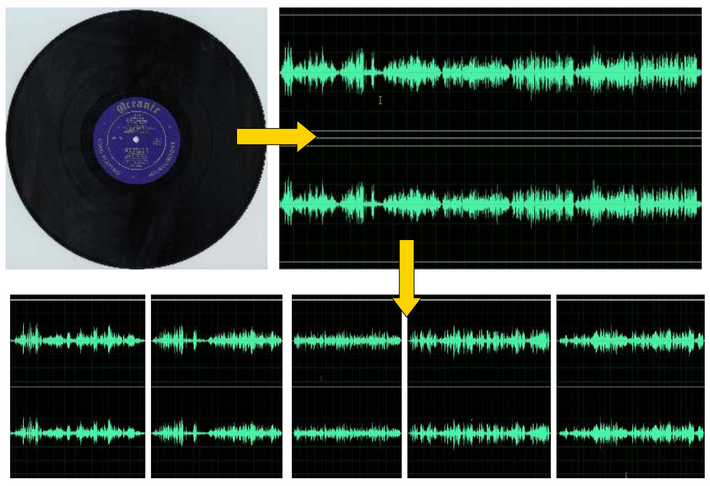
Technical Issues in Digitization of Large On-Line Collections of Phonograph Records (1)

Beinan Li, Catherine Lai, Ichiro Fujinaga

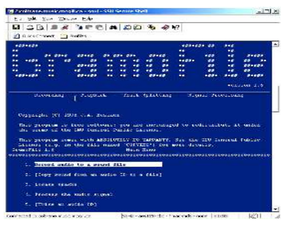
Music Technology Area, Schulich School of Music, McGill University, and CIRMMT, Montreal, Canada

Track Segmentation for LPs



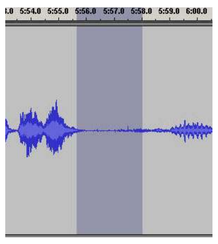
Automatic track segmentation is desirable in massive digitization for LPs.

Existing Efforts (partial)



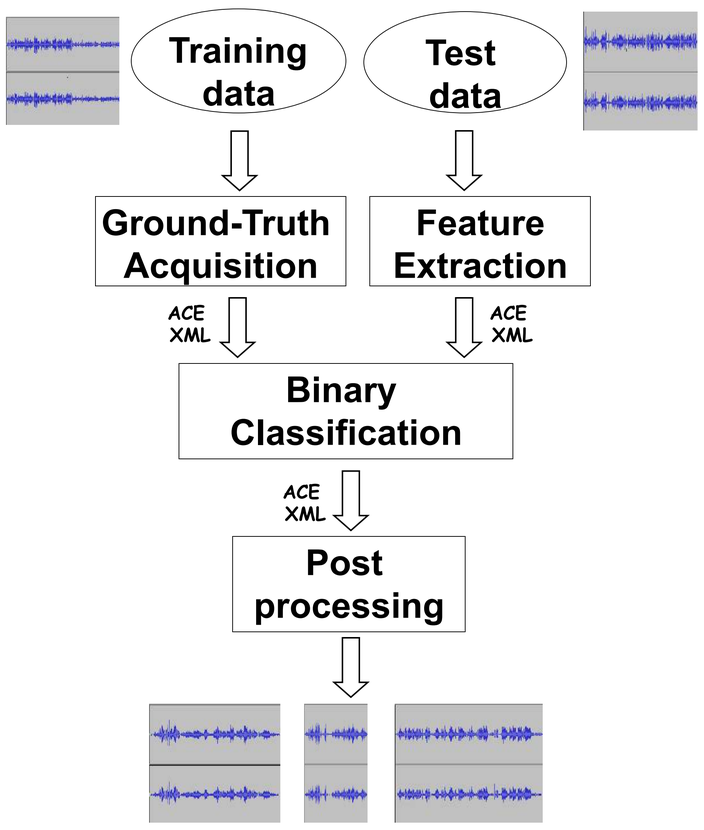
Gramofile:
(Open-source)

To locate inter-track silences:
Rule-based;
Parameter tweaking;
Quiet area and pauses;



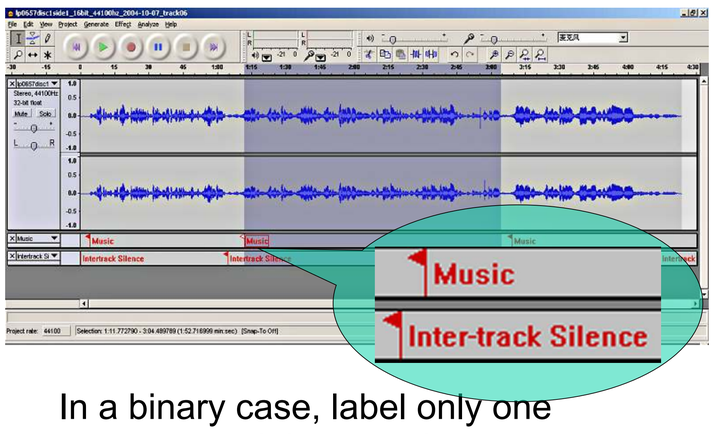
Our Approach

Supervised Classification:
Music vs. Inter-track Silence



Ground-Truth Acquisition

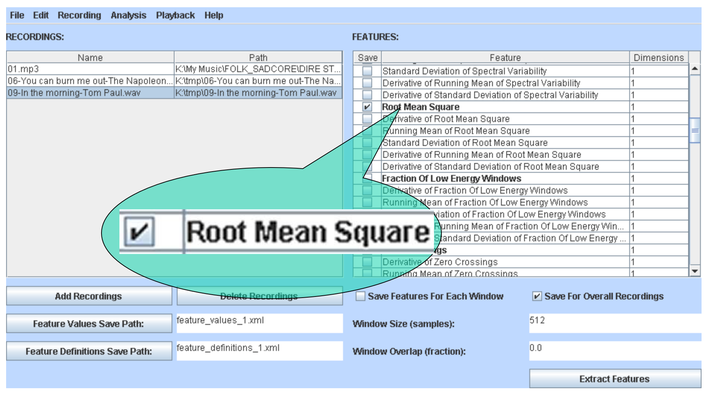
A cross-platform audio annotation tool
based on *Audacity*



In a binary case, label only one category and the complementary category will be automatically filled in.

Feature Extraction

jAudio: a Java-based audio feature extractor

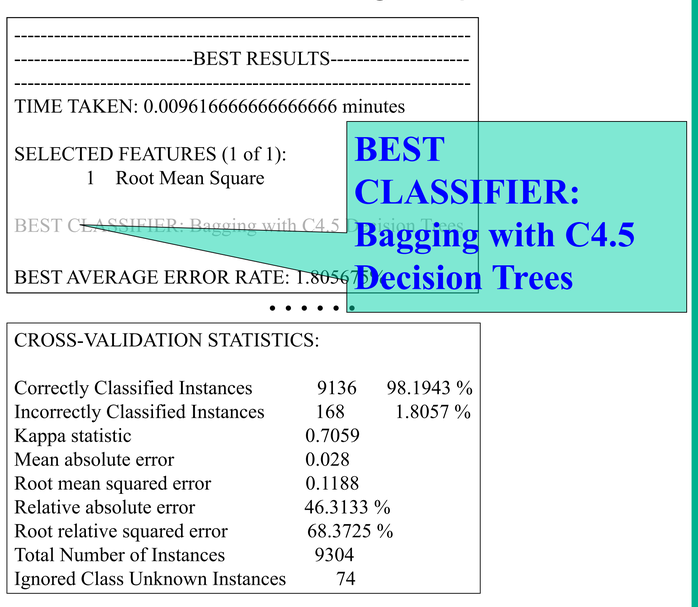


In our experiment, only RMS was extracted for objective comparison with Gramofile.

Binary Classification

ACE: Autonomous Classification Engine

Based on WEKA, *Ace* selects the most suitable classifier through experiments.

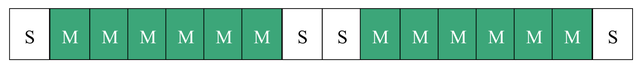


Post Processing

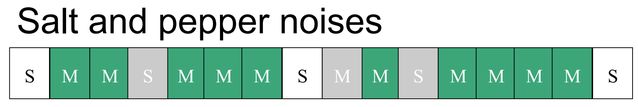
The Output of ACE:

M = Music, S = Inter-track Silence

Ideal Case:
Minor S vs. Continuous M

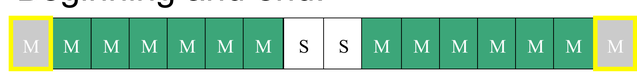


Reality:
Salt and pepper noises

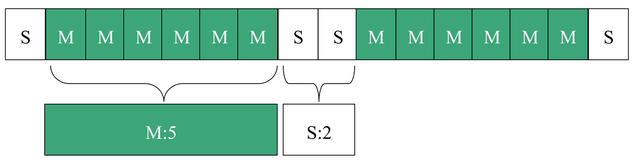


Solutions:

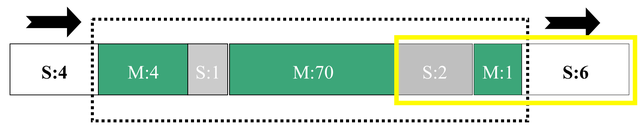
Beginning and end:



Non-uniform-window smoothing:
1) Aggregation



2) Find window boundaries (long S's)



3) Weighted smoothing
S:M = 3 x (4+70+1) : 2 x (1+2) = 75 : 2

Evaluation and Results

Error Types:

$$e = w_I e_I + w_{II} e_{II} + w_{III} e_{III}$$

$$w_I > w_{II} > w_{III}, \sum_i w_i = 1$$

Resulting Accuracy:

	Before post-proc (%)	After post-proc (%)	Gramofile (%)
Album 1	82.33	99.99	99.84
Album 2	72.71	99.99	99.77
Album 3	89.97	99.98	99.93
Album 4	69.98	99.98	35.71
Album 5	64.82	99.99	92.20
Album 6	76.87	99.97	99.89

McGill
Schulich School of Music
École de musique Schulich
CIRMMT Centre for Interdisciplinary Research in Music Media and Technology