





Jazz Standards: From the Manuscript to Multiple Possibilities Through Computation

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Abstract. In recent years, Optical Musical Recognition systems and processes have been extensively researched and developed. Recently, new visions have been provided that include handwritten music. However, most of the works developed focus on pneumatic, mensural, or cultured music, and hardly any examples of noncanonical or closer to modern music can be found. The present proposal tries to be a presentation and a declaration of intention of a larger project, which, hopefully, will end in the presentation of a PhD thesis. It is intended to contribute an idea of how to include a musical genre such as Jazz, and its paradigmatic handwritten sources, in the Optical Musical Recognition research field (until now excluded) using tools and procedures previously used, adapting them, and concluding in what is the best way and what are the ways to carry it out that end. Not concluding only in the mere transcription but in all the possibilities offered by digital music editing and analysis.

Keywords: Optical Music Recognition (OMR) · jazz standards · musical digital edition · musical analysis

1 Introduction

The materialization of music implies the capture and recording on a physical support, through different means, be it sound or its textual representation. The sound recording, at the time of its formalization, is easier compared to notational writing. However, the sound contains a unique interpretation that cannot be reproduced the same at any other time. The score, on the other hand, includes certain guidelines and minimums that the composer wants to convey, as the backbone of the work, leaving a space open for interpretation [8].

Although with the technological tools that have been developed for decades, digital musical writing has been significantly facilitated [10], there are several contexts, cultural spheres and agents of the musical production chain that continue to favor manual writing of music on paper, one of the most paradigmatic cases is the case of jazz musicians. This genre has been in the spotlight in many investigations and although it has usually been studied as an ethnomusicological phenomenon, giving importance to its sociocultural context, in this investigation the focus is on purely musical aspects. It is also common to find studies on improvisation, interpretation, learning and its harmony since they are

other characteristics of this genre [9]. The project proposed below uses music as a thematic nucleus to unite two aspects; the traditional form of musical textual expression and the benefits and potential offered by technology; not only for its transcription and its consequent accessibility and conservation, but also for its treatment, analysis, and study. The reduction to the “minimum common music” that can be written on paper and the peculiarities mentioned above, make the jazz standards an object of study that perfectly synthesizes these questions and allows centralizing the objectives of the proposed research [3].

Another fundamental pillar of the work is the impulse that the OMR (Optical Music Recognition) as a transcription instrument and the digital academic edition of music cause in the treatment of the humanities and digital musicology. In recent decades, studies have been carried out that demonstrate the potential of OMR and tools have been created for this purpose. In Rebelo says that you can see a repertoire of the areas and functions that have been covered so far [13]. One topic discussed, among others, is the use of OMR in musical information retrieval (MIR) and mensural or pneumatic transcription [1] which, although it is far from jazz musical notation, has a procedure that it is easily adaptable to the field of study of this work. Similarly, languages have been developed that act as a bridge between these musical data and machine- and human-readable information [2].

The digital edition grants access to a large amount of information, allowing its management, in an affordable and viable way, for analytical purposes: evaluation of the chord transcription algorithm and sound [4], the creation of a database of scores [11] musical pattern recognition [5] or computational music analysis [16]. The present project has a heuristic character. It aims to contribute to developing a procedural model, based on practical and adaptive experience, taking as a reference the research that accompanies the entire process, from transcription, to editing, to treatment and analysis. The conclusive information can be used to provide knowledge in the academic field, using jazz music as an element that synthesizes and brings together all these issues in a highly significant and stimulating environment from a musicological and cultural point of view.

The last thematic axis contemplated by this project is related to the new contingencies offered by science and technology in the humanistic field. Tearing down the wall that has traditionally separated the humanities from them allows new paths to be opened that, due to human, economic or temporary resources, had not been possible. It promises greater accessibility to knowledge, both by disseminating and creating it, it provides a way to include the consumer in the process and make them a collaborator [12], and it designs a transdisciplinary, multidimensional, and transmedia research process [14].

2 Hypothesis, Objectives, and Methodology

2.1 Hypothesis

The starting hypothesis is that new technologies allow for a change of paradigm in the object and the methodology of study. The entrance to the digital world in the musicology allows addressing issues that previously could not have been given response. The use

of the OMR does not corrupt the traditional pencil annotation ritual and paper, excluding the digital out of the creative process and using the technologies posteriori for the conservation of the object, its study, its analysis, and its dissemination of this.

In this way, the artistic traditionality and the potential of the technologies that characterizes the digital humanities.

2.2 Objectives

The main objective is to identify the way to analyze the Jazz Standards handwritten by technological means and adapt them for the educational field.

To do this, they must previously meet, necessarily, other objectives that will be intrinsically linked to the phases of the project.

Conceptual and theoretical phase

- Identify, know, and analyze the theoretical foundation in which the OMR transcription process is circumscribed.
- Design a selection of works that constitute a significant corpus for the research development.

Experimental and technological phase

- Edit jazz music digitally and academically.
- Know and analyze the OMR models to be able to apply the selected corpus.
- Analyze the different languages that can be used to make them readable by machine and synthesize or develop the ideal for this purpose.
- Select the functionalities of these languages, review them, adapt them to the type of music notation.
- Identify the necessary tools for musical analysis from a language digital of the musical object.

Conclusive and adaptive phase for the main objective

- Identify practical and potential functionalities of the application of this process theoretical in the educational field.

2.3 Methodology

The methodological apparatus proposed for this research process consists of two phases that are directly related to the main objectives. At the end of the section, an image of a sketch with the most significant milestones to be achieved in the project is added (Fig. 1). Although this design is based on the knowledge discovery process in Big Data, it is adapted to the project [15].

Theoretical contextualization

- Carry out a systematic review of the literature [7] on optical recognition of music in Jazz, its digital edition, and its analysis.

First, a theoretical methodology that seeks to expose and understand the context of the concepts that are the protagonists of this thesis and their connections. The bibliographic review will seek to synthesize the existing knowledge by referring to the existing literature and in the same way to make a critical assessment of the texts. The bibliographic review process will follow the line of action of the identification, filtering, and inclusion decision. Subsequently, the information will be extracted and synthesized, so that it can be applied in the execution and development of the investigation.

- Establish the statistical principles of identification and selection of works to form a corpus.

In the same way that a bibliographic review is carried out, a similar process is followed for the selection of a corpus, on this musical occasion. In this phase, the principles of selection of works that will identify them, and filter and subsequently decide which works will be considered to form the corpus of analysis must be decided, in an argumentative manner.

Experimental and technological contextualization

- Analyze the available OMR models and their theoretical adaptation to the corpus selected.

In this first part of the experimental phase, the combination of the different OMR tools is proposed and if they are suitable for the selected corpus with the intention of extracting the maximum amount of information, with the highest possible quality and precision.

- Analyze the digital languages compatible with the edition and their fit in the corpus selected.

There are digital languages that are used in musical transcription and editing that may have one or more used, such as editing, marking, analysis, etc. However, those languages that have been created on occasions for specific purposes are not always viable for all kinds of notation. So, it would be necessary to check which ones would accept the notation and engraving of Jazz.

- Analyze the tools and analysis processes necessary to reach the main objective.

In the same way that there are languages, there are also specific tools already created for editing, data extraction, analysis, etc., so it would be necessary to check which of them support the musical data type and which of them is more appropriate.

- Propose an execution plan to follow, completing and correcting the applied development process.

Once the languages and tools that can be used are known, design the action plan for OMR transcription, subsequent editing, and analysis.

- Musical optical recognition. Test of a sample of the selected corpus.
- Analysis and fault correction.

Try some of the standards to evaluate flaws or improvements.

- Recognition of the complete body.
- Transcription of data obtained to musical information through digital language.

Formalization and unification of the corpus on a website, or in some medium that can be accessed for study and analysis.

Conclusive and adaptive phase for the main objective

- Treatment and analysis of this musical information in digital language aimed at achieving the objectives and possibilities identified above exemplification of the functionalities.

Once the theoretical and experimental process has been carried out, this information can be combined to apply it in the educational field, proposing new forms for its teaching.

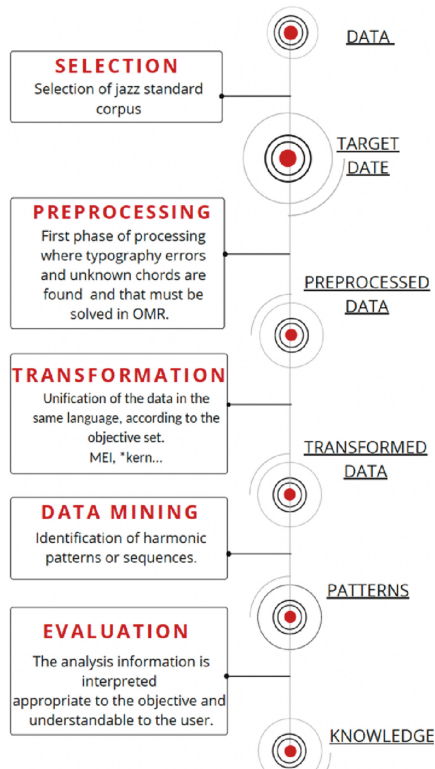


Fig. 1. Knowledge discovery process. Own elaboration.

3 Current State

The thesis is in the first phase. For now, a theoretical research action and a somewhat more “practical” one is being carried out.

In the first, a systematic bibliographic review [7] is being carried out following three main axes according to the theme. The selected documents for the bibliographic review will be those that answer the questions that arise from the combination of these three main thematic axes (Fig. 2).



Fig. 2. Axes of main topics of the project. Own elaboration.

Jazz: What is studied in jazz? What is the creative and compositional process of jazz? What applications are used and what uses do they have? Handwritten music or music with a digital editor?

Digital edition: What does digital music edition contribute compared to manuscripts? What does a manuscript contribute? What digital languages are there that can process the highest level of information from a score? Has been Jazz digitally edited? What languages are used? What applications?

Education: How is jazz learned? How can the information provided by a digital edition be applied to learning?

On the other hand, to start with the practical part and while the bibliographic review is going to be carried out, a more practical investigation is brought off with Muret. Muret is a tool created by the University of Alicante with which, from an image of a manuscript, musical information can be extracted through digital languages. Although it has not been used in this type of notation, a first test is necessary to see where the work points are for the following phases.

4 Conclusions

The present communication aims to present a doctoral thesis research project related to the application of the most avant-garde forms of optical music recognition, applied to the novel environment of handwritten scores in the field of jazz music. This project aims to

offer a heuristic model of the process that contributes to developing a procedural model, based on practical and adaptive experience, taking as a reference the above researches that accompanies the entire process, from transcription, to data processing, from editing, to the creation of complex information and to treatment and analysis and that all this converges in a conclusion and contribution of knowledge to apply in the academic field, using jazz music as a homogenizing element.

The expected results are related to the development of robust models for the recognition of manuscript musical texts, with special attention to the particularities of jazz music and its paradigmatic forms of knowledge transmission, which can be applied to the harmonic, stylistic, interpretative, etc. analysis of this cultural legacy, especially in educational and information transmission environments.

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