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Abstract

The composition of new music for guitar can involve two issues: 1) composers that have no experience with the instrument might not be able to compose a score that is idiomatic, accommodating and highlighting the unique characteristics and features of the conventional guitar techniques; and 2) composer-guitarists might repeat clichés that can origin from their performance habits. In this respect, the aim of this paper is to answer the following questions: can distant reading methods help in defining strategies for composing new idiomatic music for guitar? If so, how they can be defined and implemented? Distant reading methods allow to analyze quantitatively and automatically large amounts of data. In fact, they are big data analytics strategies that were introduced for the purposes of literary insight and that rely heavily on computer programs. The authors used them to analyze a canonical piece for classical guitar in order to extrapolate knowledge about its idiomatic features, mostly in term of left-hand behaviors. The results were consequently examined and structured with the purpose of mapping idiomatic patterns and to set rules for defining new ones accordingly. The achieved knowledge was employed in the composition of new piece for guitar, so to test the efficacy of the approach both from the composition and the performance points of view, checking how and why it fostered creativity and granted playability.

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Composing idiomatic music for guitar using distant reading strategies[1]

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The composition of new music for guitar can involve two issues: 1) composers that have no experience with the instrument might not be able to compose a score that is idiomatic, accommodating and highlighting the unique characteristics and features of the conventional guitar techniques; and 2) composer-guitarists might repeat clichés that can origin from their performance habits. In this respect, the aim of this paper is to answer the following questions: can distant reading methods help in defining strategies for composing new idiomatic music for guitar? If so, how they can be defined and implemented? Distant reading methods allow to analyze quantitatively and automatically large amounts of data. In fact, they are big data analytics strategies that were introduced for the purposes of literary insight and that rely heavily on computer programs. The authors used them to analyze a canonical piece for classical guitar in order to extrapolate knowledge about its idiomatic features, mostly in term of left-hand behaviors. The results were consequently examined and structured with the purpose of mapping idiomatic patterns and to set rules for defining new ones accordingly. The achieved knowledge was employed in the composition of new piece for guitar, so to test the efficacy of the approach both from the composition and the performance points of view, checking how and why it fostered creativity and granted playability.

Introduction

The creation of new music for a solo instrument is sometimes problematic, especially when it concerns the guitar and composers that have never played it and have no specific experiences with the instrument itself or its repertoire. According to composer Magnus Andersson, "the guitar has throughout its history been known for being, unless you are a guitarist, a very difficult instrument to write for – even to the point of destroying those attempting. This view still, in many ways, holds true" (Andersson as quoted in Josel and Tsao, 2014, back cover). While such an unconditioned approach could be useful in triggering new ideas and overcoming the boundaries of traditional techniques and recurring musical instances, at the same time it can result in pieces of music that could not be perceived as idiomatic by a performer. Furthermore, idiomatic writing, that is, music composed for an instrument that accommodates and eventually highlights its unique characteristics and features, could be the actual target of some composers approaching the instrument, so to facilitate the reading and the playability (and thus the supposed appreciation and spread) of the written score. Although idiomatic writing could be an easy task for composer-performers with a specialized instrumental proficiency, it could be a real issue for everyone else, even more so if they are trying to compose a score that must adhere to a specific difficulty level. On the other hand, sometimes composer-performers are in danger of repeating cliches that come out of their performance habits.

Possible partial solutions of the aforesaid issues have been studied by the authors implementing distant reading methods: approaches born in the context of literary studies that apply computational methods to literary data for the purposes of literary history and theory. Their strategies can be implemented in other

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cultural areas, including music, targeting for instance musical scores instead of texts. In this context, this paper aims to answer the following general questions, targeting a case study instrument, the guitar:

1) Are there any musical passages and techniques that a guitarist could feel at the same time idiomatic and new?
2) Can mathematically informed distant reading methods help in defining strategies for composing new idiomatic music for guitar? If so,
3) How they can be defined and implemented?

Towards a quantitative approach to idiomaticity

"Idiomatic music reflects what an instrument can and cannot do, what it does willingly and what it does reluctantly" (De Souza, 2019, p. 77). "Musical passages can be characterized as more or less idiomatic depending on the extent to which the music relies on instrument-specific effects" (Huron & Berec, 2009, p. 103). Moreover, "the mechanics of musical instruments commonly influence how the music itself is organized" (Huron and Berec, 2009, p. 103). In fact,

> instrumental idioms involve characteristic patterns that cannot be predicted by grammatical rules alone. When speaking a foreign language or composing for an instrument I do not play, I may easily construct utterances that are grammatically correct but stylistically nonsensical, and such mistakes may be identified only with reference to standard practice. (De Souza, 2019, p. 77)

Furthermore, "In idiomatic performance, then, speakers or players do not select every word or note individually; they also draw on larger, ready-made sequences. [⋯] Idiom must involve both instrumental affordances and players' habits" (De Souza, 2019, p. 77). Accordingly, idiomaticity is not a binary nor an objective concept: idiomatic music for guitar seems to be implicitly referred to the traditional repertoire of the instrument, but it is rather very much related to the repertoire actually known by an individual performer. The fundamental idea behind this research is to set a corpus of scores that are considered idiomatic by the guitarist(s) to compose for and to analyze it quantitatively, trying to intercept some of its idiomatic features. For this purpose, the authors developed specific distant reading strategies.

Distant reading methods try to understand a corpus not by studying its particular texts separately and by having humans reading them, but by aggregating and analyzing them as massive amounts of data with a quantitative approach, usually computerized. They are quick and automatic strategies in the context of quantitative studies as they offer mathematical expressions of quantitative relationships of the phenomena or of the corpus (i.e., a set of information of any kind, from literary texts to musical scores) analyzed. The term *distant reading* is generally attributed to Italian literary historian and theorist Franco Moretti (2000). Since such methods sometimes rely on big data, they have something in common with AI methods in algorithmic composition (for a survey, see for instance Fernandez and Vico, 2013). However, the idea behind distant reading methods is not related to the one of deep learning for an automatic creation process, but rather to a refined quantitative analysis of the work(s) taken into consideration, to be used by scholars to get new knowledge. The *distance* from the corpus – in our case the distance between the composers and the corpus of guitar music that is far from their understanding – is in such strategies considered to be

> a condition of knowledge: it allows you to focus on units that are much smaller or much larger than the text: devices, themes, tropes—or genres and systems. And if, between the very small and the very large, the text itself disappears, well, it is one of those cases when one can justifiably say, Less is more. If we want to understand the system in its entirety, we must accept losing something. We always pay a price for theoretical knowledge: reality is infinitely rich; concepts are abstract, are poor. But it's precisely this 'poverty' that makes it possible to handle them, and therefore to know. This is why less is actually more. (Moretti, 2000, pp. 57–58)

In the view of this research, the *poverty* lies in the atomized musical materials that are obtained which, however, can be handled and re-composed due to the idiomatic features – the *knowledge* – that have been intercepted.

In fact, against this theoretical background, the aforesaid corpus is analyzed through computerized automatic distant reading methods so as to infer specific elements of its idiomaticity, more specifically feasible left-hand fingerings and transitions between them. To this end, one of the authors of this paper (Giovanni Albini) developed a software in Python using music21 (Cuthbert and Ariza, 2010) and NetworkX libraries (a free software originally developed by Aric Hagberg, Pieter Swart and Dan Schult, released under the BSD-new license) that accepts the corpus as a folder of files in MIDI and/or Music XML formats.

The formalization of left-hand fingerings

The scores included in the corpus are reduced to a succession of musical chords through a *salami slicing* method, that represent a musical section as a list of pitch simultaneities, named *slices*. The reduction of a single bar of music to such slices is shown in Figure 1, transformation A. The basic assumption is that if a slice is in the slice list then there must be a left hand fingering to make it possible that is known by the guitarist. Transformation B shows then how a list of eight possible transitions between them (one for each couple of consecutive chords) is obtained. Again, if a transition is in the list of transitions, then such passage is possible as well. The software counts the occurrences of each slice and of each transition intercepting the most recurrent ones, which are possibly the most idiomatic. In this context, the corpus itself defines the targeted idiomaticity, along with its schemes and levels of difficulty.

If the corpus is one of a limited size, the two lists could offer not enough material for developing new compositional ideas and interesting, long sequences. In addition, to limit the composition to them would also limit it to a set of defined sonorities. Therefore, two kinds of variations have been taken into account:

1) the intermission of open strings chords, so to give the time to jump to a distant fingering (two examples are shown in Fig. 1, C1); and
2) the rigid translation of the fingering vertically and horizontally along the keyboard (see Fig. 1, C2).

The latter, along with the irregularity of the standard tuning of the guitar (characterized by ascending perfect fourths but with a single major third between the third and the second string), makes possible to reach different (and hopefully new) sonorities.

The musical test

Figure 2 shows the score composed by one of the authors employing the software on a single, short piece of music – Leo Brouwer's (1972) *Fugue no. 1* – and getting the source elements to compose with. The output set of elements was made up of a total of 334 different chord (hence fingering) transitions, of which 60 are not trivial transitions between or including one-note chords. The composition process started from these source elements and the composer's creativity was fostered by them, looking for musical ideas while browsing and combining them. The new music had been then studied and performed by one of the authors of this paper (Matilde Oppizzi), who had Brouwer's composition in her repertoire and confirmed the ease of learning the new score as well as the pleasure of relating with music that sounded new.

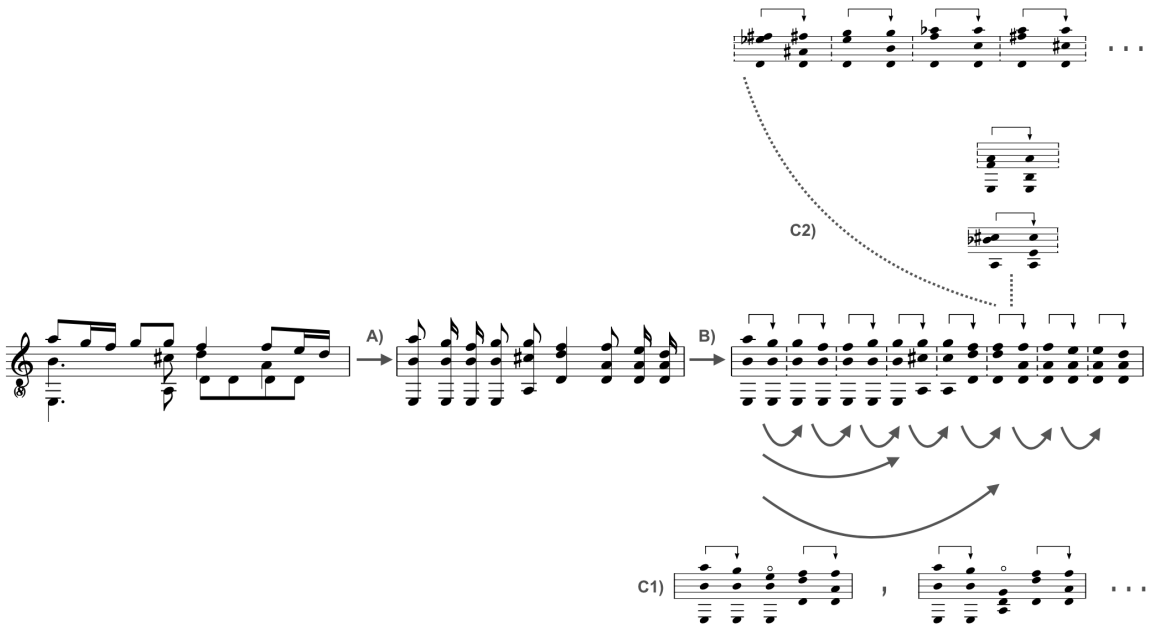

Figure 1 Example from the authors' analysis with the salami slice method (reads left to right): a single bar of music for guitar is reduced to a succession of musical chords (A); each transition is singled out (B); admitted variations for the use in an actual composition process were considered: the intermission of open string chords (C1) and the rigid translation of the fingering vertically and horizontally along the keyboard (C2).

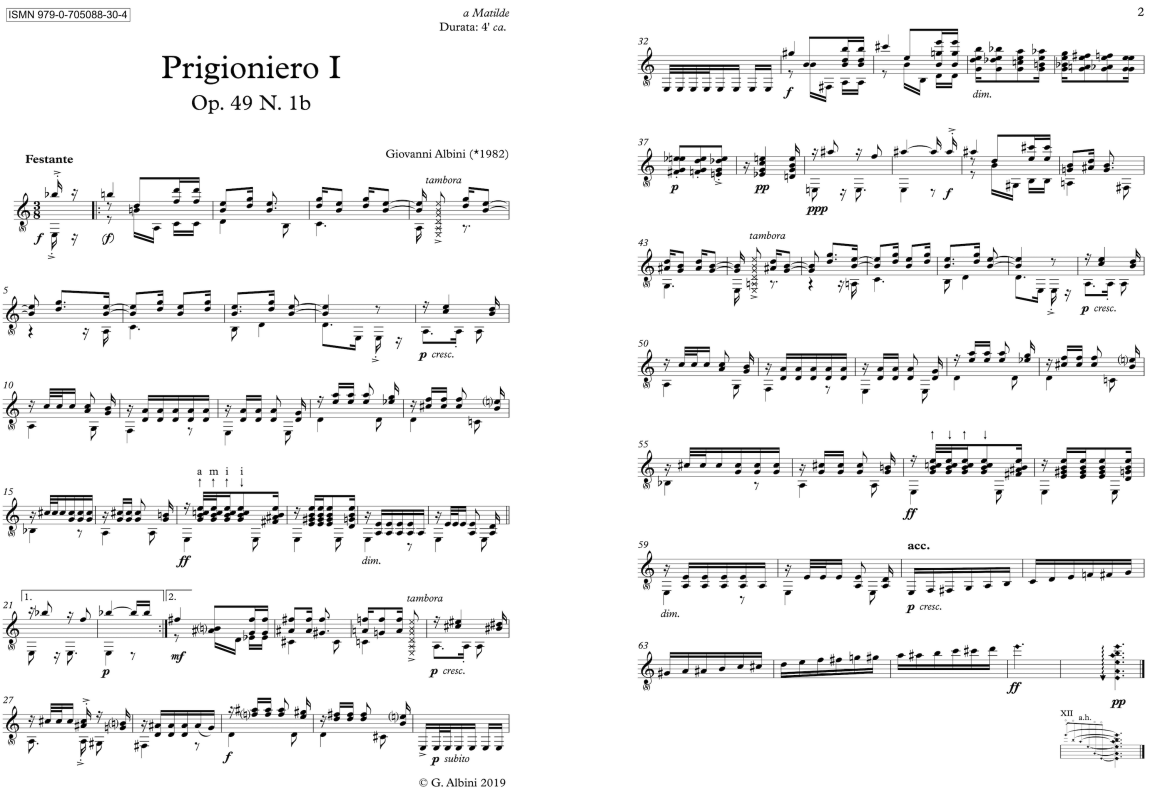

Figure 2 Score of Giovanni Albini's *Prigionero I* for guitar composed with the material the software outputted when analyzing Brouwer's *Fugue no. 1*. Reprinted from *Prigionero I* by G. Albini, 2019, The author.

Conclusions

The method hereby described has proved to be useful and effective and has shown many advantages, being:

1) automatic and quick;
2) working even on huge corpora, possibly mixing authors, styles and genres; and
3) offering a dictionary of chords and a grammar for using them without the need of specific knowledge about the guitar technique for the composers. Left-hand patterns can be achieved by analyzing the music itself without the need of data about the fingerings.

However, some issues still need to be tackled to improve the software. In fact, music notation refers to conventions that do not always show the actual music content: for example, in the case of arpeggios in which only the attack of the notes is given and not their actual duration. Moreover, sometimes the same chord could be performed with different fingerings: this might lead to new sequences of chords that are not possible or that do not show the required difficulty. Future developments should aim then to refine the algorithm contextualizing the fingerings involved and improving the usability of the software. Furthermore,

> mathematics is not a necessary requirement – and certainly not a sufficient one for granting some sort of artistic quality or relevance – in the variety of skills, tools and knowledge of a composer. However, [...] in the context of specific aims, mathematics can be a useful and reliable option that can lead to unique findings, outputs and aesthetics at different levels: from helping to study and understand musical elements, to assisting to shape them; from being an autonomous place of inspiration for triggering new ideas on music and to deal with its elements, to be put as the foundation of new aesthetics. (Albini, 2019, pp. 57–58)

In this context, automatic systems of composition and evaluation (Loughran and O'Neill, 2016) based on the method described could offer further interesting developments.

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Giovanni Albini (b. 1982) composer, ukulelist and music theorist, is a tenured professor of Music Theory, Solfège and Music Perception and Head of Research at the Conservatory of Alessandria (Italy), where he has also started the first Italian ukulele university class, and he teaches Composition at the Bachelor's of the Conservatory of Lugano (Swiss Confederation). He holds a BM, a MM and a PgD in Composition, a BS and a MS in Mathematics and a MM in Classical Guitar. He received his PhD in music composition from the Estonian Academy of Music and Theatre in Tallinn.

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Matilde Oppizzi (b. 1991) graduated with top marks at Conservatory of Pavia. She performed in concert halls and theatres all over Italy, Europe and in the USA and Canada, both as soloist and in chamber music ensembles, giving also lectures in many prestigious Universities and Institutions. She has been member of Kythara Consort – the first ever founded guitar orchestra in Italy – as first guitar and as soloist. With harpsichordist Riccardo Lorenzetti has founded Chordis Duo, a reference ensemble for modern and contemporary music for guitar and harpsichord.

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