Tutorial 1

Jazz solo analysis between music information retrieval, music psychology, and jazz research

Jakob Abeßer ()
Klaus Frieler ()
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Abstract

The tutorial will consist of four parts. The first part sets the scene with a short run through jazz history and its main styles and an overview of the central musical elements in jazz. Out of this introduction, the main research questions will be derived, which cover jazz research and jazz historiography, analysis of musical style, performance research, and psychology of creative processes. Particularly, research issues as addressed in the Jazzomat Research Project will be discussed and results will be presented.

The second part of the tutorial will deal with the details of the Weimar Jazz Database. Each solo encompasses pitch, onset, and offset time of the played tones as well as several additional annotations, e.g., manually tapped beat grids, chords, enumerations of sections and choruses as well as phrase segmentations. The process of creating the monophonic transcriptions will be explained (solo selection, transcription procedure, and quality management) and examples will be shown. Moreover, the underlying data-model of the Weimar Jazz Database, which includes symbolic data as well as data automatically extracted from the audio-files (e.g., intensity curves and beat-wise bass chroma) will be discussed in detail.

In the third part, we will introduce our analysis tools MeloSpySuite and MeloSpyGUI, which allow the computation of a large set of currently over 500 symbolic features from monophonic melodies. These features quantify various tonal, harmonic, rhythmic, metrical, and structural properties of the solo melodies. In addition, pattern retrieval modules, based on n-gram representations and a two-stage search option using regular expressions, play an integral part for the extraction of motivic cells and formulas from jazz solos. All tools can be readily applied to other melodic datasets besides the Weimar Jazz Database. Several use cases will be demonstrated and research results will be discussed.

The final part of the tutorial will focus on audio-based analysis of recorded jazz solo performances. We follow a score-informed analysis approach by using the solo transcriptions from the Weimar Jazz Database as prior information. This allows us to mitigate common problems in transcribing and analyzing polyphonic and multi-timbral audio such as overlapping instrument partials. A score-informed source separation algorithm is used to split

the original recordings into a solo and an accompaniment track, which allows the tracking of f0-curves and intensity contours of the solo instrument. We will present the results of different analyses of the stylistic idiosyncrasies across well-known saxophone and trumpet players. Finally, we will briefly outline further potentials and challenges of score-informed MIR techniques.

Tutorial 2

Music Information Retrieval:
Overview, Recent Developments and Future Challenges

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Markus Schedl ()
Xavier Serra ()
Xiao Hu (University of Hong Kong)

Abstract

This tutorial provides a survey of the field of Music Information Retrieval (MIR), that aims, among other things, at automatically extracting semantically meaningful information from various representations of music entities, such as audio, scores, lyrics, web pages or microblogs. The tutorial is designed for students, engineers, researchers, and data scientists who are new to MIR and want to get introduced to the field.

The tutorial will cover some of the main tasks in MIR, such as music identification, transcription, search by similarity, genre/mood/artist classification, query by humming, music recommendation, and playlist generation. We will review approaches based on content-based and context-based music description and show how MIR tasks are addressed from a user-centered and multicultural perspective. The tutorial will focus on latest developments and current challenges in the field.

Tutorial 3

Why is studio production interesting?

Emmanuel Deruty ()
François Pachet ()

Abstract

The tutorial follows the "Why X is interesting" series that aims at bridging the gap between technology-oriented and music-related research. It will suggest a number of reasons why production is important for MIR, seen from the eyes of an expert (the first author) and a MIR researcher (the second one).

In music, the use of studio techniques has become commonplace with the advent of cheap personal computers and powerful DAWs. The MIR community has long been confronted to studio production. Since ISMIR's first installment in 2000, about 35 papers involving more than 70 authors have addressed studio production. However, more than 44% of these identify studio production as a source of problems: the so-called album or producer effect gets in the way of artist or genre identification, audio processing techniques prevent proper onset detections, or effects are responsible for false positive in singing voice detection. A few of these papers even characterize production as not being part of the music. On the other hand, another 35% of these papers either outline the knowledge of studio production as useful or indispensable to MIR tasks, or try to provide a formal characterization for this set of techniques.

A difficulty met by MIR researchers interested in studio production techniques is that production specialists are reluctant to formalize their knowledge. Like old-fashioned guild artisans, engineers and producers reputedly learn "tricks of the trade" from the "Greatest Teachers" or "mentors". As a result, knowledge of studio production techniques is not widespread in the scientific community. Even in the upcoming field of automatic mixing, a domain intrinsically related to studio production, we have found that only 15% of scientific papers take these techniques into account. A similar issue can be observed at DAFx, where papers dealing with studio production as actually performed in the music community are rare.

The tutorial aims at explaining studio production techniques to MIR researchers in a simple and practical way, in order to highlight the main production tricks and usages to a MIR audience.

We will review standard aspects of studio music production, including recording, processing, mixing, and mastering. We will then focus on the basic methods of audio processing: EQs, compression, reverbs, and such. We will illustrate how these basic techniques can be combined creatively.

Production techniques may be implemented in a variety of ways, depending on trends and available hardware. We'll go through a brief retrospective of how these techniques have been used since the mid 60's in different ways. As different variations of the same basic processes can influence, sometimes drastically, the finished product, we believe such knowledge may be useful in relation to classification and similarity.

MIR researchers often conceptualize lead vocals as a solo line, possibly ornamented with backing vocals and audio effects. In practice, we'll show that vocal track production in mainstream pop music results in complex architectures. We will analyze the vocals tracks in some mainstream hits. It will demonstrate that studio production is an integral part of the music, not an extraneous layer of effects. Consequences are obvious for the nature of the information MIR scholars look for, e.g. in information extraction, retrieval, similarity or recommendation.

We will complete the tutorial with a short demo of automatic mixing techniques developed in our lab that use auto-adaptive audio effects. It will demonstrate that consideration of production is a definite advantage in music generation.

Tutorial 4

Introduction to EEG Decoding for Music Information Retrieval Research

Sebastian Stober ()
Blair Kaneshiro (Stanford University)

Abstract

Perceptual and cognitive approaches to MIR research have very recently expanded to the realm of neuroscience, with MIR groups beginning to conduct neuroscience research and vice versa. First publications have already reached ISMIR and for the very first time, there will be a dedicated satellite event on cognitively based music informatics research (CogMIR) at this year's ISMIR conference. Within the context of this growing potential for cross-disciplinary collaborations, this tutorial will provide fundamental knowledge of neuroscientific approaches and findings with the goal of sparking the interest of MIR researchers and leading to future intersections between these two exciting fields. Specifically, our focus for this tutorial is on electroencephalography (EEG), a widely used and relatively inexpensive recording modality which offers high temporal resolution, portability, and mobility – characteristics that may prove especially attractive for applications in MIR. Attendees of this tutorial will gain a fundamental understanding of EEG responses, including how the data are recorded as well as standard procedures for preprocessing and cleaning the data. Keeping in mind the interests and objectives of the MIR community, we will highlight EEG analysis approaches, including single-trial analyses, that lend themselves to retrieval scenarios. Finally, we will review relevant open-source software, tools, and datasets for facilitating future research. The tutorial will be structured as a combination of informational slides and live-coding analysis demonstrations, with ample time for Q&A with the audience.

Tutorial 5

Natural Language Processing for MIR

Sergio Oramas ()
Luis Espinosa-Anke ()
Shuo Zhang ()
Horacio Saggion ()

Abstract

An increasing amount of musical information is being published daily in media like Social Networks, Digital Libraries or Web Pages. All this data has the potential to impact in musicological studies, as well as tasks within MIR such as music recommendation. Making sense of it is a very challenging task, and so this tutorial aims to provide the audience with potential applications of Natural Language Processing (NLP) to MIR and Computational Musicology.

In this tutorial, we will focus on linguistic, semantic and statistical-based approaches to extract and formalize knowledge about music from naturally occurring text. We propose to provide the audience with a preliminary introduction to NLP, covering its main tasks along with the stateoftheart and most recent developments. In addition, we will showcase the main challenges that the music domain poses to the different NLP tasks, and the already developed methodologies for leveraging them in MIR and musicological applications. We will cover the following NLP tasks:

- Basic text preprocessing and normalization
- Linguistic enrichment in the form of part-of-speech tagging, as well as shallow and dependency parsing.
- Information Extraction, with special focus on Entity Linking and Relation Extraction.
- Text Mining
- Topic Modeling
- Sentiment Analysis
- Word Vector Embeddings

We will also introduce some of the most popular python libraries for NLP (e.g. Gensim, Spacy) and useful lexical resources (e.g. WordNet, BabelNet). At the same time, the tutorial analyzes the challenges and opportunities that the application of these techniques to large amounts of texts presents to MIR researchers and musicologists, presents some research contributions and provides a forum to discuss about how address those challenges in future research. We envisage this tutorial as a highly interactive session, with a sizable amount of hands-on activities and live demos of actual systems.

Tutorial 6

Why Hip-Hop is interesting

Jan Van Balen ()
Ethan Hein ()
Dan Brown ()

Abstract

Hip-hop, as a musical culture, is extremely popular around the world. Its influence on popular music is unprecedented: the hip-hop creative process has become the dominant practice of the pop mainstream, and spawned a range of electronic styles. Strangely, Hip-hop hasn't been the subject of much research in Music Information Retrieval. Music research rooted in the European music traditions tends to look at music in terms harmony, melody and form. Even compared to other popular music, these are facets of music that don't quite work the same way in Hip-Hop as they do in the music of Beethoven and the Beatles.

In this tutorial, we will argue that a different perspective may be needed to approach the analysis of Hip-hop and popular music computationally—an analysis with a stronger focus on timbre, rhythm and lyrics and attention to groove, texture, rhyme, metadata and semiotics.

Hip-hop is often said to integrate four modes of artistic expression: Rap, turntablism, breakdance and graffiti culture. In the first part of this tutorial, we will discuss the emergence and evolution of Hip-Hop as a musical genre, and its particularities, focusing our discussion on beat-making (turntablism and sampling), and Rap. A second part of the talk will highlight the most important reasons why MIR practitioners and other music technologists should care about Hip-Hop, talking about Hip-hop's relevance today, and the role Hip-hop in popular music. We highlight its relative absence in music theory, music education, and MIR. The latter will be illustrated with examples of MIR and digital musicology studies in which Hip-hop music is explicitly ignored or found to 'break' the methodology.

Next, we review some of the work done on the intersection of Hip-hop and music technology. Because the amount of computational research on Hip-hop music is rather modest, we discuss, in depth, three clusters of research on the intersection of Hip-hop and music technology. The first two are related of MIR, focusing on 'beats' and sampling, and Rap lyrics and rhyme. For the third topic, situating Hip-hop in the broader topic of music technology, we look at how an important role for both music technology and Hip-hop is emerging in music education. Finally, the last part of the talk will give an overview of resources and research opportunities for Hip-hop research.

This tutorial is aimed at anyone interested in Music Information Retrieval and popular music, whether familiar with Hip-hop music or not. We also aim to make it relevant to a broader

audience interested in music technology, touching on topics like sampling and samplers, and Hip-hop in technology and music education, and to anyone interested in text processing, with an additional focus on the analysis of lyrics.

Throughout the tutorial, we intend to include a lot of listening examples. Participants will access to an extended playlist of selected listening examples, along with a short guide to the significance of the selected recordings.