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USING ARTIFICIAL INTELLIGENCE TO ENHANCE THE QUALITY OF PHOTOGRAPHIC IMAGES: ETHICAL AND AESTHETIC ASPECTS

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A B S T R A C T

Modern artificial intelligence (AI) technologies have radically changed approaches to processing and enhancing photographic images. Along with increasing technical capabilities, ethical and aesthetic issues related to the veracity of visual information, authorship, and the perception of artistic images are becoming increasingly important. This article analyzes the main applications of AI in photographic enhancement and discusses their implications for artistic practice and the public perception of visual content.

K E Y W O R D S

Artificial intelligence, photography, post-processing, aesthetics, ethics, visual culture, image authenticity.

INTRODUCTION

The scientific novelty of this article lies in its comprehensive analysis of the technological, aesthetic, and ethical aspects of using artificial intelligence to improve the quality of photographic images, as well as in the justification and principles of the responsible use of AI to preserve the authenticity and artistic value of visual content.

Photography, historically perceived as objective evidence of reality, is undergoing a transformation with the introduction of artificial intelligence (AI) and computer vision algorithms. Advances in digital technology have enabled a shift from simple defect removal to significant processing and even generation of visual content, blurring the boundaries between document and simulation [1].

Neural network algorithms have made a quantum leap in image processing. AI is now capable of performing a wide range of tasks integrated into both professional software and mobile apps: resolution enhancement (super-resolution), noise reduction, color correction and tone processing, as well as restoration of missing fragments and full scene reconstruction [2].

The introduction of AI has a dual nature. On the one hand, AI facilitates the democratization of visual creativity-even a photographer with minimal technical skills can produce high-quality visual material. On the other hand, such technologies call into question the authenticity of photography, blurring the line between documentary evidence and digital simulation [3]. This is particularly relevant in the context of journalism, documentary photography, and archival practices, where the veracity of images is of public importance.

Automated processing also influences artistic perception, contributing to the formation of "uniform beauty". Visual solutions standardized by algorithms can limit the individuality of artistic expression and establish new, uniform aesthetic norms [4].

Therefore, the use of AI in photography is a socio-cultural phenomenon that requires an interdisciplinary analysis of its technical, ethical, and aesthetic implications, especially in the context of the widespread use of generative models.

The rapid development of deep learning and neural network methods has radically changed the approach to processing and enhancing photographic images. AI enables automatic analysis, defect removal, and reconstruction of missing information with a high level of photorealism.

The main areas of AI in image processing include:

1. Super -Resolution. Aimed at increasing the clarity and detail of low-resolution images. Models such as SRGAN (Generative Adversarial Networks), restore fine details while preserving the naturalness of the image, making the enlargement more photorealistic [2].

2. Noise reduction and restoration. Allows you to effectively remove digital noise that occurs in low light or high ISO settings. Deep convolutional Neural networks such as DnCNN remove noise without blurring important textures and details [5].

3. Automatic Color correction and lighting enhancement. Deep learning algorithms are used to restore correct color rendition and exposure even under extreme conditions. «The Learning model to See in the Dark» can reconstruct bright and clean images from frames captured at minimal light levels [6].

4. Image reconstruction and completion (inpainting). Inpainting is the process of recreating or completing missing/damaged fragments of an image. Neural networks such as Context Encoders use contextual analysis to realistically fill in gaps that were previously extremely difficult to accomplish manually [7].

5. Widespread integration into mass-market applications. AI algorithms are being actively integrated not only into professional editors but also into consumer products (mobile apps, built-in smartphone cameras). This makes advanced processing technologies accessible to a wider audience, accelerating the transformation of visual culture as a whole [1].

Table 1 - Main AI technologies for image quality improvement

No.	Direction	Purpose of use	Basic methods/models	Advantages
1	Super resolution	Increased detail	SRGAN, ESRGAN	Photorealistic enlargement
2	Noise reduction	Eliminate noise without losing detail	DnCNN	Clean image with texture preservation
3	Color correction and lighting	Exposure optimization, color restoration	Deep low-light image enhancement	Improving visual perception
4	Inpainting (restoration)	Restoring lost image fragments	Context Encoders, diffusion-based methods	Realistic reconstruction
5	Integration into applications	Automation of processing	Mobile AI modules, cloud service APIs	Accessibility for a wide audience

Modern trends show a shift toward interactive and hybrid systems that combine automatic processing with creative user control. Diffusion models and transformers, which provide more accurate reconstruction of textures and scene context, are rapidly developing. These technologies not only

improve image quality but also expand the photographer's artistic possibilities, changing the very concept of post-processing.

The rapid development of artificial intelligence (AI) is changing not only the technical aspects but also the aesthetic nature of photography. AI is eroding the historically established notion of photography as an "imprint of light" and a documentary record of reality, introducing simulation into the realm of visual imagery.

A key consequence of AI is the reduced transparency of image origin. Even heavily processed or generated images can mimic documentary quality, creating an «aura of realism». Viewers lose confidence in the authenticity of what they see, perceiving simulations as fact. This shift affects aesthetic evaluation criteria: generation algorithms are optimized for aesthetic patterns pleasing to the human eye (balanced composition, soft lighting). This can lead to the development of a standardized, algorithmically perfect visual aesthetic [4].

AI tools, by simplifying processing, contribute to the unification of visual language. Automatic Color correction, tone equalization, and texture restoration smooth out the differences between individual artistic styles. AI reinforces the trend initiated by presets, turning aesthetic choice into an algorithmic decision, which can limit the author's individuality and lead to the effect of "uniformly beautiful" images [8].

At the same time, AI opens up new possibilities at the intersection of reality and fiction. Many authors use algorithms not as substitutes, but to create new visual poetics – hybrid images that balance between the recording of fact and visual metaphor [9]. This gives rise to the category of "documentary simulation" – an image based on real material, but intentionally transformed to enhance expressiveness and semantic load.

Table 2 - Aesthetic impact of AI on photography

No.	Aspect	Traditional photography	AI-powered photography	Aesthetic consequences
1	Authenticity	Recording a real event	Full or partial simulation is possible	Blurring the lines between reality and fiction
2	Authorship	The photographer's individual style	Unification under the influence of algorithms	Reducing the differences between visual images
3	Aesthetic standards	Diversity of forms	Algorithmic optimization for "pleasantness"	Formation of standardized "beauty"
4	Interaction with reality	Documentary	Hybridization of reality and simulation	The emergence of new artistic categories
5	Viewer perception	Trust in the image	Source uncertainty	Changing Viewing Optics and the Need for Visual Literacy

With the rapid development of AI, it is necessary to reconsider traditional categories of artistic analysis. The concepts of "realism", "authorship", "expressiveness", and "authenticity" require clarification. While previously the aesthetic value of an image relied on the context of the shoot and the author's intent, now a significant portion of its expressiveness can be generated by an algorithm without direct human intervention. This situation poses a challenge for art criticism and photography

theory: developing new criteria for evaluating visual works in which AI acts not simply as a tool but as a co-author or even an independent agent of visual aesthetics.

The introduction of artificial intelligence (AI) into image processing and generation raises a complex set of ethical issues, as AI is capable of radically altering visual content while maintaining the appearance of reality [10].

A key ethical challenge is the diminishing trust in photography as a source of facts. AI technologies (super-resolution, noise reduction, reconstruction) can create images whose authenticity cannot be established. AI models are capable of constructing fragments based on probabilistic algorithms that do not reflect reality [11]. The result is a crisis of visual credibility that affects journalism, forensic practice, and science, where the veracity of an image is of public importance.

AI makes image manipulation easier, faster, and less noticeable. Technologies such as automated background replacement, facial expression manipulation, and deepfakes pose a high risk of disinformation, especially in the context of political propaganda and fake news, evidence manipulation, and the discrediting of individuals and commercial advertising. The problem is compounded by the fact that visual manipulation often leaves no technical traces, making verification systems and legal regulation extremely challenging.

AI challenges traditional notions of authorship and image rights. When an image is significantly modified or generated by AI, the question arises as to who owns the copyright: the creator of the algorithm, the user, or the system itself? Is an AI-generated image a "work of art" or purely a product of computational processes? Furthermore, portrait modification raises questions about a person's right to their own image and the need for consent to alter visual content.

Table 3 - Key ethical challenges of using AI in photography

No.	Ethical aspect	Manifestation in practice	Potential risks
1	Reliability	Auto-generation of parts, defect elimination	The Crisis of Trust in Visual Data
2	Manipulation	Deepfake , background replacement, facial expression editing	Disinformation, undermining public trust
3	Authorship	Co-authorship on AI and humans	Uncertainty of the legal status of the image
4	Image copyright	Modification of portraits without consent	Violation of personal rights
5	Responsibility	Lack of transparency in algorithms	Difficulty in identifying those responsible in cases of abuse

To minimize the risks associated with the use of AI in photography, it is necessary to:

- development of ethical standards and codes for photojournalists, artists and users;
- implementation of technical verification tools (e.g. digital watermarks and origin metadata);
- creation of legal mechanisms for the protection of copyright and personal rights.

Regulation should not be limited to technological solutions; developing visual literacy in audiences capable of assessing image sources plays an important role.

The development of AI technologies offers new opportunities for photographers, journalists, and designers, but requires a responsible and ethical approach. Responsible use of AI in photography is

based on principles of transparency, preserving authenticity, respecting individual rights, and enhancing visual literacy.

A key ethical tool is to honestly inform the audience when an image is generated or significantly modified using AI. Practical solutions include:

- digital watermarks (Digital Watermarking), indicating processing;
- metadata of origin (Provenance Metadata), recording the stages of change;
- open indication of the use of AI in signatures and publications.

These practices are being implemented through initiatives such as Content Authenticity Initiative (CAI), aimed at verifying the origin of images [12].

Responsible use of AI requires avoiding covert manipulation of perception, especially in documentary genres:

- do not distort documentary facts when restoring or improving the quality of the image;
- clearly separate artistic interpretations from photographic recording of facts;
- use open authentication standards (e.g. C2PA) to prevent unauthorized changes.

These approaches are important in photojournalism, forensics, and scientific visualization.

AI can intrude into personal space when processing portraits or recognizing faces. Ethical use requires:

- obtaining informed consent for the processing of images containing people;
- compliance with personal data protection laws (e.g. GDPR);
- avoiding modifications that may distort the identity or damage the reputation of the people depicted [13].

Technological measures cannot replace the audience's critical perception. Therefore, it is necessary:

- implement educational programs on visual literacy;
- train authors in the principles of ethical use of AI;
- develop public platforms for image verification and combating fakes.

These measures create a culture of conscious consumption of visual information and reduce the risks of manipulation of perception.

Table 4 - Practical approaches to the ethical use of AI in photography

No.	Direction	Practical measures	Expected effect
1	Transparency	Watermarking, metadata, AI labeling	Increasing image credibility
2	Manipulation control	Using C2PA, open authentication standards	Preventing hidden distortions and fakes
3	Protection of individual rights	Consent to processing, GDPR compliance, refusal of distorting modifications	Maintaining privacy and personal identity
4	Education and literacy	Educational programs, media literacy , verification tools	Reducing susceptibility to manipulation, developing critical thinking

Many international organizations and photography communities are developing codes of ethics regulating the use of AI. These are based on the following principles:

- honesty and transparency in the presentation of images;
- respect for the subjects of filming and their rights;

- clear distinction between documentary and artistic content;
- refusing to use AI to create deceptive or harmful content.

Such codes become especially important in an era when the line between “improving quality” and creating new meanings is becoming increasingly blurred.

Thus, AI is becoming an integral part of modern photographic practice, significantly expanding artistic and technical possibilities. However, it also poses new ethical and aesthetic challenges for society and the professional community related to image authenticity, authorship, and perception. The future of photography will be determined not only by technological progress but also by the ability to regulate and consciously apply these tools.

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