситуаций с