On Digital Platforms and AI for Music in the UK and China

Nick Bryan-Kinns
Queen Mary University of London
London, UK
n.bryan-kinns@qmul.ac.uk

Zijin Li
China Conservatory of Music
Anxiang Rd. Chaoyang
Beijing, China
lzj@ccmusic.edu.cn

Xiaohua Sun
Tongji University
Fuxin Road 281, Yangpu
Shanghai, China
xsun@tongji.edu.cn

ABSTRACT

Digital technologies play a fundamental role in New Interfaces for Musical Expression as well as music making and consumption more widely. This paper reports on two workshops with music professionals and researchers who undertook an initial exploration of the differences between digital platforms (software and online services) for music in the UK and China. Differences were found in primary target user groups of digital platforms in the UK and China as well as the stages of the culture creation cycle they were developed for. Reasons for the divergence of digital platforms include differences in culture, regulation, and infrastructure, as well as the inherent Western bias of software for music making such as Digital Audio Workstations. Using AI to bridge between Western and Chinese music traditions is suggested as an opportunity to address aspects of the divergent landscape of digital platforms for music inside and outside China.

Author Keywords

Digital Platforms, AI, Music, UK, China, Cross-Cultural

CCS Concepts

•**Applied computing** → **Sound and music computing;** Performing arts; •**General and reference** → *Surveys and overviews;*

1. INTRODUCTION

Digital technologies play a fundamental role in New Interfaces for Musical Expression as well as music making and consumption more widely. The unique cultural heritages, economic, social, and political profiles, and divergent digital infrastructure and regulations around the world may have an effect on how these digital technologies are created and used.

In this paper we report on the differing landscape of digital platforms (software and online services and repositories) for music in the UK and China. The UK and China make compelling comparative case studies in this area as the UK is a leader in Music Industries and one of the few countries which is a net exporter [1], yet there is very little understanding of, or access to, the Chinese music market by UK music-technology companies. The Chinese sector is growing rapidly, and the Chinese government is encouraging the promotion of Chinese music performance and appreciation [7] including moves to popularize Chinese music in primary and secondary schools. Furthermore, the market for music consumption is large in China and rapidly expanding (in 2017, China's digital music industry reached RMB 58bn with 523m digital music users, up 9.6 percent year-on-year [12]). Moreover, research and development in digital music is well established in Europe and North America with international conferences such as the Sound and Music Computing conference being established in France in 2004, whilst it is in early stages in China e.g. the first China Sound and Music Computing Workshop was launched in 2013 by Fudan University and Tsinghua University[1], now the China Sound and Music Technology Conference. Similarly, research on digital music is notably advanced in the UK compared to China, for example using AI throughout the creative pipeline from generative music composition e.g. [4] and musical assistants e.g. Amper[2], to automated mixing and production e.g. LANDR[3]. Yet, at this time, Chinese companies such as Tencent and Alibaba are investing heavily in both AI and digital music in much the same way as companies such as the BBC and Google are doing in Europe and North America.

More broadly, there are deep rooted differences in contemporary culture and heritage between China and the UK which would affect conventions and methods of music production and consumption and digital platforms to support them. For example, social media such as Twitter[4] and Facebook[5] are ubiquitous in the UK in contrast to Chinese social media platforms such as QQ[6] and WeChat[7] and there are significant differences between the use of Twitter (outside China) and the Chinese use of the somewhat equivalent Sina Weibo[8] [11] which may also be reflected in the how music is consumed through digital platforms.

Finally, comparing the context and digital platforms for music in the UK and China sheds light on differences between China and other regions such as North America and Europe more broadly given the regulatory, cultural, and technological similarities between the UK and other European countries as well as North America. There are currently no surveys which explore the differences between digital platforms for music in the UK and China, nor between China and other countries more widely.

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[1] http://www.csmcw-csmt.cn/
[2] https://www.ampermusic.com/
[3] https://www.landr.com/
[4] https://twitter.com/
[5] https://www.facebook.com
[6] https://www.qq.com
[7] https://www.wechat.com/en
[8] http://weibo.com

Table 1: Workshop Participant Demographics

	Shanghai	London
Chinese	35	4
UK	9	12
Academia	18	11
Industry	22	4
Artists	4	1
Female	14	3
Male	30	13

2. METHOD AND RESULTS

Two three-day workshops on AI for Music[9] were held in 2019 including explorations of the landscape of digital platforms for music in the UK and China and building networks with participants from academia, music industry, and performing artists. Participants were recruited through email and social media networks and their participation in the workshop funded by government research agencies in the UK and China. The first workshop took place in Shanghai (44 participants) hosted by the College of Design and Innovation, Tongji University, China, the second took place in London (16 participants) hosted by the Centre for Digital Music, Queen Mary University of London, UK, see Table 1 for participant demographics. Both workshops were structured as two days of face-to-face workshop activities followed by one day of visits to local digital music technology centres. Workshops were facilitated by researchers from the UK and China. Workshop structure and pace was designed and maintained by the lead author with each day structured into four group activity sessions of 90 minutes with group report back twice a day. Data from workshops was collected through written and oral summaries from each group activity and documentation of brainstorming activities such as post-it note grouping.

Prior to the first workshop in Shanghai participants were asked to complete an online survey to collect their thoughts and opinions on current topics and trends on digital platforms for music in China and the UK to inform the workshop discussion topics, particularly focusing on AI for music as a key contemporary concern. This activity produced 33 topics of interest. Participants then grouped topics into themes using an online tool[10] resulting in five themes which were used to as prompts in the workshops: AI for composition and music generation; Production workflow; Catalogue management and recommendation systems; IP management; Cross-cultural challenges and opportunities.

Two key areas of comparison between the UK and China explored in the workshops are reported in this paper: i) broad comparisons between the context of music making and consumption; ii) comparisons of use of digital platforms for music creation, production, and consumption.

2.1 Context of Music Making

On the first day of the workshops participants developed a high level comparison between music making and consumption in the UK and China by brainstorming key differences between China and the UK's music sector broadly split into groups based on the themes identified prior to the workshop. Participants worked in four groups, each examining one theme and the cross-cultural similarities and differences. At the end of the day participants reported back their findings. On the second day of the workshops participants undertook a thematic grouping using post-it notes and large

whiteboards to group their findings into key topics which are illustrated in Table 2.

In group discussions and reflection at the end of the workshops participants identified that these differences lead to barriers to: the adaptation of Western content for Chinese audiences; the consumption of Chinese content by Western audiences; and the production of traditional and experimental Chinese music using existing digital music workflows. These barriers are largely due to the inherent bias of contemporary music workflows, and also practices, norms, and technologies that favour Western musical traditions. This makes it difficult to, for example: access and operate in the music sector of the Chinese creative industries from outside China; access, understand, and exploit Chinese music and musical instrument collections; and to treasure, embrace, and *reimagine* Chinese intangible cultural heritage in the global digital age.

Moreover, participants identified that the level of technological and design innovation in the music industry in China is low compared to the UK, focusing on consumer consumption such as streaming services, rather than the design of new products, services, and music production workflows. This also reduces the contribution of the digital music sector in China to other Creative Economy sectors such as film making and gaming, for example there are fewer Chinese systems for generative music in computer games.

2.2 Landscape of Digital Platforms for Music

On the second day of workshops, participants identified 104 digital platforms used in the UK and China for music making and consumption based on their own use and knowledge of such platforms. Two key differences between China and the UK were found in this review: i) the intended user of the software - whether amateur, semi-professional, or professionals; and ii) which stage(s) of the UNESCO culture cycle [9] of creation, production, dissemination, exhibition/ reception/ transmission, consumption/ participation the digital platform was used. The culture cycle was used as a framework to structure the analysis of the use of digital platforms given the wide range of platforms identified. These differences are summarised in Figure 1 which shows the proportion of kinds of intended user (amateur, semi-pro, pro) in each of the culture stages for China and the UK with key differences summarised in Table 3 for ease of reading. Classification of which platforms were used in which stages of the culture cycle was undertaken by groups who reported back their assessment and merged their classification with other groups until a mutually agreeable and stable classification was established as reported in Figure 1. It should be noted that the second day in both workshops included networking and collaborative project ideation which for brevity is not reported in this paper.

Participants found that aside from core professional music software such as Logic Pro[11] and Pro Tools[12], which as noted above are inherently biased toward Western musical traditions and norms, the digital platforms used for music making and consumption in the UK and China were largely divergent. For example spotify[13] is a digital platform for streaming music used extensively in the UK, but it is not used in China. An equivalent streaming platform in China is NetEase Cloud[14] which is not used in the UK despite being available for download there. No doubt much of this divergence is due to licensing and copyright differences be-

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[9] http://ai4music.eecs.qmul.ac.uk
[10] http://well-sorted.org

[11] https://www.apple.com/uk/logic-pro/
[12] https://www.avid.com/pro-tools
[13] https://www.spotify.com/uk/
[14] https://music.163.com

Table 2: Outline comparison between music context in the UK and China

Topic	UK	China
Automatic mixing	Predominantly used in professional production systems	Predominantly used in karaoke apps
Digital Audio Workstations	Tailored to Western music production and styles	Lack of Chinese tools for audio production
Audio libraries	Extensive, high quality libraries of audio from Western instruments	Lack of high quality an accessible recordings of Chinese instruments
Copyright infringement detection	Advanced audio fingerprinting technologies	Advanced audio fingerprinting technologies
Royalty payments (e.g. for streaming services)	Per track payments	Per label payments
Music performance theory and practice	Well documented	Learnt by praxis
Tools for music education	Extensive tools for learning and practicing in Western musical styles	Lack of tools for learning Chinese musical instruments and performance style
Audio consumption preference	HiFi systems	Mobile phone

Table 3: Comparison of music software produced in the UK and China

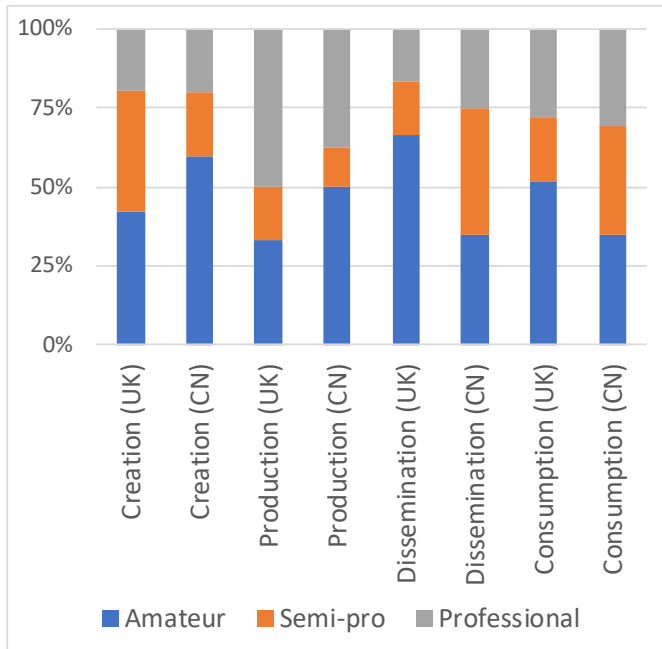| Stage	China vs. UK
Creation	China: more emphasis on amateur; UK more focus on semi-pro
Production	China: more focus on amateur; UK: more focus on professionals
Dissemination	China: more focus on semi-pro; UK: more focus on amateur
Consumption	China: more focus on semi-pro; UK: more focus amateur

Figure 1: Landscape of Music Software produced in the UK and China

tween the UK and China. One notable exception that may cross over from China to the UK is TikTok[15] which was initially launched in China and has since become popular across the globe.

In China, there is a large music consumption market given the large population, which may explain why the biggest three music companies in China (Tencent, Alibaba and NetEase) primarily focus on playing songs on their digital platforms rather than supporting semi-professionals and processionals in music making and production. For instance, the Chinese company Tencent Music recently claimed to have 800 million users in 2019, much the same as the Chinese company NetEase Cloud. In contrast, independent musician users on these platforms are only 100,000[16], approximately just 0.001 percent of the users.

3. REFLECTIONS

Through two workshops with professionals and researchers in the music sectors of China and the UK we found that both the context of music making and consumption, and the digital platforms used were divergent between the UK and China. We found more focus on amateur music creation in Chinese digital platforms (e.g. pitch correction for karaoke) compared to the UK, and more emphasis on professional music production technologies in the UK. Two key reasons for these differences were identified: i) the inherent bias of professional music production platforms to Western musical styles, and ii) the preference of mobile phones as the platform of choice for music consumption in China.

3.1 Opportunities: AI for Music

Current trends in AI research were identified by participants as possible solutions to some of the barriers to the use of contemporary music production tools for Chinese music making and production. It should be noted that the identification of these opportunities comes in part from participants' knowledge, experience, and interest in AI for music. The workshops highlighted that the rapid growth and acceptance of AI technologies in music making and consumption offer opportunities to explore support for the creation, access, and consumption of large data sets of Chinese and Western music in radical yet culturally sensitive and responsive ways.

Firstly, AI may help to reduce the imbalance between music production and consumption between China and the UK

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[15] https://www.tiktok.com/en/
[16] http://www.chinambn.com/show-6123.html

where most professional music tools have inherent Western biases. For example, participants noted that a practical way to address this may be to use AI-based style-transfer techniques (cf. [3]) to support cross-cultural content creation, production and consumption, allowing us to bridge the gap between contemporary music technologies and Chinese music traditions. Indeed, questions of how to create and tailor creative content across cultures are currently hot topics in both current academic research (e.g. [2]) and industrial research and design. This may bring new life to Chinese traditional music through new technology, and foster greater access to Chinese music both in the UK and in China, especially for younger generations.

Secondly, workshop participants identified that we may be able use adaptive music techniques to reduce the barriers to creating Chinese music with contemporary music production tools. Again, this would help to open professional Chinese music to the wider use of digital music platforms going someway to redressing the imbalance of professional music production in China. Adaptive music techniques also offer the opportunity to create new products and services at the intersection of Chinese and Western music. For example, variPlay [8] was discussed in the workshop as a UK produced adaptive-music production tool and player which could be refined to support cross-cultural music production and consumption. Similarly, Composer4Everyone [6], a Chinese social media app that uses AI based rearrangement to automatically generate music in Western styles of pop, electronic, and classical from an audio snippet is an early exemplar of the potential of AI supporting the intersection of Chinese and Western music.

Thirdly, the workshops identified opportunities for using machine learning techniques to facilitate greater access to Chinese music datasets which were noted to be largely inaccessible outside China due to language and cultural barriers. This again would help with incorporating richer and more nuanced Chinese musical element in professional music production tools and at the same time provide opportunities for Western music producers to access existing Chinese datasets. For example, some workshop participants are already exploring musical instrument playing technique detection based on Fully Convolutional Networks(FCN) and applying this to analysing Chinese Bowed-Stringed Instruments in the Dataset of the Chinese Music Instrument(DCMI) [10], starting with the Erhu, a popular Chinese bowed-stringed instrument. Based on the same DCMI, researchers are undertaking analysis and modeling of timbre features of the sound of Chinese musical instruments using support vector machines(SVM) [5], both of which have the potential to open these datasets to researchers and musicians outside China.

Finally, it was noted in the workshops that the largest Chinese technology companies have already realized that they need to be developing a whole digital music ecology to retain their market advantage and rebalance the Chinese music production ecosystem e.g. addressing the fact that there are no Digital Audio Workstations made in China. This offers an opportunity for global collaboration on development of Digital Audio Workstations (DAWs) and DAW plugins designed for the Chinese music making market.

4. SUMMARY

In workshops of music researchers and practitioners held in the UK and China we found differences between the context, use, and landscape of digital platforms for music in China and the UK. There are opportunities for using AI to bridge across Chinese and Western musical traditions and digital platforms. There are also opportunities for developing dedicated software and plugins for Chinese music makers which would increase the access to, and consumption of, Chinese music in China and across the world.

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