Artificial intelligence-aided type design for Chinese script

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Abstract

In digital typography, a set of "Hanzi" or Chinese logogram characters includes around 6'763 commonly used glyphs (Billeter 2010, Yuho 1993), the minimum number required to compose basic texts in Chinese. In Latin typography, a comparable set would include the alphabet in full caps and several punctuation signs. This disparity in the number of characters is crucial when it comes to type design: unlike alphabet-based languages, a Chinese typeface could take more than one year to complete, involving teams of people. The practical constraints of Chinese script design prevent individuals from entering the field. Moreover, creating a Chinese typeface represents a considerable investment that also prevents more graphically experimental shapes, thus becoming an obstacle to innovation (Skala 2013, Takagi 2014).

How can Artificial Intelligence (AI) be employed to reduce the amount of work done on the design of an entire Chinese set, starting from 267 basic characters only?

This research question is at the centre of an applied research project, which has developed an AI algorithm that can automatically generate Chinese typefaces, hence enabling a richer type design environment for the Chinese script. The present paper reports on the development of the research project and on its final outputs.

While other databases of Chinese script already existed, they are privately owned by Chinese type foundries: the newly established database is public and open source. It was fed with 90'000 entries, decomposing Chinese characters into radicals and components according to a reduced number of layout patterns. The database is built to train a Generative Adversarial Network (GAN) and was made available to all type designers for both training data for AI and hand-crafted design activities.

GANs are formed of two neural networks contesting with each other in the context of a zero-sum game, where the result is an advantage for one side and an equivalent loss for the other. Given a training set, this technique enables the generation of new data with the same statistics as the training set: new elements that look authentic to the human eye since they bear realistic characteristics. GANs allow for the model to learn in an unsupervised way, thus reducing human efforts (Goodfellow et al. 2014).

The research provided with surprising results: AI is doing better work at generating calligraphic 'humanistic' shapes rather than rationalist geometry, which questions the process of type design and the bias brought in the field by vector drawing. As any AI-related project, the research project questions the relation of designers with authorship and copyright. In the current type design scene, automatization of labour is already a reality: a large part of the designers' work is to discriminate between machine-generated forms. The outputs underline the fact that Artificial Intelligence can only operate from existing design, and cannot create outside of a given structure. The fear of an AI-Leviathan taking the jobs of designers is only serious for those who are themselves creating in the nutshell of existing styles. Finally, the project proves that AI can stimulate creativity by making fruitful mistakes.