

Music goes digital in the Age of Social Distancing

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Datum : 2. Oktober 2020



forced us to remain locked up in our houses, observing and communicating worldwide through digital windows. During the period of isolation that we are experiencing, the need for social connection is greater than ever. The physical world is experiencing a slowdown and an unprecedented phenomenon is taking place in the history of the performing arts, culture does not stop in the digital world.

Unlike the visual arts, the performing arts are forms of artistic expression that involve performing live in front of an audience. The music and live entertainment industry gathers large audiences on a daily basis. Social distancing and the lockdown of the physical world has had a devastating effect on the performing arts industry. Festivals, concerts and tours have been cancelled and therefore irreparable economic losses counted by hundreds of millions are predicted for 2020. The Swiss festival market attracts more than five million visitors every year, for which music festivals dominate the scene. In response to this economic crisis, governments around the world are including measures to reinforce the arts and cultural sectors. In April 2020, the Swiss government announced a CHF280 million package to support the cultural sector, including emergency funding for professionals in the performing arts and music.^[1] As a consequence of

the cancellation of live performances, the number of live-streaming platforms offering digital concerts has multiplied. Artists from around the world perform in empty halls, but for a worldwide audience in the digital world. Classical orchestras such as the Philadelphia Orchestra, London Symphony Orchestra, Berlin Philharmonic offer their concerts for free to a growing number of digital users.^[2] Musicians from around the world are helping each other holding benefit concerts online and raising money during COVID-19 pandemic. If social distancing continues throughout 2020 and ends up becoming a regular part of our way of life, forms of live artistic interaction would be affected and the offer of live streaming concerts could bloom in parallel to other forms of entertainment in services like Netflix or Amazon Prime. What is still unknown is how much the public is willing to pay for the virtual version of a stage show.

Technology for the future: education in a post-pandemic world

The COVID-19 is among us, forcing us to propose new strategies to reduce the economic impact on society. We already live in an era defined by a technological revolution, what some consider to be the *Fourth Industrial Revolution*, which is based on technological developments that include automation, artificial Intelligence (AI), machine learning (ML), the internet of things, big data and genetic science. The demand for ML and AI related technology has increased in the wake of this global crisis. This situation unprecedented in the history of humanity, and research on new technologies is essential. To this end, progress in scientific research and education is essential.

The speed of these changes is dizzying and they influence the way we live, our habits are changing, and those changes unquestionably affect teaching and the way we educate our children. Educational systems urgently need to prepare students for the challenges that await them in the society and work of the future. According to the Worldwide Educating for the Future Index (WEFFI) report, the most important areas that facilitate adaptation to these new challenges through pedagogical programs aimed at developing critical thinking, creativity, communication, entrepreneurship and digital skills^[3]. Therefore it is necessary to propose new pedagogical strategies that reinforce the skills to equip students with knowledge that can be applied in their future workplaces using these new technologies. These skills are based on the use of knowledge and intelligence to draw justified conclusions. This implies work on the intellectual and reflective process, enhancing critical thinking, and analytical capacity under its own criteria. According to the report published by WEFFI, many factors that will greatly influence the learning of future skills will take place outside the classroom. We are facing towards a future in which the use of digital technologies becomes an everyday occurrence.

When Data beats opinion: Machine learning & AI in music education

Educational programs must guarantee the learning of digital technologies, therefore it is extremely urgent to advance research in the development of new models of music technology software development. Generative Deep neural networks (DNNs) have demonstrated the

capacity for musical creation in the composition of new works, however less attention has been paid to the potential of these technologies applied to the field of music interpretation and teaching. It is necessary to readjust traditional models to the current reality using innovative mechanisms with technologies based on ML&AI applied to the study of music performance. These new technologies would assist music professionals from all levels, ranging from students to concert artists, invigorate the future of performing arts in a post-pandemic world by advancing cutting edge research in computational musicology and pedagogy.

Teaching the machine to play piano like piano masters, learning different piano techniques and musical styles of different historical eras from a large collection of recorded data can trigger unprecedented outcomes in the study of music performance. This tool will save years of time consuming human musicological work analysing hundreds of thousands of recordings and the results will not be filtered by the musical personality of the researcher. The analysis of massive numbers of data using ML&AI technologies might give information on performance practices that could contradict previous assumptions based on expert opinions. For the first time, musicologists will be able to work with objective data about performance practices in different musical periods. Students would be capable to evaluate their own performances in their practise studio using machine emulations, and therefore they will be able improve the efficiency of their practise sessions and achieve faster and better results. High-tech instruments such as Yamaha Disklavier or Steinway Spirio, integrate the most advanced recording and reproduction technology that exists today, and seem to be the best option in times of social distancing. These acoustic pianos can connect to the internet for online live streaming, recording and playback sessions, remote teaching, listening to the performances by famous pianists, and so on. Furthermore, AI systems can be integrated to these instruments to invigorate musical practices and creativity, offering innumerable possibilities that go far beyond the borders of our imagination.[\[4\]](#)

The road towards the “new normality”

We are facing one of the great crises in the modern world. In April 2020 Harvard University scientists published an article where they predicted that this infectious disease could remain active with us for the next 18 to 24 months affecting different geographic areas differently and involving intermittent periods of social distancing throughout this time period.[\[5\]](#) They were right, four months later we are already experiencing the devastating effects of a second rise in cases in Europe. By the end of August, the number of confirmed COVID-19 cases has gone beyond 24 million, claiming more than 800,000 lives worldwide[\[6\]](#). How is the people adapting their behaviour to the control measures taken by their governments in different countries? Can the rate of spread change depending on people’s behaviour? Certainly, this implies that society will inevitably have to learn to live with the virus, adapting to strict rules of physical distance and hygiene, forced to go a long way towards a new normality. What is certain is that the COVID-19 is not going to be the last worldwide pandemic, and possibly not the worst of them all. For this reason, it is necessary to prepare and adapt to new changes that are on the horizon. Although experts from different countries agree that humanity is not prepared for global pandemics, they also recognize that we are scientifically and technologically more advanced than ever in history.

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