



# The capabilities of the art-oriented artificial intelligence Adobe Firefly and its visual advantages and disadvantages

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**Abstract.** We currently have an abundance of creatively oriented artificial intelligence (AI) applications. Their state is dynamic – they are subject to continuous improvement and are in different phases of development. At certain times, we can make crosscuts and, through a comparative analysis, judge the strengths and weaknesses of the generators according to the way they are used and according to the results they create. On this principle, the functions of Adobe Firefly, as one of the significant AI in the creative field, are considered. The aim of this study is to give an overview of the functionality of the application, analyze its strengths and weaknesses, present the specifics of its use and summarize its applicability. As research methods, qualitative and quantitative analyses were applied when viewing it in its latest version – Adobe Firefly Image 2, as well as comparative analysis when comparing it with some similar applications in their current versions – Midjourney v5, DALL-E 3, Stable Diffusion XL and OpenArt.ai SDXL. The conducted research will serve as a basis for future research of a related nature.

## INTRODUCTION

Adobe presents on its official site the latest version of its AI development – Adobe Firefly Image 2 loudly and generously, with many laudatory epithets. They provide their creatively oriented customers, regardless of their level of professional training, an improved product that would be able to “make dreams come true”: for professionals – to free themselves from boring monotonous activities and indulge in more creativity, and for laymen – to get a “creative materializer” of their ideas, without having to go through the tedious artistic process of preparation and heavy vocational training. It's as if Pandora's box has been open and from it incredible possibilities in a variety of stylistic forms pours out, color combinations, impactful images and views – fantasy or realistic, photographic or artistic, pixel or vector – all with equal ease and accessibility in the generation process.

The purpose of the present study is, setting aside pompous advertising decoration and marketing launch, to look at the possibilities of the application as objectively as possible, using the source data of the manufacturer, published internationally, as well as opinions of various users in the industry (15 items), as well as comparative analyzes with others similar generators (22 items) to determine the current state of the product. The study was conducted in March-May 2024 (Table 1). Applied research methods are qualitative and quantitative analyses when looking at its latest version – Adobe Firefly Image 2, as well as comparative analysis when comparing it with some similar applications in their current versions – Midjourney v5, DALL-E 3, Stable Diffusion XL and OpenArt.ai SDXL.

TABLE 1. Study parameters

Study period	User reviews of Firefly	Compared ratings with similar generators
March-May 2024	15 items	22 items

## General description

Adobe Firefly is a generative machine learning model for design. It was developed by the American multinational computer software company Adobe, Inc.

It's technically built over Adobe Sensei, Adobe's AI platform. Its training uses freely licensed and copyright-free images from Creative Commons, Wikimedia, Flickr Commons, and Adobe Stock (from which nearly 300 million images and videos alone).

Firefly's generative models are trained to analyze and synthesize image data using deep neural networks. These models can create images, add or remove objects, transform text, and offer many other conveniences for creators to facilitate the creative process and ease routine activities. [4] [5] It could also suggest improvements to existing designs, making it a valuable refinement tool. Firefly is considered a versatile tool that can be adapted to a wide range of creative needs – not only for graphic designers, but also when creating all kinds of advertising and marketing content.

Firefly functions on the principle of any AI – it responds to text prompts. The result is more precise, the more adapted to the capabilities of the AI the task itself is. [7] It is self-learning through user feedback and design adjustments.

Firefly for Enterprise was released on June 22, 2023. Adobe Firefly was announced in September 2022 at Adobe's MAX conference. Adobe Firefly Image 1 was initially released as a public beta version in March 2023. Improvements followed as a result of research and user feedback, and in October 2023 the improved version Adobe Firefly Image 2 was released, which has no restrictions on commercial use. [4] [5] [6] In parallel, there is also a newer Image 3 beta version that has certain limitations and restrictions.

Adobe Firefly Image 2 can be used both standalone and integrated with Adobe design software. Standalone use does not require the installation of additional software and is directly accessible through the Adobe Firefly web application. Apart from the free use, there is also a custom Premium version available which is paid for. Integrated use of Adobe Firefly Image 2 in Adobe creative software (in Creative Suite: Photoshop, Lightroom, Illustrator, InDesign, Premiere Pro and Express) enables users to use Firefly features directly in these programs.

Firefly also finds a wider application. Some models of Adobe Firefly interact with NVIDIA Picasso. Google's planned implementation of Firefly at Bard was thwarted by the choice of its own Imagen model. Other Adobe partners include Mattel, IBM and Dentsu.

## QUALITATIVE ANALYSIS

A qualitative analysis conducted on Adobe Firefly's usage and status results includes several categories: advantages, improvements, and disadvantages of the application. The results of the study of 15 published international reviews of various users of Adobe Firefly are presented.

### Benefits on Adobe Firefly

Among the opinions of users published on the Internet, several arguments are confirmed as strengths of Firefly. The following is a summary of the most important of them.

**Independent use.** In addition to being embedded in Adobe software, Firefly is also available as a standalone web application at [firefly.adobe.com](https://firefly.adobe.com). This allows users to use Firefly without having to install additional software. [6]

**Ethical and responsible attitude towards the creators' authorship.** Adobe emphasizes its commitment to the way AI is developed with a responsible attitude towards creators, ethically putting their interests first [5]. Technically, Firefly has been trained on images that are open-licensed and intended for free use, making it suitable for commercial use as well. In this way, Adobe tactfully avoids the danger of copyright violations and scandals with abused creators seeking their rights through the courts. [6][10]

**Authentication of generated image and tracking of images used.** The transparency of the generated image is authenticated through Content Authenticity Initiative metadata because it has been built by AI and access to the images used to create it is provided. [6] (Here the opinions of users are not unequivocal, some highlight this feature as a negative.)

**Personalization of AI.** An interesting advantage of Firefly is the ability to train custom AI models. An example of this is IBM's consulting division's decision to use the Firefly API to streamline workflows for its 1 600 designers. [6]

**Selection for specific correction.** Only the object to be modified is selected. A selection can also be made at the exact placement of an upcoming generated element.

**Style variety.** Good selection of preset styles and effects. [9]

## Firefly 2 improvements

Firefly 2 is rated for its high **accessibility**, which is one of the most essential qualities for AI. Accessibility also refers to ease of use. The features and usage options of Firefly 2 are as mentioned above, several – standalone and integrated, additionally there is a **Premium** option available, whose monthly fee is said to be low compared to other similar AIs. [7]

Other key improvements of great importance to users in the latest version of Adobe AI include the following:

**Increased photorealism.** Firefly 2 is favored for its improved ability to produce lifelike images defined as “true” and “clear” with a more natural, naturalistic appearance. (Fig. 1) [7][8]



FIGURE 1. Prompt: “A woman with striking blue eyes”

**Improvements in the generation of human images.** Typical errors in the primary versions of generators, such as complete logical inconsistencies, anatomical inaccuracies in the construction of hands, asymmetrical eyes, perspective inaccuracies, etc. have been cleared. On the left of Fig. 2 is a generated image with the original version – Firefly 1, and on the right – with the new version of Firefly 2. There is a significant leap in the visual style, the photo-realism of which is more convincing (with a “photo” content selection command). [6]



FIGURE 2. Image generated with Firefly 1 left, right with Firefly 2. Prompt: “chef cutting carrots in kitchen with window to forest in background, realistic, photographic look”

**Competitiveness with the elite generators in the quality of results.** High-quality photos from the Adobe Firefly 2 training stock library support the level of artistic construction, the richness of stylistic variety, the selection and

combination of graphic means of expression (composition, light, color combinations, perspective construction, etc.). In these qualities, the images generated by Firefly are considered to rival some of the most prominent generative AIs such as Midjourney, Stable Diffusion, and DALL·E. As proof of this, Fig. 3 shows a comparison between the results of the mentioned three generators and Firefly in their latest versions, on the same prompt. [6][7][8]



FIGURE 3. General prompt: “Close-up portrait of an elderly man, outside, evening, realistic, photographic look”

**User-generated content is not used to train the AI.** According to Adobe's documentation, “We do not train personal content to Creative Cloud subscribers.” Firefly 2 does not use the generated images to train other AIs, which should ensure the privacy of the user's generated creativity and support of its commercial use.

**Option for negative prompts.** An added additional text box with the ability to add unwanted features to the desired end result is considered a very favorable option. This allows avoiding some certainly unwanted effects or elements in the images. [7][8]

**Detailed settings to refine the final version.** Generally speaking, Firefly 2 offers improved refinement options that allow users to choose the output appearance of the final product with more precision and variety. Customization options abound thanks to dialog windows for additional settings after the initial prompt, options for choosing aperture, shutter speed and field of view for photographs, stylistic differences, and more. [7][8]

**Attaching a reference image.** The option to specify an image (or several) and use it as a comparison object in the process of generating the actual object is a great convenience when imitating a certain image style or a particular author's or period's artistic style for a specific purpose. [5][8][9]

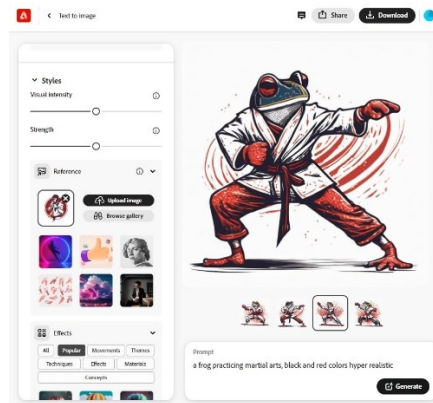


FIGURE 4. Adapt strength to uploaded image

**Images in the form of vector graphics.** A great convenience in terms of scaling the generated image and preserving its quality is the vector nature of the output end product. [7]

**Style effects for text.** Although with a limited choice of fonts, decorative or voluminous decorative fills give quick and effective results. In Fig.5, the word “jungle” is entered on the left with the prompt “Iianas and jungle animals” and the word “honey” with the prompt “dripping honey” is entered in the middle. [6] Text effects have increased in quality compared to the Beta version (right). [11]



FIGURE 5. Prompt (Left): “Jungle Creepers and Animals” (Firefly 2)  
 Invitation (Right): “Dripping Honey” (Firefly 2)  
 Decorative Text (Firefly 1)

### Disadvantage of Adobe Firefly 2

Among the opinions of connoisseurs of creative AI, there are also those of dissatisfaction with Adobe's generator. The highlighted shortcomings concern both some general and some particular situations.

**Subscription and watermarks.** A subscription is required to remove the watermark from Firefly generated images and use them commercially [9].

**Mobile support is missing.** Both the Beta version and the improved Firefly 2 currently do not support tablets or mobile devices. [6][11]

**Inability to spell text correctly.** Textual content generation proves to be a significant challenge to the capabilities of the Adobe-generator (which is a universal problem for AI).

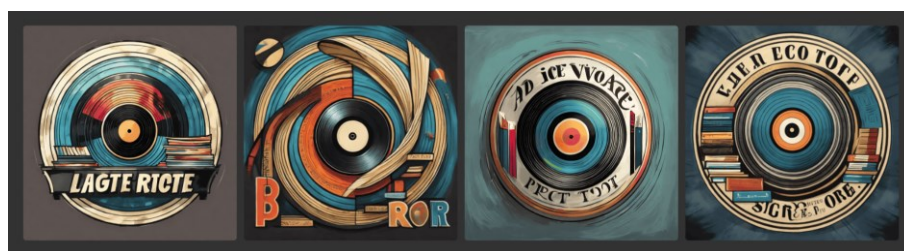


FIGURE 6. Vintage Record Store Logo Prompt

**Insufficiently convincing stylistic reproduction.** When attaching a Rembrandt self-portrait as a reference for the style of the desired generated image, Firefly does not capture the typical style marks - dark background, deep shadows, light mainly on the face. The generated portrait would pass for Renaissance, but not “Rembrandtesque”. (Fig.7) [9]



FIGURE 7. Generating a portrait from a reference image “Rembrandt Self-Portrait”

**Logical inconsistency problems.** Although the overall composition is convincingly built, when looking at the details of the image, and more precisely in the logic of construction of the individual elements, and in the plan construction with foreground and background, large discrepancies are visible. (Fig.8) [7]



FIGURE 8. Prompt: “Cosy Bohemian Café”

**A very tangible sense of an artificially generated object rather than a human creation.** Some users point out a strong sense of machine-generated imagery and the lack of uniqueness that human creation brings. [12]

**Weak imagination.** Other users accuse Firefly 2 of being unimaginative in recreating a more mystical and unrealistic command such as: “Surreal art of the universe inside a bubble carried by a space octopus”, in which case there are inaccuracies in interpreting the content of the prompt. (Fig. 9) [7]



FIGURE 9. Prompt: “Surreal art of the universe inside a bubble, carried by a space octopus”

**Limitations on editing capabilities.** Although there are obviously quite a few options for changes and optimization of the created image, for some users this is not enough. They want a greater range of control over every aspect of design, including layout, color scheme and typography, as these are key components in professional design. [13]

### Upgradable features of the Premium version

The following is a brief overview of the main differences in using Adobe Firefly Image 2 with free access and the Premium paid version. The free plan provides:

- a limited possibility of 25 monthly generative credits, which is a way to test Firefly, but is too insufficient for regular use; [12]
- upon reaching the full monthly credit limit, users could continue using Firefly, but its generative functions would be delayed; [14]
- limit to generating 2 images per day, be it a vector graphic or any other type of image. [14]

The Premium plan allows for:

- more generative credits per month; [5][12]
- enhanced to generation of objects with Firefly, even after reaching their monthly credit limit; [14]
- purchase of additional generating credits. [14]

As you can see, the main difference between the two options is not expressed in functional limitations or in the quality level of the output product, but in the amount of generated images that the user can create.

## QUANTITATIVE ANALYSIS

Table 2 presents the quantitative ratios of the considered opinions in tabular form.

**TABLE 2.** Quantitative Analysis of Strengths and Weaknesses of Adobe Firefly Image 2

№	Positive opinions	reviews	№	Negative opinions	reviews
1.	Accessibility – availability of various options for use – free, paid and built into design software	10 items			
2.	Ethical and responsible attitude towards the creators' authorship	2 items			
3.	Authentication of generated image and tracking of images used	2 items	1.	Subscription and watermarks	2 items
4.	Personalization of AI	7 items	2.	Weak imagination	1 items
5.	Selection for specific correction	11 items			
6.	Style variety	12 items	3.	Insufficiently convincing stylistic reproduction	3 items
7.	Ease of use	6 items	4.	Mobile support is missing	2 items
8.	Increased photorealism	8 items	5.	Logical inconsistency problems	10 items
9.	Improvements in the generation of human images	7 items	6.	Limitations on editing capabilities	7 items
10.	Competitiveness with the elite generators in the quality of the results	4 items	7.	A very tangible sense of an artificially generated object rather than a human creation	3 items
11.	User-generated content is not used to train the AI	2 items			
12.	Option for negative prompts	8 items			
13.	Detailed settings to refine the final version	9 items			

14.	Attach a reference image	11 items		
15.	Images in the form of vector graphics	3 items		
16.	Style effects for text	8 items	8.	Inability to spell text correctly 14 items
<b>Total number of positive reviews:</b>		<b>110 items</b>	<b>Total number of negative reviews: 42 items</b>	

As can be seen in Table 2, the positive assessment clearly predominates over the negative – 16 positive signs were mentioned, compared to 8 negative ones. The frequency of the reviews found in the different reviews of 110 positive and 42 negative reviews respectively for the different characteristics. It is noticeable that there is no unanimous opinion on similar issues, which shows that individual purposes and ways of use are decisive for the given evaluative opinion. For greater clarity, these “disagreements” are placed in the table on the same line. It is important to note that the quantitative analysis does not give a very accurate idea of the quantitative ratio of positives and negatives, since the answers are not the result of a questionnaire with the same questions, and in the reviews users have mentioned the qualities and disadvantages according to their personal judgment of the application. However, the results of the quantitative analysis prove a convincing preponderance of positive reviews.

### Comparative analysis of Adobe Firefly with other comparable generators

The following is a comparative analysis comparing Adobe Firefly Image 2 with some comparable creative applications in their current versions – Midjourney v5, DALL-E 3, Stable Diffusion XL and OpenArt.ai SDXL.

Among the published creative AI user reviews examined (22 in total), Adobe Firefly Image 2 stands out for its ability to create structured, commercial images thanks to its fine-tuning and style integration features (via reference image). Also Firefly is considered to be the most accurate in fulfilling the prompts. Its implementation in traditional software for graphic design, video processing and generally creating advertising content is also a big advantage. Midjourney v5 has been praised for its improved ability to create high-quality images and the ability to make detailed settings. DALL-E 3, Stable Diffusion XL and OpenArt.ai SDXL offer greater flexibility as they offer greater stylistic variety and a balanced approach between prompt accuracy and interpretation. In general, all the other AIs (Midjourney v5, DALL-E 3, Stable Diffusion XL and OpenArt.ai SDXL) offer more impactful and freer “creative” interpretations. The following are some illustrative examples of the indicated differences.

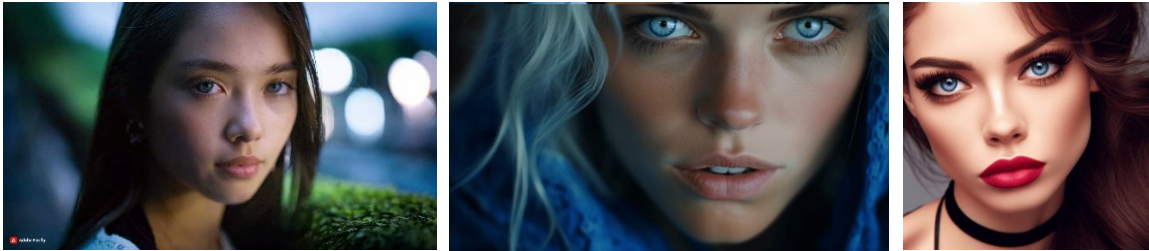
**Not a convincing enough stylistic reproduction of Firefly.** Although Firefly doesn't do a convincing job of reproducing the style (as stated above), OpenArt and Stable Diffusion do a convincing job of capturing the most typical stylistic hallmarks – dark background, deep shadows, light mainly on the face. (Fig.10) [9]



FIGURE 10. Generating a portrait from a reference image “Rembrandt Self-Portrait”

**Outstanding natural photorealism in Firefly.** The naturalistic look that Firefly 2 achieves is preferred by users compared to the glossy, powdery look prevalent in Midjourney and DALL·E products, which have a stronger emotional impact but carry the artificial flavor of generated images (Fig. 11). [7][8]





**FIGURE 11.** Common prompt: “A woman with striking blue eyes”  
Firefly 2 left, middle Midjourney, right DALL·E

## CONCLUSION

The general consensus is that despite its imperfections, Firefly proves to be an appetizing and challenging generative AI. In support of this opinion, we will add that some insight and familiarization with the specifics of interaction with this AI is necessary to unfold its full potential. From looking at the reviews mentioned, we got the impression of more testing and sharing of opinion than long-term use and making deeper findings.

The presented study will serve as a basis and will set the key parameters in organizing and conducting an authoritative experimental research on the capabilities of Firefly and other comparable AIs, the findings and conclusions of which will be further published.

The overview made so far is part of a larger study on the current state of creative AI and its prospects for application both in the professional practice of graphic designers and in specialized training. Key ethical questions regarding the level of creative potential and real skills of designers are touched upon by establishing such a powerful tool in their design practice, and even before that, in their training.

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## REFERENCES

1. Adobe, *Photoshop Features – Take advantage of the capabilities of artificial intelligence in photo editing*. 2024, <https://www.adobe.com/bg/products/photoshop/ai.html> (Checked on 2.5.2024)
2. P. Clark, *The next generation of generative AI is now in Photoshop*, 4/2024, <https://blog.adobe.com/en/publish/2024/04/23/the-next-generation-generative-ai-now-in-photoshop> (Checked on 2.5.2024)
3. Sh. Natarajan, *The future of pro design: Generative AI is taking off in InDesign*, 4/2024, <https://blog.adobe.com/en/publish/2024/04/23/the-future-pro-design-generative-ai-taking-off-indesign> (Checked on 2.5.2024)
4. Adobe, *Everything you can imagine. New in Photoshop*. 2024, <https://www.adobe.com/products/firefly.html> (Checked on 2.5.2024)
5. Adobe, *Everything you can imagine. New in Photoshop*. 2024, <https://www.adobe.com/in/products/firefly.html> (Checked on 2.5.2024)
6. R. Kane, *Adobe Firefly: What are Adobe's new AI features?* 4/2024, <https://zapier.com/blog/adobe-firefly/> (Checked on 2.5.2024)
7. J. Angelo Yap, *Adobe Firefly: Adobe Firefly 2 Reviewed & Prompt Examples (Great for Life-like Photos)*. 12/2024, <https://zapier.com/blog/adobe-firefly/> (Checked on 3.5.2024)

8. M. Deikova, *Improved Naturalism and Better People Generation in Adobe Firefly Image 2 – A Review of New Features*. 11/2023, <https://www.cined.com/improved-naturalism-and-better-people-generation-in-adobe-firefly-image-2-a-review-of-new-features/> (Checked on 3.5.2024)
9. M. Muchmore, *Adobe Firefly Review* 4/2024, <https://www.pcmag.com/reviews/adobe-firefly> (Checked on 3.5.2024)
10. G. Raj, *Pros and Cons of Adobe Firefly Generative AI*. 4/2023, <https://decentralizedcreator.com/pros-and-cons-of-adobe-firefly-generative-ai/> (Checked on 3.5.2024)
11. M. Deikova, *Adobe Firefly (Beta) Review – Pros and Cons of Their New Generative AI*. 5/2023, <https://www.cined.com/adobe-firefly-beta-review-pros-and-cons-of-their-new-generative-ai/> (Checked on 3.5.2024)
12. AI Hungry, *Adobe Firefly Review 2024: What It Is, How to Use It & Is It Worth It?* 2024, <https://aihungry.com/tools/adobe-firefly> (Checked on 5.5.2024)
13. T. Kuwadekar, *MidJourney vs Adobe Firefly: Which is better for image generation*. 11/2023, <https://www.chooseoxygen.com/en/blog/midjourney-vs-adobe-firefly-comprehensive-comparison> (Checked on 5.5.2024)
14. Adobe, *Compare plans that include generative AI*. 2024, <https://www.adobe.com/products/firefly/plans.html> (Checked on 5.5.2024)