INTRODUCING THE JAZZOMAT PROJECT AND THE MELOPY LIBRARY

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1. INTRODUCTION

In October 2012 a research project on the statistical analysis of jazz solos started operation at the HfM "Franz Liszt" in Weimar [1] . The aim of this contribution is to introduce this project, its goals and methods, and to place it in the context of jazz research, cognitive music psychology and computational (ethno-)musicology with special consideration of oral traditions in jazz and its implications for creativity research (cf. Pfleiderer & Frieler (2010)).

2. RESEARCH GOALS

The Jazzomat project consists of two main building blocks: The first is a considerably large database of (approx. 200) high-quality jazz solo transcriptions taken from a representative sample of jazz styles, the second are analytical tools, which will be used to investigate the creative design of jazz solos. The lack of a solid data base to confirm certain persistent but largely untested theories is one of the most important (but often neglected) problems in jazz research (cf. Pfleiderer (2004)). One well-known example for these theories, is the so-called "formulaic approach to improvisation". Thomas Owens (1974) demonstrated the existence of certain formulas in Charlie Parker's solos, but no thorough systematic examination for other improvisers—let alone across improvisers—has been carried out so far. Especially, the "orality" of formulas, i. e., the question if, how and to what extend they spread from one improviser to another (and perhaps nowadays by textbooks) is in the main focus of the project. This tasks amounts essentially to pattern mining in a large data set of solo transcriptions, based on the definition of cognitively adequate and instrument specific musical patterns (Conklin & Anagnostopoulou (2006); Lartillot & Toiviainen (2007); Meredith et al. (2002)). The transmission of patterns will be examined by tracing them across solos, which will provide insights in the practice of oral tradition in jazz.

3. DATABASE ASSEMBLY AND MUSIC REPRESENTATION

The database is being assembled using modern MIR tools (Songs2See, SmartScore) and notated transcriptions taken from the literature and other public sources. This material is meticulously cross-checked, rectified and enhanced by experienced jazz musicians and musicology students with the help of Sonic Visualiser. Beat tracks, chords and phrase structure are annotated manually. Since the focus lies on the syntactic and not on the expressive nor the semantic level, the improvisations are coded as metrical and harmonically annotated lists of pitches with precise onset and durations times but currently without loudness and timbre information, which, however, is planned to be included in the future.

4. THE MELOPY LIBRARY

The statistical approach to music cogition has gained some impetus during the last years (e. g. Huron (2006); Pearce et al. (2008); Müllensiefen et al. (2008)). The main idea of this approach is that human brains build up, extract and update probability distributions from incoming perceptual streams which leads to the generation of various expectations while shaping (re-)cognition. This is actually the base of the cultural background of a listener. Hence, while studying probability distributions of musical objects, conclusions on listeners' perceptions and cognitions can be drawn and adequate models can be built. Furthermore, probability distribution of musical elements give descriptions of music-cultural traditions and means to compare these. In our context, for example, the distribution of certain formulas and patterns might serve as a discriminating feature for individual and genre styles. Furthermore, creativity in general relies on the cultural-cognitive background and on preconfigured sets of cultural transmitted building blocks.

To this end, MELOPY, an open-source Python library, is currently under development (with a base system already in operation). The basic frame work is designed to be very general, which makes the library widely usable, e. g., in the field of computational music ethnology. The general philosophy of its music representation is not based on a musical score – such as, e. g., Music 21 (Cuthbert & Ariza (2010)), Humdrum (Huron (1995)) and many other systems–, but on physically measured sonic entities (tones), e. g., suited for ethnological field recordings and other non-scored music such as jazz, pop and rock. Once a comprehensive representation of musical entities is achieved, application of statistic methods is straight-forward, but the biggest challenge is the selection of suitable abstractions from the musical surface, a problem which will be addressed thoroughly in the project including auxillary lab experiment. To allow greatest flexibility, we will include a so-called "feature machine", which provides the user with

[1] "Melodisch-rhythmische Gestaltung von Jazzimprovisationen. Rechnerbasierte Musikanalyse einstimmiger Jazzsoli", DFG-PF 669/7-1

the possibility of defining features and arbitrary combinations of them in a highly modular fashion by connecting simple building blocks. This approach allows fruthermore-automated feature generation and selection for machine learning purposes, such as stilistic classifications. Furthermore, we plan to implement interoperability with existing computational system such as Music21 or Humdrum, enhancing the research options even further.

5. WEB-PLATFORM

Finally, we plan to set up a publicly available web platform prodiving access to our database which will not only contain our jazz data but preferably other melody corpora as well, e. g. the EsAC data (Schaffrath (1995)). The web site will allow users to download, listen, read, analyse, visualize and compare melodies in an easy-to-use way, and might serve as an educational tool as well [2] .

6. REFERENCES

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[2] A prototype of such a system is already implemented, and can be accessed under `http://jazzomat.hfm-weimar.de/meloworks`.

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