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A Study of Tonality in Electronic Dance Music

ABSTRACT

In this paper, we present a study of tonal practises in Electronic Dance Music (EDM), an umbrella term referring to a number of subgenres such as house, techno or jungle, originating in the 1980's and intended for dancing at nightclubs and raves. EDM is produced mainly with electronic equipment and has a strong presence of percussive elements and a steady beat.

Based on corpus analysis of audio and midi files, we enquire what the role of commonplace digital production techniques –such as layering and looping– could be in defining some tonal practises in Electronic Dance Music.

Background

Despite an increase in academic literature regarding EDM in recent years, the study of its tonal features is somewhat lacking when compared to other musical facets such as rhythm or structure, and has been targeted only superficially in musicological research (Tagg 1994; Spicer 2004; Doehring 2015).

Wooler and Brown (2008) proposed a framework for discussing tonality in EDM by describing surface elements such as the rate of tonal change, the tonal stability or the number of simultaneous musical layers. However, their approach is merely descriptive and somewhat vague.

For the purpose of automatic key finding, –a popular task in the emerging field of Music Information Retrieval,– Faraldo et al. (2016) outlined a number of tonal properties of EDM to inform the computational process. They found a strong bias towards minor modalities (80%), with an almost total absence of modulation and a lack of directional tonal properties present in euroclassical repertoire or in pop music.

Aims and repertoire studied

EDM producers often create music by combining musical excerpts from a variety of sources. These include collections of pre-cooked sequences and samples, *quotations* from records, overdubs, free-style improvisations and parameter tweaking on analog and digital synthesisers.

We are interested in how electronic popular music production practices, mostly revolving around the *Digital Audio Workstation*, have an impact in the development of tonal language, leading to unique configurations unseen in other musical genres. Such production techniques, seem closer to cinematographic montage (based on splicing, layering and processing sound files) than to musical operations over symbolic data (i.e. musical notation).

In particular, *house* music presents an optimal choice for such study, since pitch is still a prominent element of this subgenre, which is less true of other EDM styles. It completely embraces digital production techniques and, given its strong rhythmic nature and orientation towads the dance floor, it might be rather open-ended regarding its tonal language. Furthermore, its cyclical structure based on loops, could have implications in the ways listeners integrate tonal units together, which are unlikely in other tonal dialects.

Methods

For our study, we have gathered a collection of approximately 2000 excerpts of EDM audio tracks with manual annotations of key and mode. Complementing this dataset, we collected a package of over 2500 midi loops with house music chord progressions and bass lines from online catalogs, intended for use as compositional building units by semi-professional producers.

The audio collection has been of primary utility in modelling and evaluating an automatic key estimation system, which in turn has proven a fruitful way of understanding specific aspects of modality in EDM.

The midi loops, which can be seen as short musical scores, were used to generate statistical data about pitch-class sets and scales, chords and melodic contours, although in the current study our prime interest lays in the characterisation of tonal centre and mode rather than in chordal structures and melodic motives. In any case, analytical results were integrated in two generative music systems (of keyboard stabs and bass lines) which are being used to monitor the validity of our formulations.

Implications

In this paper, we show how EDM production techniques have a direct impact on its tonal language, what we regard as a novel contribution that might inspire computational analysis methods and compositional tools, as well as further scholarly research. For example, we confirmed that simultaneous layering of several audio files often leads to *polymodal* or *atonal* excerpts with a loose sense of tonal center. In other cases, fragments with sparse pitch content (a simple bass line or a tuned bass-drum) could be seen as *amodal* (i.e. with a clear tonic but no sense of modality).

In addition, we often observed modal variants other than the traditional major and minor scales, with a notable presence of the *phrygian*, although pitch-class sets with six or less tones appear more frequently than heptatonic scales. These *defective* scales, which in most cases could be seen as subsets of the traditional modes, provide a sense of tonal ambiguity (cfr. Temperley 2007), or better, tonal *openess*, that seems characteristic of the bass layer in particular, providing opportunities for recombining and remixing.

We also confirmed that the structural organisation of EDM, primarily based on *loops,* tends to neutralise the directional tonal dialectics found in pop and euroclassical music,

something observed by Tagg (2014) in other popular music styles, favouring cumulative forms that evolve by density changes and timbral intensification (Spicer 2004).

The results of our research are being implemented in various analytical and creative tools, validating to some extent the results of our investigations. Our key detection system (Faraldo et al. 2016) has been the best scoring algorithm in the category of Electronic Dance Music in the last MIREX 2016 exchange, –a worldwide cross-institutional call for researchers on Music Information Retrieval to compare algorithms devoted to various musical tasks,– and has been already incorporated into music making applications such as Reactable's *Rotor* modular music synthesiser (cfr. <reactable.com/rotor>).

On a more experimental level, we are developing expert agents such as the *House Harmonic Filler* and *Bass-House* prototypes (both written in Pd), that provide simple ways of creating and modifying tonal materials (midi chord loops and bass lines, respectively) in stylistically significant ways.

Acknowledgement

Keywords

Tonality, popular music, computer music, music information retrieval.

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