EXTENDED PLAYING TECHNIQUES: THE NEXT FRONTIER IN MUSICAL INSTRUMENT RECOGNITION

First Author
Affiliation1
author1@ismir.edu

Second Author
Retain these fake authors in submission to preserve the formatting

Third Author
Affiliation3
author3@ismir.edu

ABSTRACT

Although the automatic recognition of a musical instrument from the recording of a single "ordinary" note is close to becoming solved problem, the ability of a computer to precisely identify playing technique within an extended taxonomy remains far below human accuracy. This article provides the first benchmark of machine listening systems for the classification of extended playing techniques in the symphonic orchestra. We identify three necessary conditions for significantly outperforming the classical mel-frequency cepstral coefficients (MFCC) baseline: (1) the inclusion of second-order scattering coefficients to account for the presence of amplitude modulations ; (2) the inclusion of large temporal scales ; and (3) the resort to supervised metric learning.

1. INTRODUCTION

The progressive diversification of the timbral palette in Western classical music at the turn of the 20th century is reflected in four concurrent trends: the addition of new instruments to the Western symphonic instrumentarium, either by technological inventions (e.g. theremin) or importation from non-Western musical cultures (e.g. marimba) ; the resort to novel instrumental associations, as epitomized by *Klangfarbenmelodie* ; the temporary alteration of and a more systematic usage of extended instrumental techniques, such as snap pizzicato, col legno batutto, or flutter tonguing. The first of these trends has now stalled: to this day, most Western composers rely on an acoustic instrumentarium that is only marginally different from the one that was available in the Late Romantic period. Nevertheless, the latter two approaches to timbral diversification, namely polyphonic mixtures and extended instrumental techniques, were massively adopted into post-war contemporary music.

Far from being exclusive to Western classical music, extended playing techniques are also commonly found in the oral tradition. In some cases, they even stand out as a distinctive component of musical style. Four well-known examples are: the snap pizzicato ("slap") of the upright bass in rockabilly, the growl of the tenor saxophone in rock'n'roll, the shuffle stroke of the violin ("fiddle") in Irish folklore, and the glissando of the clarinet in Klezmer music.

2. RELATED WORK

Timbre classification Of a single musical instrument: [**?**]. Retrieval of percussion gestures using timbre classification techniques: [**?**]. Polyphonic instrument recognition using spectral clustering: [**?**]. Knowledge representation issues in musical instrument ontology design: [**?**]. Guitar playing technique classification: [**?**]. MedleyDB: [**?**]. Audio Set: [**?**]. Visipedia: [**?**] Scattering transforms in musical instrument recognition: [**?**, **?**].

3. TASK

database browsing, ranking task

4. SCATTERING TRANSFORM

5. LMNN

6. PROTOCOL

6.1 Data

SOL, typology

6.2 Metric

p@k

6.3 Methods

7. EXPERIMENTS