Human-Computer Imagination Exchange

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Introduction
Artistic tools can always be understood both as limitations and advantages for the artist. The industry of musical instruments is constantly introducing new improvements; however, it is common to witness conflicting opinions, among users, on whether those represent "real progress" or not—after all, it is a fact that the vintage-instrument market is healthy. In my opinion, the limitation/advantage duality is inadequate to describe the unique relationship between artists and their expressive means, hence the contradiction.

A new instrument
During my post-graduate study, a deeper insight into this very relationship started to emerge. I was investigating the sonic properties of microsounds, atoms of sound too small to possess either duration or timbre, which I organized via (sample-accurate) synthesis algorithms somewhat akin to granular and pulsar synthesis. My original intention was to discover and implement deterministic "laws" for microsound composition, but soon I recognized that this task required the complete exploration of:

- an infinite field of sonic possibilities;

- a higher order infinity of functions driving sonic transformations within that field.

After some preliminary attempts, I came up with a solution addressing both of them at the same time: I decided to use a recurrent neural network (specifically an Echo State Network) in the parameters mapping stage, i.e. between the physical interface and the sound synthesis. Echo State Networks are a simple way of implementing highly dynamical, chaotic behaviour. Depending on the feedback factor, their response can be extremely non-linear, to the point where self-oscillation is induced.

Combining Echo State Networks, non-standard synthesis algorithms and a Wacom graphic tablet gave birth to a new instrument, whose potentialities I am still exploring, but which clearly possesses a certain degree of autonomy and agency. It is the central voice of a recent piece of mine[1] (a live-electronics solo), available here: vimeo.com/107184206

The experience of coding, playing, rehearsing and performing with this system advanced my perspective in relation to the questions posed in the first paragraph. First, it is clear that deterministic approaches don't work. Deterministic tools are bound to be partial and don't reflect the artist/means relationship, which is indeed much more circular, peer-to-peer and collaborative. As I experienced myself, machine learning and artificial neural networks are certainly prolific research areas for the development of what I would call "artificial imagination", with which human imagination can collaborate and play.

[1] The software/instrument of the piece features a few more processes, some of which explicitly designed to be indeterministic or chaotic: first and foremost, a large network of feedback delay lines, from which sounds emerge and evolve. Generally speaking, however, the topology itself of the processes (which in most cases can feedback into each other) makes the system capable of indeterminacy.

Perspectives

From this point of view, there seems to be an obvious risk of delegating too much of (or all) the creative task to the machines, especially if artificial imagination is re-enclosed in a deterministic paradigm. Again, the key factor lies in the user's imaginativeness (think of Ligeti's piece for 100 metronomes); but this can be encouraged, to some extent, by instrument designs that are open, free and less goal-oriented.

Having said that, the development of artificial imagination is indeed an exciting evolution of artistic and musical means: from my perspective, it fosters a less-formalized, more explorative approach to music-making. This couples very well with the exploration of physical computing, which opens up a whole new dimension in the imagination exchange between humans and machines.

Conclusion

It seems to me that today we are similar to our stone-age ancestors discovering the musical properties of wood and bones, without having a preconceived idea about the final results, much more than we still take into account the post-golden-age extreme formalism of serialism, the last attempt of making new music with old instruments. Hegel taught us that art's survival is never guaranteed, and it seems that we are now as far as we can get from a new musical golden age: after all, in our theatres we still hear almost exclusively compositions from the baroque, classical and romantic periods. Sooner or later, though, our imagination and our expressive means will find a new ideal synergy. For the moment, when we connect a sensor to a neural network, we are just hitting a log with a bone.