

AI Photographer Generating Experimental Photographs Using Artistic Style Transfer Neural Networks

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ABSTRACT

Contemporary photographers have the idea of conflating the imaging possibilities of digital technologies with an experimental spirit. The AI photographer developed in this project can produce experimental photographs using deep learning, by which the methods of a human contemporary photographer are learned by artistic style transfer neural networks. The AI photographer generated thousands of diverse mutations of a photograph as if forming a new generation that builds the future as the descendants of a few pairs of parents.

1. BACKGROUND

Rainbow Variations by the photographer T. Koyama weaves together *Rainbow Forms*, *Melting Rainbow*, *Waves Rainbow*, *Seventh Depths*, and *Pico*[1]. Each dazzling distortion was rendered using a layered, manual process. For example, the camera captures the water droplets and reticulations of the wet photographs, the changing wave patterns of submerged photographs in clear water, intentional mistakes using a multi-shot digital camera, etc.

In collaboration with T. Koyama, I have developed an AI system that learns a method of producing experimental photographs using artistic style transfer neural networks. First, the works named *Rainbow Variations: AI mutations* displayed at the fourth Special Exhibition at the Color Science and Art Center, known as the “Collab Gallery,” is inspired by *Rainbow Variations*. Second, using this experience, the works named *AI Photographer Rainbow Mutations* can create further unexpected mutations using additional distortion data. These works were exhibited at Tokyo Polytechnic University's Festa in the Faculty of Art 2019.

2. WORKS

2.1 *Rainbow Variations: AI mutations*

Rainbow Variations: AI mutations generated experimental photographs through inspiration by the concept of *Rainbow Variations* using the interactive artforms *AI Artistic Painting Mirror*[2] and *Deep Neuro Artist*[3], which are based on deep neural networks. In the exhibition, a video installation showed 1044 reconstructed photographs. AI learned three distortion data of *Meltings*, *Waves*, and *Seventh Depths* as a style image (see Figures 3, 4, and 5) and generated new mutations from *Rainbow Forms* as a contents image (see Figure 2). This video installation was exhibited as a 55-inch portrait-style OLED display panel. (See the left-hand image in Figure 1.)

2.2 *AI Photographer Rainbow Mutations*

AI Photographer Rainbow Mutations expanded *AI mutations* to generate further complex mutations[4]. In addition to the distortion data of the previous exhibition, many types of data have been superimposed and crossed over to produce 3414 novel mutations. For example, AI learned *Bubbles*, *Waves Rainbow*, and the experimental photos by Hajek Halke who is a German experimental photographer (see Figures 6, 7, and 8). Additionally, AI learning was also executed under the condition of swapping a style image for a contents image. Examples of generated photographs are shown in Figure 9. This video installation was exhibited as a 65-inch landscape-style OLED display panel[4]. (See the right-hand image in Figure 1.)

3. PERSPECTIVE

In this collaboration, we have generated experimental photographs using neural networks that learned the process of producing of a photographer. We can recognize the potential of AI learning the processes of thinking and producing of artists. Neural networks will be able to learn various styles of artistic processes in the future.

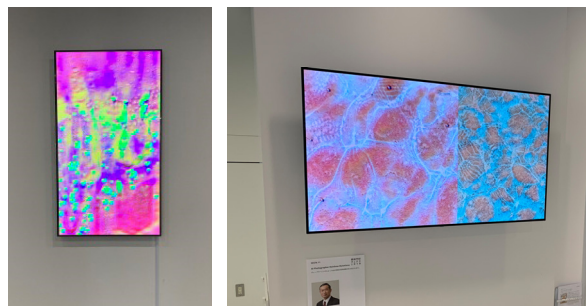


Fig. 1 *Rainbow Mutations* Exhibition.

4. REFERENCES

- [1] T. Koyama, “Rainbow Variations,” Artbeat publishers, (2015)
- [2] Y. Kuhara, “Artificial Intelligence Artistic Painting Mirror as Interactive Art Using Deep Neural Networks,” Proc. of 1st International Symposium on Color Science and Art 2018, pp. 23-24 (2018).
- [3] Y. Kuhara, “Deep Neuro Artist,” Festa in Faculty of Art 2018, Tokyo Polytechnic University, Pictorial record book, pp. 16-17 (2018).
- [4] Y. Kuhara, “AI Photographer Rainbow Mutations,” Festa in Faculty of Art 2019, Tokyo Polytechnic University, Pictorial record book, pp. 28-29,78-79 (2019).

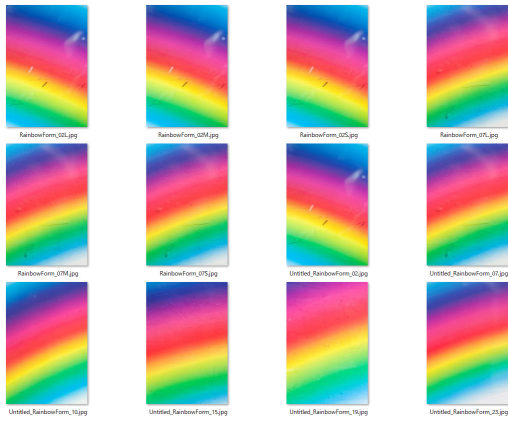


Fig. 2 Rainbow Forms 12.

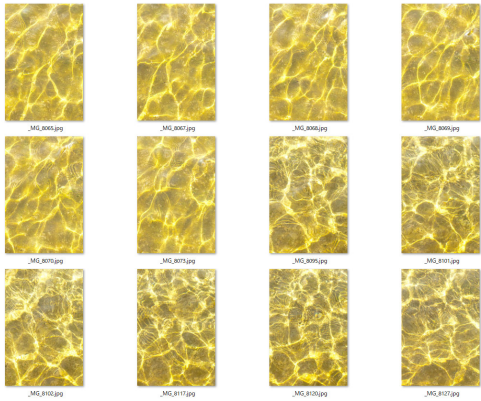


Fig. 3 Waves 12.

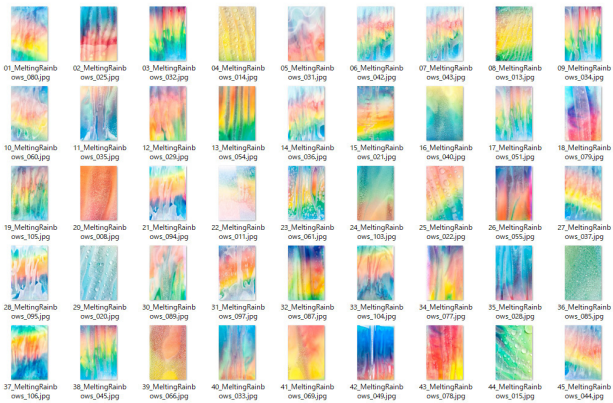


Fig. 4 Meltings 45.

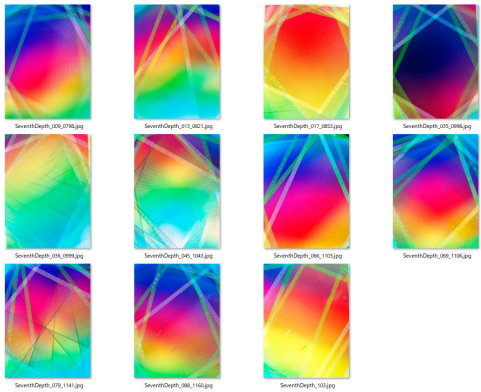


Fig. 5 Seventh Depths 11.

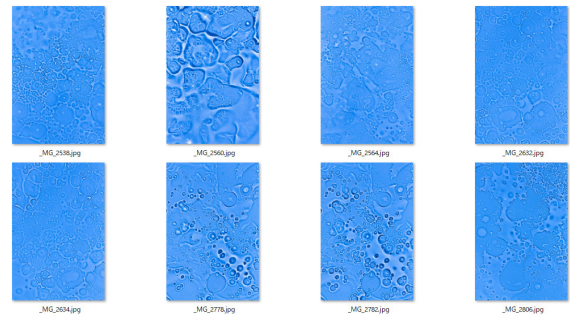


Fig. 6 Bubbles 8.

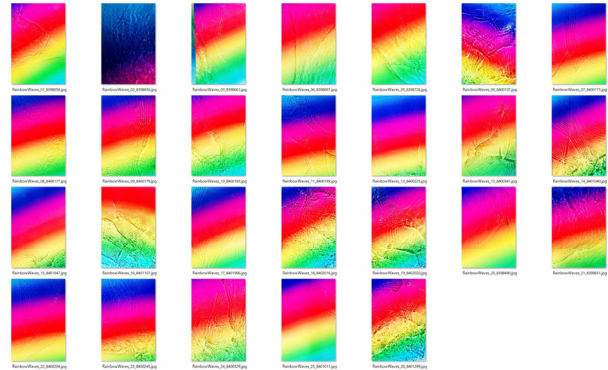


Fig. 7 Waves Rainbow 26.

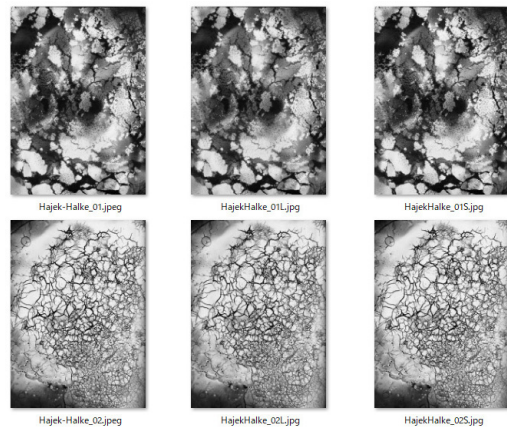


Fig. 8 Photographs by Hajek Halke 6.

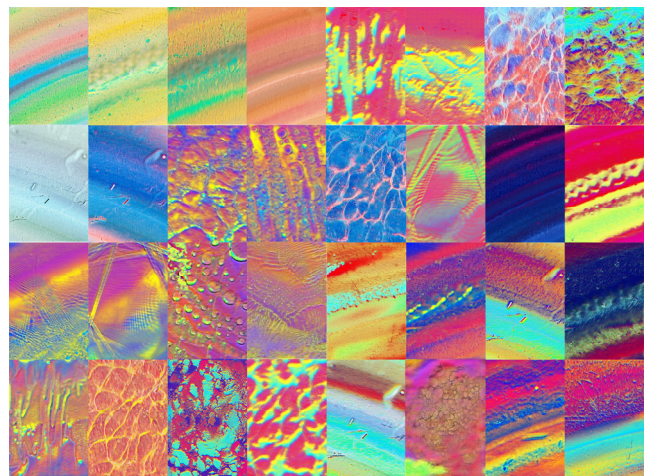


Fig. 9 Examples of AI Mutations