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RESEARCH ARTICLE

Formation of reflexive generative A.I. with ethical measures of use

Evgeny Bryndin

Research Centre "Natural Informatic", National Supercomputer Technological Platform, Novosibirsk, Russia

Correspondence to: Evgeny Bryndin, Research Centre "Natural Informatic", National Supercomputer Technological Platform, Novosibirsk, Russia;
Email: bryndin15@yandex.ru

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Abstract: The application of reflexive generative AI in the social sphere will improve the quality of life of individuals and society. Its commercial application will require compliance with ethical standard measures to ensure that its use does not cause harm. The development, implementation and use of an ethical standard for the use of reflexive generative AI will increase the safety of its use. The ethical use of generative AI by individuals should be automatically regulated by it. The reflection of generative AI is implemented by the AGI multilogic and ensures the validity of content generation.

Keywords: reflexive generative AI, ethical measures, content generation validity

1 Introduction

Generative AI (GenAI) is a technology that generates text, images, audio, video, code or other content based on algorithms, models or rules. The distinctive features of GenAI are its intelligence, creativity and its capabilities in these areas, so AI is likely to play a key role as an expert assistant that improves the efficiency and productivity of employees. Therefore, GenAI can be expected to become the main driver of the global economy, industry, medicine and other fields of activity.

Generative AI uses a computational process known as deep learning to analyze patterns in large data sets, then replicates it to create new data that appears human-generated. It does this using neural networks, a type of machine learning process that is similar to how the human brain processes, interprets, and learns from information over time. Generative AI models become more complex over time. The more and better the data a model is trained on, the more compelling its results. Generative AI has exploded in popularity thanks to the emergence of OpenAI models ChatGPT and DALL-E, which provide accessible AI tools to consumers. Google, Microsoft, Amazon, and Meta have all launched their own generative AI tools to capitalize on the technology's rapid adoption. Google is integrating generative AI into search with AI Overviews. Microsoft plans to embed generative AI even deeper into its PCs. Apple will introduce Apple Intelligence, a blend of proprietary AI models and OpenAI technology, in iOS 18, iPadOS 18, and macOS Sequoia later this year.

Generative AI models typically rely on the user to input a prompt that guides them to create the desired output, whether it's text, an image, a video, or a piece of music ChatGPT: An AI language model developed by OpenAI that can answer questions and generate human-like responses from text prompts. DALL-E 3: Another AI model from OpenAI that can create images and illustrations from text prompts. DALL•E 3 understands a lot of nuance and detail, making it easy to translate ideas into accurate images.

Gemini is a generative AI chatbot from Google and a competitor to ChatGPT. It's trained on the large language model PaLM and can answer questions and generate text from prompts.

Claude 3.5: Anthropic's Claude AI model offers a 200,000 token context window. Midjourney: Developed by San Francisco-based research lab Midjourney Inc., this AI model interprets text cues to generate images and illustrations, similar to DALL-E.

GitHub Copilot: An AI-powered coding tool that offers code completion suggestions in Visual Studio, Neovim, and JetBrains.

Llama 3: The open-source Meta large language model can be used to create conversational AI models for chatbots and virtual assistants, similar to GPT-4.

Before adopting GenAI technology in a given domain, the costs and benefits must be carefully balanced and the ethical concerns of users and the production of ethical output must be assessed. The validity and safety of responses to users is produced by a reflexive GenAI with ethical enforcement measures.

2 Types of generative AI models

There are different types of generative AI models, each designed for specific tasks and purposes. They can be broadly divided into the following types.

2.1 Format-based models

Format-based models are trained on large datasets to understand the relationships between sequential information, such as words and sentences. Backed by deep learning, format-based models are generally good at natural language processing and understanding the structure and context of language, making them well suited for text generation tasks. ChatGPT-3 and Google Gemini are examples of format-based generative AI models.

2.2 Generative Adversarial Networks

Generative adversarial networks consist of two neural networks, known as a generator and a discriminator, which essentially work against each other to create authentic data. As the name suggests, the role of the generator is to create a convincing output, such as an image based on a cue, while the discriminator works to assess the authenticity of said image. Over time, each component gets better at its role, leading to more convincing results. DALL-E and Midjourney are examples of GAN-based generative AI models.

2.3 Variational Coding

Variational encoders use two networks to interpret and generate data, in this case an encoder and a decoder. The encoder takes the input data and compresses it into a simplified format. The decoder then takes this compressed information and reconstructs it into something new that resembles the original data, but is not exactly the same. One example would be training a computer program to generate human faces using photographs as training data. Over time, the program learns to simplify photographs of people's faces to a few important features - such as the size and shape of the eyes, nose, mouth, ears, etc. - and then use these to generate new faces. This type of VAE can be used, for example, to increase the variety and accuracy of face recognition systems. By using VAEs to generate new faces, face recognition systems can be trained to recognize a wider variety of facial features, including those that are less common.

2.4 Multimodal Models

Multimodal models can understand and process multiple types of data at once, such as text, images, and audio, allowing them to produce more complex outputs. An example would be an AI model that can generate an image based on a text prompt as well as a text description of the image prompt. OpenAI's DALL-E 3 and GPT-4 are examples of multimodal models.

3 Use cases for generative AI

In customer support, AI-powered chatbots and virtual assistants can help companies reduce response times and handle common customer queries faster, reducing the burden on staff. In software development, generative AI tools can help developers write cleaner and more efficiently by reviewing code, highlighting errors, and suggesting potential fixes before they become bigger problems. Writers can use generative AI tools to plan, draft, and review essays, articles, and other written work. Generative AI is finding traction in a range of industries, commercial, and consumer markets.

Apple is bringing generative AI to Siri and iOS 18, iPadOS 18, and macOS Sequoia, the company announced at Apple's Worldwide Developers Conference on June 10, 2024. Apple is betting that generative AI will be a seamless addition to how Apple's ecosystem may already organize a consumer or professional's life. Apple Intelligence will be available in beta this fall in iOS 18, iPadOS 18, and macOS Sequoia. It will work on iPhone 15 Pro, iPhone 15 Pro Max, and certain other current iPad and Mac devices with M1 or newer chips. ChatGPT support for Apple Intelligence will come later in 2024. Because of the computationally intensive workloads, Apple Intelligence will only be compatible with the most powerful devices.

Apple has officially partnered with OpenAI to deeply integrate ChatGPT into iOS 18, iPadOS 18, and macOS Sequoia. At the same time, Apple maintains its privacy standards, and the personal data of gadget owners remains safe. Users will not need an OpenAI account, and the processed data will have a high degree of protection. Most of the information will be processed locally on the device. The implementation of Apple Intelligence computing processes in public and commercial areas of activity will show how secure and in demand these innovations will be in reality.

The smartphone industry is set to be revolutionized by Generative AI-powered devices. By 2027, GenAI smartphones are expected to account for 40% of the market and exceed half a billion shipments. Samsung will capture half of this market next year, followed by key Chinese OEMs such as Xiaomi, vivo, HONOR, and OPPO. China has taken the lead in generative AI adoption with 83% of respondents reporting using it in various fields. In the US, the figure is 65%. The global average for generative AI adoption is 54%.

3.1 Healthcare

Generative AI is being explored as a tool to speed up drug development, while tools like AWS HealthScribe allow doctors to transcribe patient consultations and upload important information to their electronic health records.

3.2 Digital Marketing

Advertisers, marketers, and sales teams can use generative AI to create personalized campaigns and tailor content to consumer preferences, especially when combined with customer relationship management data.

3.3 Education

Some educational tools are starting to incorporate generative AI to develop customized learning materials that match students' individual learning styles.

3.4 Finance

Generative AI is one of many tools in complex financial systems to analyze market patterns and predict stock market trends, and it is used in conjunction with other forecasting techniques to assist financial analysts.

3.5 Environment

In the field of ecology, researchers are developing generative AI models to predict weather conditions and simulate the effects of climate change.

4 Dangers and Limitations of Generative AI

A major concern with the use of generative AI tools, especially those that are publicly available, is their potential to spread misinformation and harmful content. The consequences of this could be wide-ranging and severe, from perpetuating stereotypes, inciting hatred and harmful ideologies to damaging personal and professional reputations. Gartner analysts believe that generative AI will impact culture and society as a whole. The risk of legal and financial consequences from the misuse of generative AI is also very real; indeed, it has been suggested that generative AI could threaten national security if used inappropriately or irresponsibly. A major concern with the use of generative AI tools, especially those that are publicly available, is their potential to spread misinformation and harmful content. The consequences of this could be wide-ranging and severe, from perpetuating stereotypes, inciting hatred and harmful ideologies to damaging personal and professional reputations. Gartner analysts believe that generative AI will impact culture and society as a whole. The risk of legal and financial consequences from the misuse of generative AI is also very real; indeed, it has been suggested that generative AI could threaten national security if used inappropriately or irresponsibly.

5 Ethical considerations for using GenAI

The ethical landscape of GenAI is complex and multifaceted, requiring careful consideration of the various factors that influence responsible development. We will briefly consider the ethical measures that apply to the research, development, and use of GenAI, as well as to the

provision of services to the public.

(1) The provision of generative products or services must comply with laws and regulations of public conduct.

(2) Content generated using GenAI must not contain: subversion of state power; harm to national unity; propaganda of terrorism or extremism; propaganda of ethnic discrimination; information of a violent nature; false information; violating economic or social order.

(3) In the processes of algorithm design, selection of training data, creation and optimization of models, provision of services, etc., respect intellectual property rights and commercial ethics; advantages in algorithms, data, platforms, etc. cannot be used to participate in unfair competition.

(4) Before using GenAI to provide services to the public, the developer must submit a security assessment to a government inspection agency.

(5) GenAI providers are responsible for the legality of the sources of pre-training data and optimization data of generative content.

(6) GenAI providers must formulate clear, specific, and enforceable rules for the use of human domain knowledge anthologies.

(7) GenAI providers must protect user input and usage records in the course of providing services. 8: GenAI providers must establish mechanisms to receive and process user complaints and promptly process individual requests to review, delete, or mask their personal information.

(9) GenAI providers must provide secure, stable, and resilient services throughout the lifecycle and ensure normal user usage.

(10) GenAI providers must provide descriptions of the source, scope, type, quality of pre-training data, and training optimization.

(11) GenAI providers must instruct users on the scientific understanding and rational use of generated content.

(12) When a GenAI provider is found to have violated business ethics; the service must be suspended or terminated.

Generate AI shall evaluate the ethical requests of users and generate ethical generations based on these measures. This will contribute to the formation of an ethical digital environment [1, 2].

6 Reflexive GenAI

A survey of 738 international GenAI researchers found that future progress in destructive GenAI and AGI applications could have extremely negative consequences for humanity. Given the need to justify content generation on ethical grounds, the author proposes to use reflexive GenAIs. Reflexive GenAIs explain their responses. The possibility of designing and implementing GenAIs with understanding, reasoning, and explanation is considered. Understanding is developed by neural network learning and recognition. Reasoning is implemented by reflexive multilogic. Explanation is carried out by learning methods for constructing solutions in accordance with the development of answers.

GenAI with AGI multilogic consists of multimodal self-organizing ensembles of software and hardware agents with artificial intelligence [3–5]. Logic, as a sequence of associative acts, is determined by the specificity of information. The sequence of associative acts of implementing formulas is determined by algorithmic rules. The logic of justifying events with language sentences is implemented according to grammatical rules. The sequence of associative acts of implementing combinatorial problems is determined by design methods. Management logic is aimed at developing various solutions. To solve complex problems of everyday life, AGI multilogic is included, based on various methods. Multimodal GenAI with AGI multilogic explores subject areas of knowledge using different methods, techniques and approaches. For this, AGI multilogic selects information processing options. The choice of a method, technique or approach is based on the relationship between the data of the current task and existing standards, rules and facts proven by science and practice. In practice, there are many methods, techniques or approaches, each of which solves the current task. The methodology for finding a solution to a problem aims to build a communicative chain of actions based on the formulation of the problem being solved. The choice of a method, technique or approach to solving a current problem requires an analysis of the ontology of the subject area within the selected topic. The analysis of the ontology of the subject area within the selected topic is carried out using unified objectification. It is aimed at determining the semantic meanings, data and patterns of the subject area of knowledge that are relevant to solving a specific problem. Automated analysis of the ontology of the subject area is carried out according to the methodology.

The methodology leads to methods, ways and strategies of studying the subject. It uses

a system of criteria for organizing and constructing theoretical and practical activities. The methodology describes the characteristics of the study; reflects the logical structure of the problem being solved; shows the planned scheme for solving the problem (stages, phases, sections and solution techniques). Solution techniques are an assistant in building a logical scheme, following which the current task is implemented step by step. Solution techniques contain a set of actions, some algorithms or a set of specific steps aimed at solving each stage, stage, section of a specific problem. An objectified methodology for the ontology of the subject area and the skill base of a certain area of activity of a multi-modal self-organizing ensemble of software and hardware agents with artificial intelligence allows you to automatically find techniques for developing a solution. A set of multi-modal parameters suitable specifically for the solution that will be used in this methodology are determined by the solution techniques. The processes of analysis and objectification of the ontology of the subject area can use several methodologies simultaneously, which will then be applied to solve the problem at different stages separately or reflexively. Reflection can be multi-level, process-based, evolutionary, decentralized, distributed, etc.

AGI multilogic uses objectified moral, social and business attitudes, norms and measures as semantic criteria when modeling consciousness [6]. Reflexive AGI multilogic with objectified methodologies aligns multimodal ontologies of subject areas for standardized interdisciplinary work with them [7,8]. AGI multilogic is implemented on the basis of self-learning programs with a constant increase in the level of information penetration and forecasting of a more optimal solution and objective result, that, as practice shows, have enormous reflexive intellectual potential. For example, the self-learning program AlphaGo Zero beat the human-trained program AlphaGo, which defeated the champion of the game of Go, Lee Sedol, with a score of 100:0. Model development and testing of self-learning reflexive programs can be carried out by translating the task into a game format. The logic of self-learning is set by the developer in the program algorithm schemes.

Self-learning programs satisfy three conditions:
(1) replication, the ability to reproduce and produce digital offspring.
(2) variability, the ability to change and differences between digital scenarios.
(3) competition, the desire to surpass the competitor.

Let's consider an example of a self-learning program for marking and issuing effective solutions with prime numbers for a variety of areas of activity in the programming language Author. Based on the ability of the language "Author" to make changes to programs in its own code, we will create a repository of marked effective solutions in the range from 1 to 200 with numbers of areas of activity inside the program code.

```
// prosto.txt
// self-learning program for finding effective solutions. var isProsto(n){
    numbers of effective solutions m={2,3,5,7};
    if(n<0)return #;
    ok=0;
    if(n==0 || n==1)ok=1;
    for(i=0;i<m.size();++i){
        if(n==m[i]){ok=1;break;}
        if(n<m[i])break;
        }
    if(i==m.size()){
        u=m[i-1];
        oknew=0;
        do{
            ++u;
            uok=1;
            for(i=0;i<m.size();++i)if(!(u%m[i])){uok=0;break;}
            if(uok){
                oknew=1;
                m.push(u);
                if(u==n)ok=1;
                }
            }while(n>u);
        if(oknew){
            f=getFunction(getThisFunctionName());
            pos=f.Root();
            pos=f.Next(pos);
            f.setComand(pos,"m="+m.export());
            }}
    return ok;}
void main(){ok=isProsto(n=200); trace("Number"+n+(ok?"":" no")+" effective solution.");}
```

The task is to call the function “isProsto(n)” with a given number for analysis. Actually, the variable “m” contains our storage. To replace the command in the algorithm scheme, the function “f.setComand(pos, “m={solution 2, solution 3}”);” is used, which must be called from the function object. The first parameter must specify the identifier of the node with the command in the graph scheme of the algorithm, which (the command) should be replaced, and the second is the command object (the operator tree). The second parameter can also be a text string that will be implicitly transformed. In order to get the node identifier, we use the fact that the array/storage is on the first node from the beginning of the function algorithm. The function “f.Root()” will return the identifier of the first and last node of the scheme, so to speak, the node of the beginning of the end of the algorithm. From it (the node) you can go to, guaranteed, one, the first node. But moving up from the first and last node (“f.Up(pos)”) it is possible to get a set (an array of identifiers) of nodes, which end the algorithm. The point is that at the end of the algorithm there may be a conditional operator with a branch leading to the beginning of the end node.

After running the program, the function “isProsto(n)” was transformed as follows:

```
// prosto.code
void isProsto(var n){
numbers of effective solutions m={ 2,3,5,7,11,13,17,19, 23,29,31, 37,41,43,
47,53,59,61,67,71,73,79,83,89,97,101,103,107,109,113,127,131,137,139,149,151,157,163,167,173,179,181,191,193
,197,199};
        if(n<0)return # ;
        ok=0;
        if(n==0||n==1)ok=1;
        i=0;
        for(;i<m.size();++i){
                if(n==m[i]){
                        ok=1;
                        break;
                        }
                if(n<m[i])break;
                }
        if(i==m.size()){
                u=m[i-1];
                oknew=0;
                do{
                        ++u;
                        uok=1;
                        i=0;
                        for(;i<m.size();++i)if(!u%m[i]){
                                uok=0;
                                break;
                                };
                        if(uok){
                                oknew=1;
                                m.push(u);
                                if(u==n)ok=1;
                                }
                        }while(n>u);
                if(oknew){
                        f=getFunction(getThisFunctionName());
                        pos=f.Root();
                        pos=f.Next(pos);
                        f.setComand(pos,"m="+m.export());}}
        return ok;
```

The “Author” language has the ability to use labels, by which you can find the identifiers of the nodes corresponding to them in the algorithm scheme. The program needed to perform complex calculations that only need to be done once, so as not to waste time on the same calculations every time you run it. The language’s ability to transform the script is used to solve this problem.

```
// one.txt
void main(){
        trace("Helloy World!!!");
        <label:10>
        if(1){
                x=1+1; // complex calculations
                f=getFunction(getThisFunctionName());
                pos=f.getLabel(10); // looking for tag
                pos=f.insertDown(pos);
                f.setCommand(pos,"x="+x);
                pos=f.Down(pos);
                command=f.getCommand(pos);
                command.setSub({0},PROGRAM("0"));
                f.setCommand(pos,command);}
        trace(x);
        getstring();}
```

Duplicate code from which the interpreter will take the program code after the first launch:

```
// one.code
void main(){
        trace("Helloy World!!!");
        <label:10>
        x=2;
        if(0){
                x=1+1;
                f=getFunction(getThisFunctionName());
                pos=f.getLabel(10);
                pos=f.insertDown(pos);
                f.setCommand(pos,"x="+x);
                pos=f.Down(pos);
                command=f.getCommand(pos);
                command.setSub({0},PROGRAM("0"));
                f.setCommand(pos,command);
                }
        trace(x);
        getstring();}
// one.code :-|
```

The language has a special system function “Spirit();”, which deletes itself the first time it is executed. It takes the name of the function and arguments to it. The function will be called only once and no traces will remain of it.

```
// Spirit.txt
firstprocess(namef,n){
        x=100*(1+1);
        f=getFunction(namef);
        pos=f.getLabel(n);
        f.setCommand(pos,PROGRAM("k="+x));
        return 1;}
void main(){
        Spirit("firstprocess",getThisFunctionName(),10);
        <label:10>
        trace("k="+k);
        getstring();}
```

Program will display an effective solution and transform itself into a digital offspring with a new scenario. Self-training of the program in the process of implementing the user’s request according to new scenarios increases its professionalism.

```
// Spirit.code
int firstprocess(var namef,var n){x=100*(1+1);
        f=getFunction(namef);
        pos=f.getLabel(n);
        f.setCommand(pos,PROGRAM("k="+x));
        return 1;}

void main(){
        k=200;
        trace("k="+k);
        getstring();}
// Spirit.code          :-|
```

The program with the proposed schemes of algorithms and self-learning logic can issue optimal recommendations to experts in various combinations and any range of activities.

7 Conclusion

Modern development of generative AI requires more high-performance and less energy-consuming chips and video cards. Reflexive capabilities of content generation justification and ethical measures and standards for the use of GenAI require the transition to a quantum technological level of design, development and implementation of high-performance and low-energy chips and neural networks. Quantum technologies will bring reflexive GenAI with ethical standards of use closer to human consciousness about understanding, reasoning, explaining and implementing content. Mutual understanding will come in the interaction of a person with reflexive GenAI in the joint implementation of complex projects, tasks and problems [9, 10].

The natural psychological intelligence of consciousness implements information processes through the neural network structures of the brain. Artificial neural networks of multimodal GenAI with reflexive ethical multilogic can implement such information processes and participate in joint activities with specialists in various fields of activity [11].

AI with depth of information insight penetration and forecasting superior to humans has won victories at board games, such as when IBM’s Deep Blue defeated Garry Kasparov in 1996 and Google’s AlphaGo beat Go champion Lee Sedol. AI software called Swift, developed by researchers at the University of Zurich in Switzerland and Intel, has shown impressive results

by defeating three world champions in drone racing, an event that has been hailed as a "new milestone" in the development of AI. In June 2022, Swift raced on a specially built track near Zurich, where it defeated the champion of the Drone Racing League . In 2024, AI is leading the way in innovation, bringing about big changes in various fields. An AI that is smarter than any human could be possible by the end of next year, Elon Musk predicted. Within five years, AI capabilities will surpass those of all of humanity. It is clear from the conversation that he was referring to the so-called artificial general intelligence (AGI), that is, an AI system that has autonomous self-control, a sufficient degree of information self-awareness, and the ability to learn new skills.

Artificial intelligence is becoming the basis for online interactions between people, government, and business. Self-learning algorithms and programs have become a powerful and innovative approach in the field of artificial intelligence [12]. Researchers at MIT make language models scalable and self-learning. An algorithm for matching LLMs to human preferences, with batch learning, reinforcement learning, and reinforcement learning (ReST). The Author programming language is designed for writing self-learning programs.

A reflexive generative AI assistant with ethical multi-logic that identifies the needs of society and generates recommendations based on dialogue with experts can be created based on GigaChat LLM models with prompt engineering, depth of understanding and objectification. Multi-logic is implemented by self-learning programs with a full set of predictions GigaChat LLM models. Reflexive ethical self-learning GenAIs, based on dialogue with experts, will develop recommendations for the collective organization of life activities with forecasts, assessments and justifications for many years to come.

Artificial intelligence can change the way we live, work, and interact [13–15]. Multimodal GenAI with reflexive ethical multilogic with a depth of informational insight penetration and forecasting social, economic, ecological and other life processes, surpassing the natural psychological intelligence of consciousness, based on self-learning programs, will be able to lead humanity to the formation of a global harmonious civilization.

Conflicts of interest

The author declares that there is no conflict of interest.

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