

USING NEURAL NETWORKS TO ANALYZE THE CREATIVE PROCESS

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Abstract: *The development of artificial intelligence creates a new ground for the study of complex cognitive processes such as creativity. As one of the most promising AI technologies, neural networks provide unique opportunities for analysis and modeling of the creative process. The purpose of this study is to explore the potential of neural networks to analyze the creative process, as well as to determine their role in understanding and developing human creative abilities.*

Keywords: *neural networks, artificial intelligence, creativity, data analysis, machine learning, cognitive science.*

Neural networks are mathematical structures that reproduce the functioning of the human brain. They consist of many interconnected elements (neurons) that transmit and process information. Neural networks are used to solve problems that are difficult for traditional software algorithms, such as pattern recognition, data classification, prediction, pattern recognition, etc. Currently, neural networks are actively used in medicine, finance, transportation, robotics, computer vision, natural language processing, and many other fields.

The responsibility of the creators of neural networks is an issue that is becoming more and more relevant with the development of artificial intelligence technologies. As neural networks become increasingly complex and integrated into many aspects of our lives, many legal and ethical issues arise regarding their creation and use. Neural network creators are responsible for ensuring that their development does not harm people or the environment. For example, if a neural network driving an autonomous car makes a wrong decision, it can have serious consequences. Neural networks must produce accurate and reliable results, especially when they are used to make important decisions, such as medicine or finance.

Creative analysis using neural networks goes beyond simple pattern recognition and classification. It involves a deeper understanding and interpretation of creative processes, which requires a comprehensive approach. We divide the analysis into several aspects:

- Neural networks, especially convolutional (CNN) and recurrent (RNN), can analyze visual, musical or textual data to detect stylistic features. For images, it can be the choice of color, composition, brush strokes (pictured), perspective. For music, these are melodic expressions, harmony, rhythm, tempo, instruments. For the text, this is the choice of vocabulary, syntactic structures, rhymes, metaphors and other literary devices. Networks are trained on large data corpora to identify patterns characteristic of certain styles (eg impressionism, baroque, romanticism, postmodernism, etc.). As a result, it is possible to determine the affinity to a certain style or to identify a mixture of styles.

- Neural networks are able to analyze the technical aspects of the work. For visual arts, this can be identifying the materials used (paint, paper), the techniques of applying paints, and

identifying fakes or copies. In music, it can be an analysis of the technique of playing an instrument, the use of certain methods of composition. Analysis of the use of tropes, figures of speech, specific grammatical structures in literature.

Throughout the history of their work, artists have sought new tools and technologies that allow them to create unique and memorable works. However, it has never been more difficult to master and apply a "tool" for creativity than in recent years, especially with the active development of artificial intelligence and machine learning from the middle of 2022. These technologies have opened new opportunities for creative expression, allowing artists to experiment with different styles, genres and forms and create unique works of art that did not exist before. Since MidJourney's launch on July 12, 2022, and the release of Stable Diffusion 2.1 on December 7 of that year, these technologies have demonstrated the ability to create images that can be used for artistic purposes. However, the use of neural networks to generate images, both with and without subsequent manual processing, has given rise to significant ethical debates.

Neural networks like Midjourney and Stable Diffusion provide artists with powerful tools for creative expression. However, their use can lead to unethical results, as algorithms can reproduce the negative aspects of human behavior encoded in their models. This can manifest itself in the creation of copyright-infringing works of art or the dissemination of harmful stereotypes and discrimination. Artists should be aware of these risks and consider them when working with neural networks. A similar problem can arise if the dataset on which the neural network is trained contains material that raises ethical concerns.

In 2018, the portrait of Edmond Bellamy was created using neuroalgorithms. During the work on the project, an open-licensed code library was used, and copyright issues were hotly debated. The debate was about who owns the authorship: the survey developers, the code creators, the source code authors, or none of them.

In December 2022, there was a public outcry from artists over the Artstation platform's use of algorithmically generated images instead of manually. Many users began to delete their portfolios, expressed anger and accused the creators of the neural network of dishonesty. In response, the platform introduced a special marking system for such works and gave authors the ability to prohibit the use of their works for training neural networks. However, demands for a complete ban on AI-generated images have not been met. At the same time, other platforms for portfolio placement have made conflicting decisions. Artfol.me banned AI-generated images entirely, while DeviantArt developed its own DreamUp generator.

Recently, many well-known artists, such as Greg Rutkowski, have expressed concern about their work being used to train artificial intelligence. They actively collect petitions and research legal aspects to protect copyright. From this point of view, it is now clear that there is a need to develop legal regulations that ensure the ethical and responsible use of artificial intelligence technologies.

Researchers T. T. xien, G. F. Norbe and A. Matyuk put forward the assumption that intelligent systems are always controlled by their creators. This can lead to legal liability and the possibility of financial gain. However, at the moment there are no specific norms regulating such situations in the legal systems. Within the framework of the review of the case related to

the work of Chris Kashtanova, only works of art created with the help of artificial intelligence will be registered as objects of copyright. it was determined that it was not possible and, accordingly, it could not be used for commercial purposes. unique objects. This makes them less attractive to corporations and leaves job opportunities for artists who are currently working.

Neural networks are used to create unique works of art, experiment with colors and shapes, automate routine tasks, generate ideas, learn and develop, create interactive works, analyze data, virtual exhibitions and unique actively used to create compositions. Consider the main types of neural networks and their applications in these areas:

- **Generative-competitive networks (GANs).** GANs consist of two neural networks: a generator and a discriminator. The generator creates the images and the discriminator evaluates their realism. This learning process allows the generator to create increasingly realistic images.

- **StyleGAN:** Generates high resolution images and stores the image style it learns.
- **BigGAN:** trained on large datasets and produces high-quality images. Takroriy neyron tarmoqlari (RNNs). RNNs rasmlarga aylantirilishi mumkin bo'lgan matnlarni yaratish uchun ishlatiladi.

- **DeepDream:** transforms images into abstract or surreal shapes by applying various filters.

- **Pix2Pix:** Converts images from one domain to another, for example black and white photos to color photos.

Convolutional Neural Networks (CNNs). CNNs are widely used for image analysis and processing. They can be trained to recognize and classify images that are useful for artists.

- **DeepArt:** Transforms images in the style of famous artists, using CNN to analyze style and texture.

- **Portrait2portrait:** transforms styled portraits from different eras and cultures using CNN to analyze faces and styles.

- **Transformers (Transformers).** Transformers such as GPT-3 and DALL-E are used to generate texts and images based on text descriptions.

- **DALL-E:** Generates images based on textual descriptions using the Transformer architecture.

- **Starryai:** Creates artwork using descriptions and images created by DALL-E.

- **Diffusion models (Diffusion models).** Diffusion models such as Clip are used to generate images based on textual descriptions and to classify images.

CLIP: Generates images based on text queries using a pre-built model to match text and images.

DreamBooth: Teaches a diffusion model based on images and texts associated with a particular artist or style that allows for the creation of unique works.

- Interactive neural networks allow viewers to interact with artworks creating a unique user experience.

Artbreeder: Allows users to mix and match different artworks to create new unique pieces. **Paints Neural Network:** Allows users to paint on canvas using neural networks to analyze brush movements and create realistic images.

However, the use of neural networks in the field of art can lead to many positive results. For example, artificial intelligence is able to help artists create more complex and vivid works of art, as well as increase their efficiency and effectiveness. This will ultimately help increase Inspiration, creativity and collaboration between artists and AI. An important aspect remains the question of measurement, a certain "golden mean", finding which is now the main task for society.

The question of whether it is appropriate to use artificial intelligence in the field of art remains at the discretion of each individual artist or creative organization. If they decide that the use of artificial intelligence is contrary to their ethical principles or does not lead to the desired results, they have the right to refuse to use it in their work. It is unclear whether this will lead to their "non-competitiveness" in the future, or whether the use of artificial intelligence will remain narrow. The future of interaction between artists and artificial intelligence cannot be predicted with certainty, but the process should not be feared. It is appropriate to focus on existing opportunities and their further development.

Artificial intelligence is currently having a significant impact on artists and creative professionals. Working as new creative tools, neural networks help speed up the creation process, generate ideas and new forms, and provide more opportunities for experimentation. It's important to learn how to use these technologies in a way that doesn't harm artists or violate copyright, and doesn't hurt audiences' feelings. Perhaps in the future our views on how to creatively interact with artificial intelligence will change and we will have to adapt our approaches. However, it is important to remember that artificial intelligence and neural networks are currently only tools, and our imagination and creativity form the essence of the artistic process.

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