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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 originating in the 1980s with a strong presence of percussive elements and a steady beat. EDM is produced mainly with electronic equipment and intended for dancing at nightclubs and raves.

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 literature regarding EDM in recent years, the study of its tonal features remains residual when compared to other musical dimensions 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 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) and Faraldo (2018) 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 dialectics found 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 and free-style improvisation and parameter tweaking on analogue 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 media. Such production techniques, are certainly 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 house music, what is less true of other EDM subgenres. Besides, it completely embraces digital production techniques and, given its strong orientation towards the dance floor, it might be rather open-ended regarding its harmonic 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

We have gathered a collection of circa 2000 excerpts of EDM audio tracks with manual annotations of key and mode for our study which are now publicly available (Faraldo 2018). Complementing this dataset, we collected a package of over 2500 midi loops with house chord sequences and bass lines from online catalogues, meant to be used 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, what in turn has proven a fruitful way of understanding specific aspects of modality in EDM.

The symbolic midi loops were used to generate statistical data about pitch-class sets and scales, chords and melodic contours, although in the current work our prime interest is in the characterisation of tonal centre and mode rather than in chordal structures and melodic motives, areas that we will address in a different publication. In any case, results from the analysis were put onto two generative music systems, — for chord loops and bass lines — which are being used to monitor the validity of our formulations.

Implications

In our study — see Faraldo (2018) for conclusive results — we show how EDM production techniques have a direct impact on its tonal language, what we regard as a novel contribution that might inform computational analysis methods and compositional tool, as well as further scholarly research. For example, we confirmed that simultaneous layering of several audio files often leads to *polymodal* or *atonical* excerpts with a loose sense of tonal centre. 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).

Besides, we often observed modal variants other than the traditional major and minor scales, with a notable presence of the *phrygian*. However, pitch-class sets with 6 or less notes are found more frequently than the traditional heptatonic scales. These *defective* scales provide a sense of tonal ambiguity (Temperley 2007), or better, tonal *openness*, that seems quite characteristic of the bass layer in particular, providing opportunities for recombining and remixing.

We also confirmed that EDM structural organisation based on *loops* neutralises the tonal dialectics based on resolution, something observed by Tagg in other popular music styles (Tagg 2014), favouring a cumulative form based on density and timbral intensification (Spicer 2004).

The results of our research have been implemented in various analytical and creative tools, validating to some extent the results of our analytical inquisitions. 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 competition — a worldwide cross-institutional call for researchers on Music Information Retrieval to compare algorithms for various musical tasks — and has been already incorporated into music making applications such as Reactable's *Rotor* modular music synthesiser.

On a more experimental level, we have developed 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 (Faraldo *et al*. 2017).

Keywords

Tonality, Popular Music, Computer Music, Music Information Retrieval.

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