

www.Vmus.net: An Online Platform for Musical Performance Studies

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In this report, I am going to introduce an online platform for musical performance studies which is still under further construction. The first thing I will mention is the related background.

I. Background: A Conception Postponed for 10+ Years

As many researchers present today, I have been using computer assisted methods to analyze recorded music since a decade ago. In 2003, I made a tool to analyze and compare different performances for my master's thesis. This small tool was only designed for myself and looked very primitive and ugly, while it could be applied to generate the most frequently-used graphs such as tempo-dynamic curve, IOI deviation curve and performance worm with very high efficiency. For example, in my doctoral dissertation, I analyzed hundreds of historical recordings and shared all the results online just in a few weeks without much effort. And because this tool was programmed in actionscript, a computer language for online applications and games, there was a possibility to make this tool fully available online ten years ago. But it was not until 2013 could I have time to realize it.

II. Necessity: An indispensable in the Era of Web 2.0, Cloud Computing and Big Data

Why I did not do it earlier is partly because that I thought there had already been so many powerful tools such as Sonic Visualiser. But gradually, I realized that there were still a few problems that could not be thoroughly solved by this kind of traditional software.

1. These offline tools are still too sophisticated for musicians and musicologists. Most of them even have difficulty installing the software not to mention using it properly.
2. Some kind-hearted musicologists wrote detailed tutorials for their colleagues. But even if they could follow the complicated instructions, spending a whole day on a five minutes' music piece would be extremely boring and painful.
3. Therefore, the application of such computer assisted analysis is still not popular enough among researchers. The existing studies are mainly restricted to certain categories of keyboard music and many efforts are wasted by repeated processing of the same pieces.

So, in an era when we rely and share everything on the internet, an online tool for musical performance studies is apparently indispensable. This online tool should be very easy to access for everyone and should make the analytical process much more user-friendly with the highest efficiency. Most importantly, this tool will enable researchers to share data, work on projects together remotely; and potentially accumulate a huge database for future data mining.

III. Usage: Generating Tempo Curve or Performance Worm in Just a Few Minutes

I would like to spend the next few minutes in demonstrating how to use this online tool. The first step is to just open a website at www.vmus.net.

The front page has three columns: the left column is a list of recent frequently analyzed music uploaded by users; the middle one is a list of newest analytical results and the right column has a slideshow of the recent uploaded screenshots and twitter messages. New users usually start with uploading their own music and this obviously needs an account. You can either sign up a new account or log in with one of your social accounts such as twitter or facebook.

Then you can upload your music and start to analyze. For example, this mp3 file of Grieg's violin sonata. It will usually take several seconds to upload the music and generate a waveform which is determined by the speed of your computer and the internet connection. Currently my server is located in Hong Kong, so probably the connection is not very fast in the UK. Now we can try to play the music and probably add a layer of spectrogram as well which will facilitate the following reverse conducting work. The next step is quite similar to the tapping along process in Sonic Visualizer. But we need to set the music related parameters first. For example, in this piece, the uploaded music is in two time and starts from the first bar, so obviously "Beats per bar" should be two and "Bar offset" should be zero. Because there is an upbeat before the first bar, "Beat offset" should be minus one. The advantage of setting these parameters before hand is to correlate the tapping beats with the score.

I believe most people will not have any difficulty in this tapping along process, so I just make a few examples. Apparently, the markers I made are not precise enough. But we can slow down the playback; enlarge the display and edit the markers with different tool buttons such as move button or delete button. It is really convenient and I prefer to use shortcut keys to further boost the efficiency. Usually, five minutes' music can be done within 20 minutes and you can also save the result for future editing or sharing with others. For saving time, I will just load a prepared result of this piece. Then we can generate tempo related graphs with the beating information. This is a kind of tempo-dynamic curve which I recommend to use. The vertical axis represents tempo in BPM and bar numbers are shown in the horizontal axis. The red dots are unsmoothed local tempos and the black curve is smoothed tempo trend. The grey band around the tempo curve means relative dynamic or loudness. I think this kind of graph might be the most practical way of representing the correlation in different levels between tempo and dynamic. And the most attractive way to do this must be the performance worm. We can immediately switch tempo-dynamic curve to performance worm. And we can also change the window size parameter for observing the different trends in different hierarchies.

After we have done all of these, probably the next step is to just copy the graphs into your research papers or upload and share the screenshots on social media with others. You can always keep and manage your own items and even participate other analytical works you are interested in.

Please refer to: http://www.vmus.net/score/VmusNet_Users_Guide.pdf

IV. Future: All-in-One Solution Easily and Equally Accessible by Everyone

Although currently vmus.net is still under construction, it has already been an alternative solution for Musical Performance Studies which is obviously much more efficient with potential possibilities. In the future, I am planning to improve this tool in many aspects including:

1. Further boosting the efficiency by optimizing the algorithm.
 2. Adding new functions such as magnetic alignment.
 3. Allowing users to keep their own private data.
 4. Upgrading cloud servers to accelerate download and upload process.
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V. Significance: Integration of Musicological and Empirical Approaches

Actually, empirical approaches such as tempo-dynamic curve can be applied in many different contexts and I even use them in music reviews. But the ideal precondition is that no one dislikes these approaches because he or she does not fully understand them. Potentially, vmus.net could make analytical tools easily and equally accessible by everyone, which might make computational analysis on recorded music much more popular among researchers, teachers and learners.

Furthermore, I believe that one of the most important innovations in Musical Performance Studies and Musicology is to seamlessly integrate the traditional Musicological methods and latest empirical approaches together. I really hope that vmus.net could facilitate such an inevitable trend.

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Biography:

Yang, Jian obtained his bachelor's, master's and doctoral degrees in engineering, violin and musicology respectively and is an associate professor and deputy director of the National Experimental Teaching Demonstration Center of Digital Media Art at Nanjing University of the Arts, China. He is also the director of China Musicology Network, council member of Society for Western Music in China and the leader of Nanjing Philharmonic Orchestra. He gives concerts regularly and has published many award-winning articles, books, CDs and apps. Yang's sojourn in Cambridge as a visiting scholar of Music Faculty and St John's College since Oct. 2013 has led to media coverage in outlets such as BBC, Cambridge University Website, Cambridge News and CCTV (China Central Television). Recently, he was awarded the First Prize of the 14th Fok Ying Tung Education Foundation Outstanding Young Teachers of Higher Education, one of the most recognised prizes for young scholars in China.

