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Agile Seed Funding Report, Round 2 2019-20

“Digitizing and translating figured bass into chord labels for Bach chorales in symbolic formats”

With the help of CIRMMT Agile Seed Funding as stipend, we managed to finish "The J. S. Bach Chorales Figured Bass Project" with rewarding research accomplishments. As planned, we have released the first database of 139 Johann Sebastian Bach four-voice chorales including digitizing 139 Johann Sebastian Bach four-voice chorales, based on the Neue Bach Ausgabe (NBA) critical edition, that contains figured bass annotations in musicXML \*\*kern, MEI, and MIDI formats. To the best of our knowledge, this is the first dataset with figured bass annotations that is publicly available, offering great potential for computational studies. This work has been accepted as a paper by Music Encoding Conference 2020.

We also used machine learning to teach computers to arrange figured bass automatically. With a comparative study of using different feature combinations and machine learning models, our best-performing model achieved an accuracy of 89.2% on our dataset. The generated figures will not only enable performers to improvise the basso continuo accompaniment for the remaining Bach chorales that are unfigured, but also allow us to study the repertoire of J. S. Bach chorales as a whole, empirically test theoretical predictions, and conduct exploratory studies on figured bass. This work will be submitted as a paper to the International Society of Music Information Retrieval (ISMIR) Conference 2020. Furthermore, we aim to build a database with figured bass annotations accessible via a single, searchable interface, and this proposal has recently been awarded the CIRMMT Student Award 2020.

Finally, we built a heuristic algorithm that translates figured bass into chord labels, providing another source of annotations for harmonic analysis. This research is particularly intriguing, since figured bass provides not only a particular interpretation of harmonic rhythm, but also other types of harmonic syntax, such as the interpretations of non-chord tones and chord qualities, giving us the key to Bach's thoughts on harmony. This is undoubtedly of great interest for future research in areas such as music theory, musicology, and automatic harmonic analysis.