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CONTEMPORARY APPROACHES TO INTEGRATING AI AGENTS INTO LIBRARY INFORMATION PROCESSES

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Abstract. *The work aims to investigate the possibility of using software agents based on artificial intelligence to optimize the information process in libraries. Modern libraries, especially academic ones, act as resource centers for providing scientific and educational information for the scholarly community. However, the library's activities are not only about serving users and satisfying their information needs. Numerous internal processes are not visible to the average person. User. Despite providing libraries with information systems that support their activities, libraries must keep pace with modern technologies and strive to optimize and transform their activities in accordance with the conditions of modernity, as well as the information needs of users. One of the most modern technologies is the production of various kinds of tools combined with the work of artificial intelligence. Since much research has been conducted on the possibility of using AI in different fields, the library industry is no exception. The paper considers the possibility of applying AI-based agents to the ability to process and optimize processes related to information processing in libraries. The paper analyzes the capabilities of software agents based on AI, such as AutoGPT, AgentGPT, MiniAGI, SuperAGI, and natural language processing, for use in the library. The main attention is paid to analyzing the main areas, such as cataloging and book-buying recommendations. The paper proposes new approaches to optimizing information processes in libraries with the help of intelligent agents, emphasizing their potential to increase the productivity and quality of library services.*

Keywords: AI-based agents, automation of library processes, generative artificial intelligence

WSPÓŁCZESNE PODEJŚCIA DO INTEGRACJI AGENTÓW AI Z PROCESAMI INFORMACYJNYMI BIBLIOTEK

Streszczenie. *Praca ma na celu zbadanie możliwości wykorzystania agentów programowych opartych na sztucznej inteligencji do optymalizacji procesu informacyjnego w bibliotekach. Nowoczesne biblioteki, zwłaszcza akademickie, pełnią rolę centrów zasobów dostarczających informacje naukowe i edukacyjne społeczności naukowej. Jednak działalność biblioteki nie ogranicza się wyłącznie do obsługi użytkowników i zaspokajania ich potrzeb informacyjnych. Wiele procesów wewnętrznych nie jest widocznych dla przeciętnego użytkownika. Pomimo wyposażenia bibliotek w systemy informatyczne wspierające ich działalność, biblioteki muszą nadążać za nowoczesnymi technologiami i dążyć do optymalizacji i transformacji swojej działalności zgodnie z warunkami współczesności, a także potrzebami informacyjnymi użytkowników. Jedną z najnowocześniejszych technologii jest produkcja różnego rodzaju narzędzi połączonych z działaniem sztucznej inteligencji. Ponieważ przeprowadzono wiele badań dotyczących możliwości wykorzystania sztucznej inteligencji w różnych dziedzinach, branża biblioteczna nie jest tu wyjątkiem. W artykule rozważono możliwość zastosowania agentów opartych na sztucznej inteligencji do przetwarzania i optymalizacji procesów związanych z przetwarzaniem informacji w bibliotekach. W artykule przeanalizowano możliwości agentów oprogramowania opartych na sztucznej inteligencji, takich jak AutoGPT, AgentGPT, MiniAGI, SuperAGI i przetwarzanie języka naturalnego, do wykorzystania w bibliotece. Główna uwaga poświęcona jest analizie głównych obszarów, takich jak katalogowanie i rekomendacje dotyczące zakupu książek. W artykule zaproponowano nowe podejścia do optymalizacji procesów informacyjnych w bibliotekach za pomocą inteligentnych agentów, podkreślając ich potencjał w zakresie zwiększenia wydajności i jakości usług bibliotecznych.*

Słowa kluczowe: agenci oparci na AI, automatyzacja procesów bibliotecznych, generatywna sztuczna inteligencja

Introduction

Until recently, libraries played a key role in storing, organizing, and providing access to information. However, the increase in the volume of information and data that needs to be processed and the increasing requirements for the speed of their processing have caused a revision of the basic concepts of library work. Technologies for organizing processes affect the interaction and satisfaction of users' information needs. Therefore, they require the introduction of new technological solutions.

Many works of the world's leading scientists were devoted to modeling possible areas of application of AI: from the educational process to the medical field, the creation of robotic controls, etc. However, there is practically no research on integrating AI into library processes [1,12].

One of the most promising approaches to solving these problems is artificial intelligence (AI)-based agents. Highly advanced AI algorithms cannot only automate routine data processing processes but also provide more accurate analysis and personalized information delivery. Through machine learning, natural language processing, and intelligent search techniques, libraries can significantly increase their productivity, improve the quality of services, and provide users with more convenient access to knowledge.

This paper reviews the possibility of integrating agents based on high artificial intelligence into library systems. The key AI technologies and their application in the field of library science are analyzed, and potential challenges and ways to overcome the difficulties associated with implementing these innovations are outlined. Attention is paid to automating data processing, classification, and cataloging, and improving user experience through intelligent reference systems.

The purpose of the study is to study the capabilities of autonomous artificial intelligence agents, AutoGPT, AgentGPT, MiniAGI, and SuperAGI, to optimize and simplify information processing processes in libraries, as well as to study their possible impact on the efficiency of library system services and the quality of information services provided.

The object of research is software agents based on artificial intelligence, AutoGPT, AgentGPT, MiniAGI, and SuperAGI, as well as their features and possibilities of integration into library information systems.

The subject of the study is the integration of AI-based agents into library systems to automate and improve the efficiency of information processing and the impact of these technologies on the overall performance of library processes.

1. Analysis of literature

This paper explores the possibility of integrating agents based on high artificial intelligence to improve/simplify library information processing processes. Several works by foreign and Ukrainian scientists have covered theoretical assumptions and research regarding the capabilities and areas of application of AI software agents and LLMs in various fields such as medicine [4, 16], logistics and transport [11], management processes [6, 13], military affairs, analysis of social networks, etc. [7–9] and educational processes [2, 10], virtual assistants [3, 5]. In particular, many works are devoted to the study of the possibilities of language models for the implementation of tasks related to educational and scientific activities, such as:

- generation of text on a given topic;
- creating an annotation on a given topic (by keywords or other query);

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- text translation;
- selection of literature on the topic of research;
- even creating a review for a research paper.

However, the solution of all these tasks in one way or another requires the presence of a human factor to analyse the results obtained and an expert assessment of their correctness (relevance) to the request, since existing systems do not have the property of autonomy. Although modern LLMs have a well-implemented apparatus for solving the problems described above, in some cases, the presented results look illogical and contradict common sense; therefore, to one degree or another, they need to be corrected by a person.

The development and research of AI capabilities began in the 1950s and consists of various stages and advances in this direction, from Logic Theorist and the Turing machine to attempts to create humanoid AI (AGI). Modern technologies are high-level AI. In this paper, the possibilities of using autonomous artificial intelligence agents, AutoGPT, AgentGPT, MiniAGI, and SuperAGI, are investigated for the possibility of integration into the library environment to optimize the processes related to the processing of requests from users, create metadata of bibliographic sources, and change the work (improve efficiency) of librarians.

Despite the good results in solving some problems, not everyone has a positive attitude towards the processes associated with improving AI's work and strengthening AGI's functions. There are also critics and skeptics of the use of such technologies, who still consider it impossible to create a strong AI because it is impossible to endow the machine mind with purely human qualities such as logic, intuition, experience [12, 15, 16], psychological aspects, etc. Also, numerous studies confirm the feasibility of controlling the results obtained from using AI, especially LLM, by humans.

2. Results and discussion

Before thinking about what processes in the library can be replaced or supplemented with autonomous AI agents, it is advisable to consider what is meant by the concepts of LLM and, based on it, agents: AutoGPT, SuperAGI, MiniAGI, AgentGPT, SuperAGI.

Figure 1 presents the timeline of the development of software products based on AI.

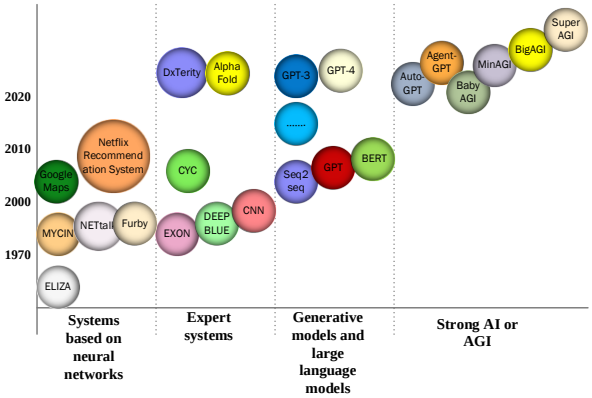

Fig. 1. Chronology of the development of the most popular software products created based on AI and their conditional classification

As you can see from the figure, there are quite a lot of them, and this direction of digital technologies has been developing for a reasonably long time.

2.1. Large language model (LLM)

One of the current stages of AI development is the so-called Large Language Model (LLM). This is one of the results of the development of mass models based on artificial intelligence, which consists of deep learning. Large language models are usually built based on recurrent or transformer algorithms and are trained on vast sets of text data, capable of learning and comprehending the structure of language, grammar, semantics, and context. The most well-known examples of LLMs are GPT (Generative Pre-trained Transformer) from OpenAI, BERT (Bidirectional Encoder Representations from Transformers) from Google, Llama, BLOOM, GPTNeoX, and others. After the models are trained on large data sets, they can be used to solve various problems related to text information processing. For example, text generation, question answering, machine translation, content creation, and more. LLMs possess impressive language comprehension and content production abilities, making them useful for many applications in artificial intelligence and natural language processing.

It should be noted that LLMs are not designed to solve problems related to complex mathematical calculations or solve technical or engineering problems. As well as specific sector tasks. This is due to the algorithms that underpin such models. Large language models are built on machine learning and natural language processing (NLP). They are implemented due to probabilistic algorithms, which select the placement of words by predicting the probability of the proximity of words, taking into account those that precede it. Thanks to this approach, which is applied to large arrays of diverse text and many parameters, it is possible to create models that can generate sentences that are logically related to each other and relevant to the formulated query. This algorithm allows you to generate sufficiently large, logically structured texts. Thanks to the constant improvement of the algorithms of large language models, it has become possible to create AI systems that can understand and generate results close enough to natural human speech. However, such models are not limited to simple text generation. Based on language models, you can implement personal assistants and chatbots for customer service and content creation. There are even examples of the implementation of assistance in scientific research. Document clustering and classification, speech and image recognition, and optical character recognition can be done. This is only a limited set of tasks. As these models continue to evolve and their algorithms improve, it is possible to predict the possibility of their application in other areas to solve increasingly complex Tasks.

Despite users' admiration for the comprehensive capabilities of LLMs, taking into account the features of the algorithms that underlie them, the ethics of their use and interpreting the results acutely arise.

Even though in the literature, as well as in practical application, one can trace the significant admiration and popularity of large language models, as well as attempts to use them in various directions and industries, we should not forget that these are only systems, the work of which is based on the generation of texts. Numerous studies have proven that such systems do not give good enough results when it comes to more complex tasks, such as solving specific field problems in mathematics (in a broad sense, even at a low level), physics, chemistry, and various kinds of technical issues [5]. The essence of this problem stems from the algorithms that underlie LLMs and their main idea and purpose – text generation. In addition, they can be attributed to single-step systems. LLMs can only perform one task simultaneously, without human interaction (prompts). This poses a problem for solving complex problems that involve the execution of several stages.

If we are talking about attempts to solve problems that involve multi-stage or multiple executions of some actions, LLMs are not suitable for this. Also, considering them in the context of attempts to create strong AI (AGI) is like a zero initial stage. A positive aspect for the average user is the ease of use of LLMs, as they do not require any thorough knowledge and skills in the field of IT, and they can also be used online. Because of this, they have become widely used.

The next step in the evolution of AI can be considered multitasking autonomous programs or software agents that can learn independently and do not need to be adjusted by the user. Let's consider a few such examples.

2.2. AutoGPT

AutoGPT is one of the classes of applications called recursive AI agents. It is an open-source application that uses GPT-4 and is designed to perform tasks that involve long-term planning and use.

Unlike LLM or NLP, such programs are designed to perform complex, multi-step tasks. The operation of such programs is based on the autonomous use of the results they generate to generate new prompts, combining these operations to perform complex tasks.

AutoGPT is an artificial intelligence (AI) system that uses GPT-4 technology to write code and execute Python scripts, providing users extensive capabilities to solve various tasks. This innovative solution allows you to create personalized tools and applications. Thanks to the capabilities of self-improvement through a feedback loop, AutoGPT can constantly adjust work, improve its performance, and adapt to different tasks.

It is a technology that overcomes the limitations of LLM. To get the best results for an LLM case, you must consider and formulate the request clearly and unambiguously. In the case of AutoGPT, the thoughtfulness of the query is not so important. Depending on the task, the system can adjust its steps and sequence of actions to solve the problem. This solution occurs in a loop (usually, the user specifies 20-25 cycles).

The following components can be distinguished as components of AutoGPT:

GPT language model: The basis of AutoGPT is a generative pre-trained transformer such as GPT-4, which provides the model's ability to understand and generate text based on input.

Feedback loops: AutoGPT uses an iterative approach where the output of one cycle can become input for the next, thus providing adaptive learning and correction.

Goals and sub-goals: The model can break down the main objective into a series of sub-goals, which allows the final result to be achieved step by step.

The process of AutoGPT's functioning can be divided into several stages:

Goal definition: In the initial phase, the user sets the primary goal. This can be writing a report, generating code, or analyzing data.

Planning: The model develops a plan comprising a series of tasks or sub-objectives necessary to achieve the main objective.

Execution: AutoGPT executes the task in stages, using the results of the previous steps as input for the next steps.

*Evaluation and adjustment***:** At each stage, the model evaluates its actions and adjusts the plan as needed, thus ensuring high adaptability and efficiency.

If we compare the main ideas of LLM and AutoGPT, we can see that they are radically different. AutoGPT splits an enormous task into smaller tasks, then separates independent instances and processes them. The original (initial) request acts as a project manager to coordinate the entire process and form the final result. In addition to using GPT4 to construct sentences and queries based on the text it has learned, AutoGPT can browse the internet and incorporate the information into its calculations and output.

Although AutoGPT offers excellent advantages in terms of ease of use and versatility, it is essential to acknowledge potential limitations. Users should exercise caution when using the Docker Dev build due to possible errors and consider the learning curve associated with its new features. From the perspective of an inexperienced user, Auto-GPT is characterized by a simple and intuitive interface and a functional feature set. AutoGPT opens up new opportunities for automating various processes:

Business process automation: The model can generate reports, generate content, analyze data, and perform other routine librarian tasks.

Software development: AutoGPT can generate program code and test and debug programs, which significantly increases development efficiency. This is especially useful if a person is not a programmer and needs to solve a primitive problem (calculate, write a script, or visualize data)

Personal assistants: The model can organize schedules and reminders and perform other household tasks, thus providing convenience and comfort at work.

2.3. AgentGPT

AgentGPT is a service that allows users to design, modify, and run specialized AI agents. This can be accomplished by setting up and running self-managed AI agents, allowing them to assign their own names and define any goal the AI should pursue. An autonomous AI project will seek to achieve the goal by creating and executing tasks while learning from the results.

With its help, you can create a trained agent to perform the user's tasks.

AgentGPT consists of several key components:

Agent-based systems: Agent-based systems are autonomous software structures capable of executing tasks, interacting with other agents, and making decisions based on specific rules and criteria.

GPT language model: A generative pre-trained transformer (GPT) provides a high-level understanding and text generation capability, allowing agents to interact with users and other systems.

Integration platform: It is the environment in which agents' actions coordinate, ensuring their interaction and joint execution of tasks.

The process of AgentGPT's functioning can be divided into several stages:

Goal definition: The user sets the main goal or task to be completed. The agent-based system defines the specific sub-goals needed to achieve that goal.

Task distribution: An agent system distributes tasks among individual agents, taking into account their specialization and capabilities.

Task execution: Each agent uses the GPT language model for text generation, data analysis, or other necessary actions.

Coordination and integration: The agent system coordinates agents' actions, ensuring the integration of the results of their work and the achievement of the final goal.

Evaluation and adjustments: At each stage, the agent system evaluates the agents' performance and makes necessary adjustments.

One of the advantages of AgentGPT compared to the previously described models is the user experience. It is designed to collaborate with people to achieve tasks. Like AutoGPT, it decomposes the formulated task and works sequentially to solve each element. The next step is to present the final result.

It has gained widespread popularity due to its simple interface, even among those who are not into programming.

In parallel with the average user, AgentGPT has become helpful for IT administrators, companies, AI researchers, and data analysts. It attracts users with extensive technical expertise in software development and AI technologies, catering to their needs and interests through its innovative features and capabilities.

Although both AutoGPT and AgentGPT are AI agents built on OpenAI, they have some important differences:

Autonomy: AutoGPT can work and make decisions independently, while AgentGPT requires human intervention.

User-friendliness: AgentGPT, due to its intuitive user interface, is more user-friendly than AutoGPT.

Prompt generation: AutoGPT can generate its own prompts, while AgentGPT depends on user input.

Although AutoGPT and AgentGPT share an everyday basis in the form of GPT's generative language model, they differ in architecture and how they work. AutoGPT is focused on executing tasks through iterative cycles, while AgentGPT uses autonomous agent systems to distribute and coordinate tasks. Both technologies have a wide range of applications and open up new opportunities for automating processes in various industries, including the library.

These are entirely different in their properties, purpose, and methods of solving the system's problems.

Both Auto GPT and Agent GPT are just tools, but they are designed for different applications.

Auto GPT has proven itself flawlessly in contexts such as data management, content creation, research, and analysis, where offline operation is preferred. Agent GPT, on the other hand, is great for individual sales and marketing automation, where human input and engagement are essential.

Therefore, when deciding which one to use, it is essential to consider the goals and nature of the tasks you plan to perform.

AI researchers or users claim that AgentGPT is a more convenient means of using AI agents. Although its operation is based on the same technology as ChatGPT and AutoGPT, its functionalities differ significantly. While Agent-GPT can work independently without human agents' help, it is designed to collaborate with them to complete tasks more accurately.

By giving an AI agent like Agent-GPT a broad target, it can break down the target into smaller tasks and start executing them. In general, using artificial intelligence agents such as Agent-GPT can help to complete tasks faster and more efficiently, but you always need to check the adequacy of the result obtained.

Let's consider other AI Agens: BabyAGI, MiniAGI, BigAGI**.**

2.4. MiniAGI

MiniAGI (Mini Artificial General Intelligence) is a simplified version of Artificial General Intelligence (AGI) systems that combines the capabilities of different agents to perform tasks that require adaptability, autonomy, and a high level of intelligence. MiniAGI is designed to implement complex functions with limited resources, providing high efficiency and speed in solving problems. MiniAGI uses GPT-3.5-Turbo and GPT-4.

It possesses the basic capabilities of temporary and long-term memory, which allows it to maintain context and build on previous communications. It combines a solid prompt with minimal tools, a chain of thoughts, and short-term memory with summation. Also capable of internal monologue and self-criticism.

MiniAGI consists of:

Agent systems: Autonomous software agents capable of executing tasks, interacting with other agents, and making decisions based on specific rules and criteria.

GPT Language Model: A generative pre-trained transformer that provides understanding and text generation.

Integration platform: An environment that ensures coordination of agent actions and joint execution of tasks.

The process of MiniAGI's functioning can be divided into several stages:

Goal definition: The user sets the main goal or task to be completed.

Task distribution: The integration platform distributes tasks among agents, taking into account their specialization and capabilities.

Task execution: Each agent uses the GPT language model for text generation, data analysis, or other necessary actions.

Coordination and integration: The platform coordinates the actions of agents and integrates the results of their work to achieve the ultimate goal.

Evaluation and adjustments: At each stage, the system evaluates the agents' performance and adjusts as needed.

Differences from other systems:

Scalability: MiniAGI is designed to handle resource-constrained tasks, providing high efficiency and speed.

Autonomy: MiniAGI agent systems can operate autonomously, minimizing the need for constant user intervention.

Adaptability: The system can adapt to changing conditions and adjust its actions to achieve optimal results.

It adapts to the capabilities of GPT and includes summaries to complete tasks efficiently. Similar to AutoGPT and AgentGPT, it decomposes the task at hand. However, unlike AutoGPT, it uses the power of artificial intelligence to optimize and prioritize elementary tasks, thus ensuring smooth and efficient operation.

Typical MiniAGI Use Cases:

Smart home devices: MiniAGI can be used to create smart home devices, such as lighting, home assistants, security systems, and more, that can adapt to users' needs and automate their home comfort.

Medical devices and diagnostics: MiniAGI can assist in developing medical devices for diagnosing and monitoring patients' health status and creating personalized treatment plans and recommendations for patients.

Environmental monitoring: MiniAGI can be used to create environmental monitoring systems that automatically detect and analyse environmental changes, such as air pollution, water quality, and noise levels.

Financial technology: MiniAGI can be applied in financial technology to analyze data, forecast markets, and make investment decisions. It can help automate and optimize financial processes.

Education and training: In the field of education, MiniAGI can be used to develop interactive learning programs, gaming platforms, and individualized learning materials that will help students absorb knowledge more effectively.

Maintenance and support: MiniAGI can automate technical support and maintenance, providing users quick and efficient access to information and solutions to solve problems.

The technologies previously described demonstrate how autonomous AI agents can be used to solve various tasks and improve themselves. There are theoretical assumptions that the development of AI agents will reach the level that they can autonomously communicate with each other and form the so-called collective intelligence. At the moment, this is the issue that the relevant specialists are dealing with. This technology currently exists under the name SuperAGI.

2.5. SuperAGI

SuperAGI is an open-source cloud-based framework that enables the creation, operation, and management of agent-based artificial general intelligence (AGI). The platform provides capabilities for programming agent workflows using the React architecture, integrating external resources, and enhancing functionality. In addition, SuperAGI supports autonomous agents that can reason, make decisions, and learn in real-time. Tasks can be performed and decisions made without constant human intervention, increasing efficiency and adaptability. SuperAGI also provides the ability to use many open models through various software interfaces, allowing users to use them to solve various tasks easily.

This platform provides users with a user-friendly and clear format that makes it easy to understand and use. An invaluable tool for AI developers and practitioners, SuperAGI supports different languages and offers a resource complete of tools and templates for agents, as well as the ability to monitor agent performance closely. Additionally, this system is characterized by flexibility and scalability, making it an effective tool for handling complex AI operations and requirements and useful for companies looking to expand their AI capabilities.

SuperAGI consists of several key components:

High-level agent systems: Autonomous software agents capable of performing complex tasks, interacting with other agents, and making decisions based on multi-level criteria.

Advanced language models: Generative models that surpass the capabilities of traditional GPTs, providing deeper understanding and text generation.

Scalable integration platform: An infrastructure that enables agent coordination at scale, allowing large amounts of data to be processed and numerous tasks to be performed simultaneously.

Reinforcement learning and self-learning: Algorithms that allow agents to learn based on feedback and their own experiences, improving their performance over time.

The process of SuperAGI's functioning can be divided into several stages:

Goal definition: The user sets a complex goal or task that needs to be completed.

Task distribution: The integration platform distributes tasks among agents, taking into account their specialization, capabilities, and current context.

Task execution: Each agent uses an advanced language model to generate text, analyse data, or perform other necessary actions.

Coordination and integration: The platform coordinates agents' actions and integrates their work results to achieve the ultimate goal.

Evaluation and adjustment: The agent system evaluates agents' performance, takes into account feedback, and self-learns to improve their actions continuously.

Differences from other systems

High level of intelligence: SuperAGI outperforms traditional AI systems due to its ability to analyze deeply and make complex decisions.

Scalability: The system can handle large amounts of data and perform numerous tasks simultaneously, ensuring high performance.

Self-learning: Using reinforcement learning and self-learning algorithms allows agents to continuously improve their efficiency and adaptability.

Typical use cases for SuperAGI:

Business process automation: SuperAGI can be used to create autonomous agents that can automate routine tasks and optimize business processes in various industries such as finance, logistics, marketing, etc.

Data management and analytics: SuperAGI can assist in collecting, processing, and analyzing large amounts of data, enabling businesses to identify and understand patterns, gain valuable insights, and make informed decisions.

Medicine and science: In the fields of medicine and science, SuperAGI can be used to analyze medical data, develop new diagnostic and treatment methods, and identify patterns and new discoveries in scientific research.

Software development: SuperAGI can assist in software development and testing by creating autonomous agents to detect bugs, optimize code, and ensure high product quality.

Customer support and service: SuperAGI can be used in the customer service industry to automate question answers, analyze customer feedback, and provide real-time user support.

Education: SuperAGI can create interactive and adaptive learning environments that help students assimilate knowledge more effectively and individually.

Summarizing the above, it is possible to form a conditional hierarchical scheme of software models based on generative AI.

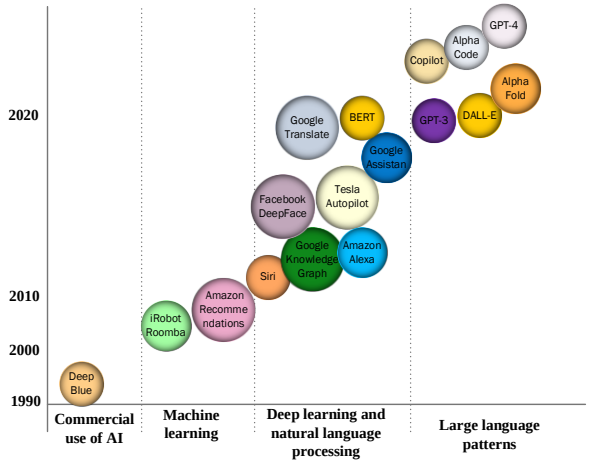

Fig. 2. Chronology of the development of the most popular software products created based on AI, which work on the principle of generative models

3. Processing requests from agent data

Several prompts were introduced to determine the software system that gives the best results, and the results obtained were analyzed. The result obtained was ranked by a specialist in the relevant field, where 1 is the worst result, and five is the best. A commercial key, OpenAI, was used to test each system.

Prompt 1 (from the IT field): Create an HTML skeleton with Bootstrap responsive design, a responsive menu, and a responsive hamburger menu that also works on mobile. And import all the necessary scripts, such as jQuery, Popper, and Bootstrap, before closing the body tag.

Table 1. The results of using Prompt 1

	ChatGPT-4	Auto GPT	AgentGPT	MiniAGI	SuperAGI
Results	1	3	4	2	5

Prompt 2 (from the field of economics). I need help creating an AI-based business strategy for the internet service with revenue $100K/month.

Table 2. The results of using Prompt 2

	ChatGPT-4	Auto GPT	AgentGPT	MiniAGI	SuperAGI
Results	2	3	4	5	1

Prompt 3 (from the field of economics). Create a marketing strategy for Facebook for the library with a revenue of 10000 users per month.

Table 3. The results of using Prompt 3

	ChatGPT-4	Auto GPT	AgentGPT	MiniAGI	SuperAGI
Results	2	3	4	5	1

Prompt 4 (from the field of economics). Act as a branding consultant to create a simple brand for a new NFT company with revenue $75K per month

Table 4. The results of using Prompt 4

	ChatGPT-4	Auto GPT	AgentGPT	MiniAGI	SuperAGI
Results	2	3	4	5	1

Prompt 5 (library science): Define the main priorities for the academic library in 2024 in Poland.

Table 5. The results of using Prompt 5

	ChatGPT-4	Auto GPT	AgentGPT	MiniAGI	SuperAGI
Results	2	3	4	5	1

And let's look at the results.

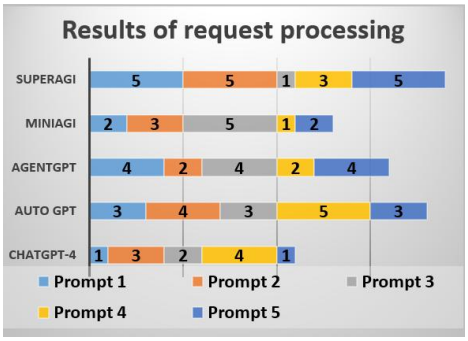

Fig. 3. Distribution of points as a result of processing requests

After analyzing this diagram, we can conclude that the best results are shown by SuperAGI Auto GPT when processing requests, regardless of the direction.

It is important to note that the best overall result was obtained when solving the economic task of creating a business strategy.

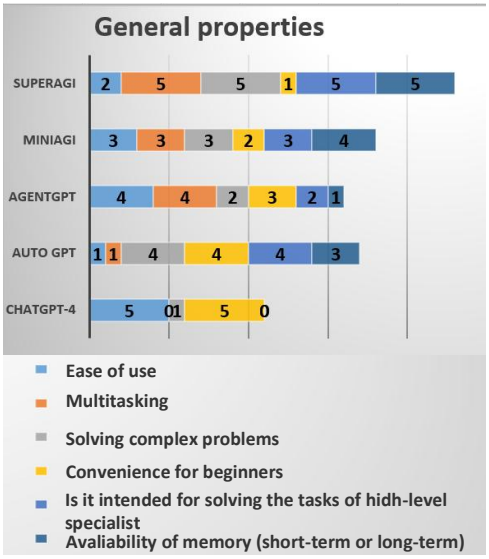

Fig. 4. Distribution of points of general characteristics

In parallel with the correctness and reliability of processing requests from users, convenience for users, the ability to perform several operations simultaneously, the quality of the results presented, and other criteria are also important. The following figure presents the results of the study of user-friendliness.

The figure illustrates how different AI agent systems are evaluated across several general characteristics, including problem-solving capacity, user convenience, applicability for experts, and memory availability. Such comparative visualization helps highlight not only each system's strengths but also the trade-offs that may arise in practical implementation. This analysis provides a clearer context for interpreting the assessments presented in the following section.

If we summarize the results of the study of query processing by the systems under consideration and the general characteristics, we get the resulting assessments:

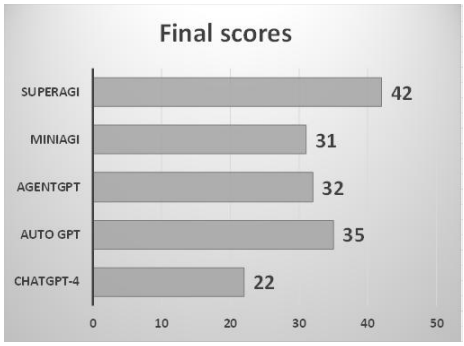

Fig. 5. Final scores

As can be seen from the presented results, the most efficient work in the direction of processing requests is SuperAGI and Auto GPT.

Table 6 presents data from GitHub that confirms the results obtained.

Table 6. Now let's look at the GitHub repositories

AI Agent	Last update	GitHub Stars	GitHub Forks	Watching
AutoGPT	26 Apr 2024	164k	43.5k	1.6k
AgentGPT	2 Nov 2023	30k	9.2k	295
MiniAGI	2023	2.8k	294	47

4. AGI agents to optimize library processes

The use of modern artificial intelligence systems such as AGI (Artificial General Intelligence), AgentGPT, MiniAGI, or SuperAGI in the library can open up several interesting opportunities:

- Automation of library processes: AGI systems can automate catalog management, process book orders, analyze user requests, and perform other administrative tasks.
- Personalized recommendations: Using MiniAGI or SuperAGI can help in more accurate book selection for users, considering their reading history and interests.
- Answering user questions: AGI can handle questions from library users, providing quick and accurate information about available resources, library services, and other questions.
- Optimization of library services: The application of AGI can contribute to optimizing librarians' schedules, event planning, resource management, and other aspects of library operations.
- Research and analytics: AGI can help in conducting scientific research, analyzing data on the use of library resources, and evaluating the effectiveness of various programs and initiatives.
- Language analytics and document processing: AGI can automatically analyze and process text documents, including scientific articles, reviews, catalogs, etc.
- Information search and aggregation: AGI can search and aggregate information from various sources, allowing users to access up-to-date data and resources quickly.
- Virtual assistants and chatbots: AGI can be used to create virtual assistants or chatbots that provide users with information support, answer questions, and help users choose books or other resources.
- User habit analysis and recommendations: AGI can analyze data on users' use of library resources, allowing personalized recommendations and improved service.
- Interactive Virtual Exhibits and Curricula: AGI can help create interactive virtual exhibits, curricula, and games that promote library visitors' education and cultural development.
- Adaptation of resources for people with disabilities: AI agents can automatically convert text to speech. people with visual impairments or other reading problems. Technologies like text-to-speech can allow library users to listen to books or other resources; Change the fonts and colors of text on the site to make them more accessible to users with visual impairments or color blindness; can be used to develop training materials that help users with disabilities learn new technologies or libraries, etc.

Implementing artificial intelligence in libraries can improve the user experience, provide more efficient management, and drive innovation in this area.

If we are discussing the possibility of using AI and AGI in the library, we can use both language models and AI software agents. Their differences and features:

Language models: These are computer models trained on large arrays of text to understand and generate human language. Language models can be trained on various tasks, such as predicting the next word in a sentence (language model), translating text from one language to another (machine translation), answering questions (question-answering models), etc. Examples of language models are GPT (Generative Pre-trained Transformer), BERT (Bidirectional Encoder Representations from Transformers), and others.

Software agents: This software acts on a user's or system's behalf, performing autonomous actions in response to predetermined rules or conditions. Software agents can use various technologies to make decisions and interact with the user, such as machine learning, Natural Language Processing (NLP), search algorithms, intelligent agents, etc.

In some cases, language models can be used as part of software agents, such as a model for text generation or for understanding the user's natural language. However, software agents may include other components that are not necessarily related to language modelling, such as decision-making algorithms, scheduling systems, user interfaces, etc.

Artificial intelligence (AI) agents are software systems or algorithms that act autonomously to achieve specific goals or solve problems in a real or virtual environment. These agents can have varying levels of complexity and intellectual abilities, from simple systems that respond to certain stimuli to complex agents that can learn and make decisions in complex situations.

For better understanding, table 7 groups the tasks described above, which will allow you to understand the capabilities of the platforms better

Table 7. Areas of application of different platforms

LLM Framework	Cataloging	Search for information	User support	Resource management
AutoGPT	Automated metadata generation, classification by topic	Individual recommendations according to user requests	Chatbots for responding to requests	Real-time inventory updates
AgentGPT	Dynamic search and cross-reference between directories	Multimodal search (text, audio, video)	Interactive tips for using resources	Forecasting resource requirements
MiniAGI	Collapse similar entries for compactness	Advanced contextual analysis	Navigating user needs	Analysis of resource consumption
SuperAGI	Deep clustering by content	Integration with external databases	Full automation of voice assistants	Integration with knowledge management systems

5. Conclusions

This article discusses modern AI systems such as AGI, AgentGPT, MiniAGI, and SuperAGI, and their potential applications in the library field. The study found that each of these systems has unique features and benefits that can benefit libraries. Agent-based systems like AgentGPT can effectively interact with users through chatbots and virtual assistants, providing personalized recommendations and support. MiniAGI can be used to automate document processing and information analysis processes, which helps increase libraries' efficiency. However, for the full potential of automation and deeper data analysis, the SuperAGI system is the most suitable, as it combines highly advanced learning algorithms, autonomous agent systems, and scalable infrastructure.

While integrating artificial intelligence (AI) provides significant benefits, libraries must also prioritize ethical considerations in its implementation. Remembering that AI is simply a collection of well-executed algorithms is important.

The deployment of artificial intelligence in libraries faces various challenges. Among the main obstacles are a lack of infrastructure and resources, a lack of qualified personnel, and a lack of robust data privacy regulations. In addition, the high costs associated with adopting artificial intelligence pose a significant obstacle, especially in developing countries, where libraries often suffer from underfunding. Overcoming these challenges is critical to the effective use of AI in library environments.

In addition to these practical challenges, it is important to ensure that AI systems are monitored by qualified personnel who can monitor the results

Ethical considerations play a crucial role in successfully integrating AI into library systems. Libraries must establish ethical principles that promote fairness, transparency, and inclusivity in AI-driven services. Ensuring fairness and equity in the services provided by AI agents is paramount, as well as encouraging libraries to adopt ethical principles that increase diversity and equity in their operations. It also includes addressing issues such as bias, discrimination, and transparency, ensuring that AI technologies are used for the fair benefit of all library users.

Integrating SuperAGI into the library field can open up new opportunities to improve user service, automate administrative processes, and provide quick access to information. Despite this, the choice of a specific system should consider the specifics of the needs and resources of a particular library, its technical capabilities, and the purpose of implementing artificial intelligence.

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