Clave patterns in Uruguayan Candombe drumming

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Clave patterns in Uruguayan Candombe drumming
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SUMMARY
Uruguayan Candombe drumming has deep African roots, and like other musics of the Afro–Atlantic world, its rhythm is timeline–based. The timeline pattern of Candombe, called madera, has many traits in common with similar patterns in Afro–American music, like the son clave. It presents, however, significant differences with the more common uses of timeline patterns in other musics of the same tradition. For instance, instead of a single timeline pattern as in other Afro–Latin–American musics, the madera pattern allows for different variants.

In this paper, Music Information Retrieval techniques are applied to a dataset of Candombe recordings in order to analyse the characteristics of the madera pattern, and group and classify its most recurrent variations.

URUGUAYAN CANDOMBE DRUMMING
Llamada de tambores
drum call parade
• groups of ca. 20 to 60 players
• three types of drum: chico, repique, piano

Rhythmic structure
• 4–beat cycle, 16 pulses
• chico: high pitch, timekeeper
• repique: medium pitch, improviser
• piano: low pitch, rhythmic cycle

Fig. Group of Candombe drummers (cuerda de tambores) during a llamada de tambores.

MADERA PATTERN
The madera (or clave) pattern is produced by hitting the wooden shell of the drum with the stick. Played by all the drums as an introduction to and preparation for the rhythm; during the llamada only by the repique drum in between phrases.

Fig. Simplified primary patterns of the three drums and madera with metric structure

AUDIO FEATURE EXTRACTION
Spectral features used for both onset detection and madera sound classification.

Spectral flux (SF)
• Short-Time Fourier Transform
• mapped to MEL scale bands
• first-order difference
• half-wave rectified

Onset detection
• SF summed along all sub-bands
• fixed and adaptive thresholds

Sound classification
• first 40 MEL bands (< 1500 Hz)
• SVM trained on isolated sounds

Fig. Detection of madera pattern sections for two repiques playing simultaneously

ANALYSIS OF MADERA CYCLES IN A RECORDING
• feature signal is time quantized to the 16 rhythm subdivisions
• a map of the feature vectors of each rhythm cycle is computed
• the detected madera patterns are clustered and aurally checked

Dataset analysis
All the cycles with madera pattern in the dataset ordered by cluster, with transcription in music notation. There are four main groups, two of which can be subdivided in two variations.

Fig. Analysis of madera patterns in a single recordings. The feature map of the recording (below), the centroid of each cluster (top–right) and a 3D Isomap representation of patterns (top–left).

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