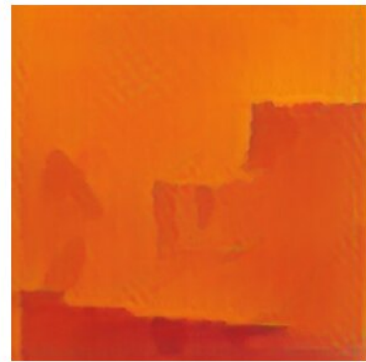# A model that can create unique Chinese calligraphy art

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Credit: Zhuo et al.

Over the past few years, computer scientists have developed increasingly advanced and sophisticated artificial intelligence (AI) tools, which can

tackle a wide variety of tasks. This includes generative adversarial networks (GANs), machine-learning models that can learn to generate new data, including text, audio files or images. Some of these models can also be tailored for creative purposes, for instance, to create unique drawings, songs or poems.

Researchers at Tongji University in Shanghai in China and the University of Delaware in the US have recently created a GAN-based model that can generate abstract artworks inspired by Chinese calligraphy. The term Chinese calligraphy refers to the artistic form in which Chinese characters were traditionally written.

"In 2019, we collaborated with a restaurant based in Shanghai to showcase some AI technologies for better customer engagement and experience," Professor Harry Jiannan Wang, one of the researchers who carried out the study, told TechXplore. "We then had the idea to use AI technologies to generate personalized abstract art based on the dishes customers order and present the artwork to entertain customers while they wait for their meals to be served."

The initial objective of the recent work by Wang and his colleagues was to connect the names of Chinese dishes with art. To do this, they decided to use Chinese calligraphy, as it is a treasured part of China's cultural heritage that can express complex meanings in an aesthetic and artistic way. In addition, they drew inspiration from some paintings by abstract expressionist painters, such as the American painter Franz Kline, realized in the 1940s and 1950s.

"We first compiled a Chinese calligraphy dataset, where each character has many different calligraphy images," Wang said. "Subsequently, we trained a conditional GAN model based on the dataset to generate new Chinese calligraphy images that look like the characters in the training set but have never been seen before."

First, the model created by the researchers calculates the similarity between the characters that spell the name of a Chinese dish and the characters in the new calligraphy dataset they compiled, identifying the most similar ones. Subsequently, it generates an entirely new character based on these similar characters.

"This new character is sort of 'inspired' by the dish name and inherits some characteristics from dish name characters," Wang explained. "The model also applies a number of aesthetic transformations, such as style transfer based on famous paintings by artists such as Picasso, Rothko, Rousseau and Hockney, or oil painting transformation and white space ratio adjustments."

When the researchers tested their GAN-based framework, they found that it can reliably create unique and aesthetically pleasing Chinese calligraphy art inspired by dishes, as well as by other words in Chinese, while also introducing stylistic elements of expressionist painters. An initial demo of their model is available online and Wang and his colleagues are now working on further improving the quality of the artworks it produces.

"In our recent study, we were able to use Chinese calligraphy as a special medium to connect words and images, subsequently using NLP and GAN technologies to create Chinese calligraphy inspired abstract art," Wang added. "We now plan to fine tune our model to have better control on the generated results."

  More information: A framework and dataset for abstract art generation via CalligraphyGAN. arXiv:2012.00744 [cs.CV]. arxiv.org/abs/2012.00744

harrywang.me/calligraphy/

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