Co-creating Musical Compositions with an Artificial Agent: Time-travel through Machine Learning

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Abstract

In recent years, co-creation of artistic artefacts with artificial generative agents is becoming more accessible and effective. We offer here our personal considerations as artists exploring this novel creative context where boundaries of agency and control between human and machine are blurred. Through our experience we hope to suggest a possible direction for the future of AI-assisted musical composition.

Identity Reflection

Which elements of a composer's identity are imbued into their work? Do we have evidence to claim that there is some measurable predictability in the style of an author, such that it is possible to extract part of that identity? To what extent do Generative Adversarial Networks (GAN) (Goodfellow, et al., 2014) and Variational Auto-Encoders (VAE) (Kingma & Welling, 2013) exploit, and to what extent are they fooled by, this predictability?

It seems evident for anyone exploring the intersection between art and machine learning, especially generative deep learning, that the predictability of an author's work, or at least some of its elements, is the underlying assumption for both classification and generation. After all, statistics and probability are the foundation of machine learning.

On the other hand, we feel that, while this predictability is measurable, it certainly is not the entire picture. As artists, we grow and evolve over time, we learn (and unlearn) tools for self-expression, we push ourselves to create novel and interesting output rather than something predictably ours. As a result of this evolution, an artist's work often reflects the internal changes and the different influences they may have had in different periods of their life.

Time traveling

We believe that pieces of work from the same author can be conceptualized as a continuous stream of self-expression, rather than individual units, all reflecting a single, monolithic identity. Within this framing, we extend the existing VAE and GAN models developed in the music domain (Roberts, Engel, Raffel, Hawthorne, & Eck, 2018; Simon, et al., 2018; Dong, Hsiao, Yang, & Yang, 2017), by introducing an additional latent constraint (Engel, Hoffman, & Roberts, 2018) that encodes a reference to the author's timeline (i.e., at what point in the author's life the composition was written).

This type of latent space conditioning allows an author to generate a track fitting any style or period of their career (hence, "go back in time") by simply controlling this attribute when sampling from the model. With active participation of artist, composer and producer Vicky Fung, we would like to investigate the possibility of such type of "time-travel" by creating (or re-creating) songs that reflect her identity from different artistic periods.

Vickynet

The desired outcome is to train a VAE model so that it can generate musical compositions in the style of Vicky Fung across arbitrary periods of her career; we will call this model *vickynet*. We intend to publish a web interface to *vickynet* to showcase its functionality.

The second objective is to co-create a novel musical composition using *vickynet* and while doing so, organize our thoughts and reflections

on this type of creative process involving humans and artificial agents, around the central theme of blurred identity boundaries.

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Biographies

Vicky Fung made her debut in the Hong Kong music scene as a songwriter in 1996 and has composed works for many prominent local singers for over 20 years. Vicky has brought new impetus to Cantopop with her compositions and has been received prestigious professional awards such as "Best Alternative Composition," "Best Melody," "Best Song" at the CASH Golden Sail Music Awards in 2005, 2012 and 2018. As an artist, composer and producer, Vicky not only composes works for other singers, but has also released 3 albums of her own recorded compositions. She also curated the music for a multi-media show *Utopia, Momentarily* as part of the program for New Vision Media Festival 2016. Vicky held her recent concerts *Travelling Soul* at The Academy of Performing Arts in 2017, and *Surreality.Live* at West Kowloon Cultural District in 2020 to showcase her unique blend of aesthetics crossing between pop and art.

Giovanni Lion is a second-year PhD student in the School of Design at The Hong Kong Polytechnic University under the supervision of Professor Johan Hoorn. His research focus is centred around artificial intelligence and creativity, more specifically, concept formation in artificial agents. He adopts a transdisciplinary approach, spanning across Philosophy, Psychology, Cognitive Science, Computer Science and Design, looking for opportunities to decompartmentalize existing knowledge and identify synergies across disciplinary boundaries. As a practitioner, he is intrigued with algorithmic music, procedural generation in videogames, interactive installations and virtual reality. His interest in Artificial Intelligence crystallized in late 2017 as he had the opportunity to work as Robot Operator for Hanson Robotics, handling their humanoid robot Sophia.