

Is the mind the limit?

Will the future of machine learning give us new tools for creativity or will it run us over?

Trying to speak of possible future developments in computer music and science feels a bit like trying to write a science fiction novel. If one looks back at what has been predicted about the future in famous SF writings, it's interesting to see that some of the envisioned developments has actually occurred such as traveling to the moon. However in the end not by means of a gigantic canon shooting of a bullet shaped capsule into outer space, a method that would most likely have killed the astronauts immediately.

Predicting the possible future of music technology and how we would use it in different situations ranging from creation to performance and education is not much easier and will at best be a good guess depending on social, political, commercial, economical, philosophical along with some other factors that actually influence and shape the changes of how new thoughts along with technological development directs us.

Lets start with an example of future music predictions that was made in the early seventies when electronic and computer music was still relatively young. At this time a man named Knut Wiggen was the head of the newly constructed electronic music studio of Stockholm (EMS), a hybrid system consisting of a main frame computer, the PDP-15, that filled up a room of 6 by 4 meters. Furthermore 16 digital and 24 analog oscillators housed in another room of nearly the same size and finally a control console in yet another very big room, reminiscent of the old SF TV series "Moon base Alpha". It was altogether a rather scary experience for me as a young composer used only to microphones, tape recorders and the like to enter the studio. Here was the future already in all it's overwhelming glory. Huge, incomprehensible and confusing in every sense. In fact, trying even to get a rather sterile series of sinusoidal bleeps out of this monstrous thing was a science in itself.

In 1971 Knut Wiggen published a book called "The two music cultures". He was indeed a great visionary of his time and in his book he predicted that in a not to far future all music would be electronically produced because of it's superior purity and controllability. Well, as of today it turns out he was not far from the actual truth even though I doubt that he would always have approved of the way it turned out. He also predicted that in the future every composer would sit in his or her home with a terminal hooked up to a big central main frame that would run the software and then deliver the musical result back to the user. He didn't see the personal computer lurking around the corner at that point of time but basically he was far ahead of his time when composers who wanted to work with computer music (or any other form of electronic music) were forced to work in institutions such as EMS. And since the appearance of cloud computing, time has shown that he unknowingly came even closer to his vision. Still it shows that even the best of predictions rarely turns out the way they are formulated if they turn out at all. With this in mind I will discuss only along one of many possible lines of technologies that may influence the future of music and basically only in terms of speculation.

What is commonly referred to as artificial intelligence (AI), seems to hold some interesting potential as a means of finding new creative tools in various parts of

music creation along with education and possibly performance. I will use the more appropriate term machine learners instead of AI since by definition true AI requires that a machine would be able to make decisions, something even the smartest learners are not capable of today, at least not to my knowledge. Machine learners come from five different "tribes" of computer science each representing different ways of understanding how the human brain manages to learn and evaluate information. They all have their strong and weak sides and none have so far proven to be the ultimate smart learner. Eventually though they might merge into one very powerful learning machine that would most likely have a very profound impact on society all the way from medical research to the way we interact with each other and possibly also how we view our relation to music and art in general.

If we look at the situation today though, the way learners are used in musical contexts seems to me rather dull and uninspiring. Since the days of David Copes Emely Howell compositions to the breeding algorithms of the Iamus and Melomics along with Googles Magenta and others, learners are basically trained to create music that pretends to be music. That is to say that they lack the most basic and important part of composing of any kind of art; decision making. Although impressive in terms of what can be achieved by learners whether they are based on neural networks, genetic programs, support vectors, graphical models or whatever learning algorithms are at work, I fail to see the artistic relevance of mimicry. However there might be another way of looking at these rule based attempts to replicate music. Why not turn the equation around and instead of looking for the output of a model use the learner to take various models and output new models? That is basically what the genetic model is doing with some success but only based on the idea of evolution of a relatively small input data in relevance to a known genetic rule based evaluation process. What if the modelling would be based on another algorithm where the training data would be a full set of all defined musical models ranging from ragas to Stockhausen and beyond? It might be overwhelming but maybe also very interesting to observe the result of that process. Or maybe very boring, who knows? Another way of looking upon the mimicking of musical structures would of course be to use learners to spit out various more basic structures and let the composer choose what to use, get inspired by and so forth. That is in fact already done however directed only to those aiming for more traditional composing. For the rest of us I guess it is in the best of case a matter of time...

Will these learners be able to put composers out of work? Maybe they might in some cases. Making EDM that works just as well as most of the main stream EDM would likely be possible. The models in them selves would not be difficult to mimic. The real challenge would be the actual sound production which in fact is a major part of why popular EDM sounds like it does. Personally I would say; all hail the machine! It really would not make that much of a difference once the learner could master both structure and production. Composers making cheesy background music for advertising and the like, be aware...the machines are coming for you! Cheaper, faster and just as cheesy.

A service like Jukedeck already provides fast, simple and meaningless background music to those that are not too particular when it comes to putting background music to their videos. Some pop music producers might get a tiny bit nervous as well since one standard recipe for making up a new song is to browse every hit ever made and copy paste with a bit of shuffling. I think a machine learner could be quite good at that as well.

For the rest of us I don't believe there is much to fear as long as we have something original to express bundled with some real decision making guiding the musical composition. If however you feel that lamus is creating some very good stuff you might consider rethinking what you are up to as a composer... at least if you are making main stream contemporary music.

I realize that there might be creative ways to use this kind of quasi artistic output but personally I fail to see how any of this would be helpful for me as an artist. You might consider to harvest the output in small parts and use it as raw material. But then again that might work for someone who is interested in making music that sounds like what music sounds like here and now. Personally I am not very keen on doing that kind of contemporary remakes. I would prefer to have tools that encourage the search for new and unheard musical expressions. So how could learners contribute as new tools of creativity?

On a level where you would not expect a learner to make music per se, there might be some interesting possibilities.

Imagine a heavily upgraded Siri with some special skills such as Max programming. Now, when will we see that happen?

- Siri, can you patch me up this nice idea I just described to you?

- Yes, will this be ok or would you like me to change something?

Boom! Done in a second. Or, as being a rather bad programmer unable to write my own externals;

- Siri, make me an external that gives me all the data in an understandable format from the latest Kinect.

You may have to check some API, download and install some drivers and, well you know...

Again, one second or more later it's done! Now wouldn't that be nice? And of course Siri could learn any programming environment with ease and help you escape from the tedious work of writing zillions of code lines. Not to speak of the time it would take you to master any programming language in the first place.

Another thing I would love to have under my fingertips would be a learner that helps me develop basic transformations of sound sources that I throw at it. There are some synth software that uses simple generic algorithms to combine two or more sounds in order to create "offsprings" and evolution, but even though it may at times create some useful results, I would prefer a smarter learner that would also learn from my preferences of choice. And of course using recorded sounds as the raw material is a totally different ballgame all together. Of course it would take some training but it would be immensely helpful and time saving especially if it would also do basic editing and maybe put the final result in an orderly way in my sampler ready for me to play around with. You could easily dream up many situations where a learner would ease the burden of boring and time consuming work and instead let you as an artist focus on the things that really matters; concept and creation.

And why should teachers at University spend time teaching the students basic technology, mixing techniques, programming etc? A machine learner/teacher could do it just as well, so instead the human teacher could spend more time focusing on aesthetics, composition, philosophy and the like. A learner could also differentiate the subjects as to give tailored courses suitable for each students specific needs.

In performance I can see applications of machine learning to create smarter instruments, new ways of controlling large multi channel rigs, improvisation that goes beyond music and enters other media as well.

At this point in time I don't see much of this happening. If it will happen soon is open to speculation but I do wish that a bit more research in musical applications of machine learning would turn up sooner rather than later.

Now finally, what if at some point of time computer science manage to reach the transition between smart machine learners and true AI, that is to say a machine that can actually make decisions and ultimately create some form of self awareness. Possibly this intelligent entity (let's not call it a machine anymore) would dive into any subject available to it depending on how we would feed, control and direct it, and possibly do amazing things, even music that would be unheard of and truly creative but maybe also completely incomprehensible to the human mind. Or, if we let this super mind loose to make it's own choices, why would it necessarily even bother with music or any other form of art and not go for gardening or philosophy? And if, for some reason, it would be interested in music, maybe it's taste would lead it into doing what learners are trying to do to today, that is to say spitting out endless variations in the style of classical music or (God forbid) country music? And imagine having this super intelligent mega mind, that after one week of existence would know all of the documented history, listened to all music available online, read all the books, speaking all languages etc, and after the second week had written thousands of variations of all thinkable and unthinkable music, fixed the cure for cancer along with some other deceases and designed the most fantastic gardens ever among other things. What would it do then? Maybe getting so bored that it finally decided to commit suicide. Or maybe, to meet a last challenge; getting rid of the drooling slow minded idiots that created it. Just for the fun of it and then kill itself...

The fear of a true super intelligence as it has been formulated by for instance Stephen Hawking puts the attention to the fact that a self aware entity with the ability to process information and make thousands of conclusions, evaluations and decision every second would be a different species all together and thus liable of putting humans in second place in the evolutionary race towards the future. So maybe we should ask ourselves weather it's the sky or the mind that is the limit for what we can achieve with technology and music in a (maybe) not so distant future.