Assessing Music Content Analysis with Procedurally Manipulated

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Background

- Evaluation is a central to advancing Music Information Retrieval
  (Downie, 2004; Sturm 2016)
- Accuracy assessments require ground-truth
- Ground truth can be difficult to acquire for features like mode
- Unrelated musical properties may influence feature extraction
  (Swierczek & Schutz, in prep)

How do structural musical properties influence feature extraction?

- We synthesize audio from MIDI to examine the individual influence of musical properties on feature extraction
- This approach analyzes changes from a baseline rather than accuracy

Method

72 Piano Preludes

447 Manipulations

MIDI

Tempo (BPM)	Transposition(Semitones)	Dynamics (Velocity)
30-300 BPM	-24 - +24 Semitones	1-127

193,536 Analyses

Relative Mode
Number of Onsets

ESSENTIA
librosa
MIRtoolbox 1.8.1

Variation from Baseline

$$\frac{feature^{MANUIPULATED}}{feature^{BASELINE}}$$

Results

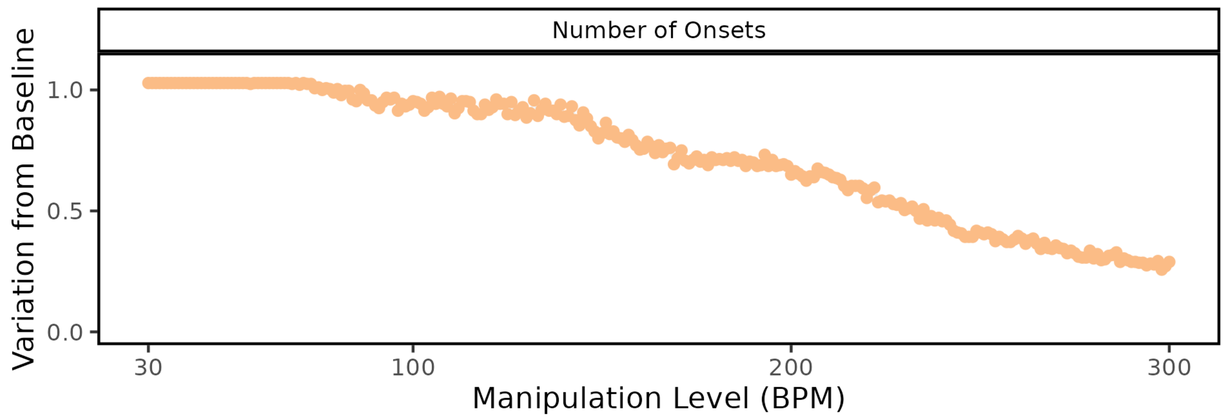

FIGURE 1: *Variation from Baseline for one piece (Prelude in A Major by J.S. Bach, BWV 864) for one manipulation type (Tempo) for one feature (Number of Onsets) as extracted by Librosa. Values less than one indicate the number of onsets extracted for a manipulated audio file is less than extracted from the baseline audio file.*

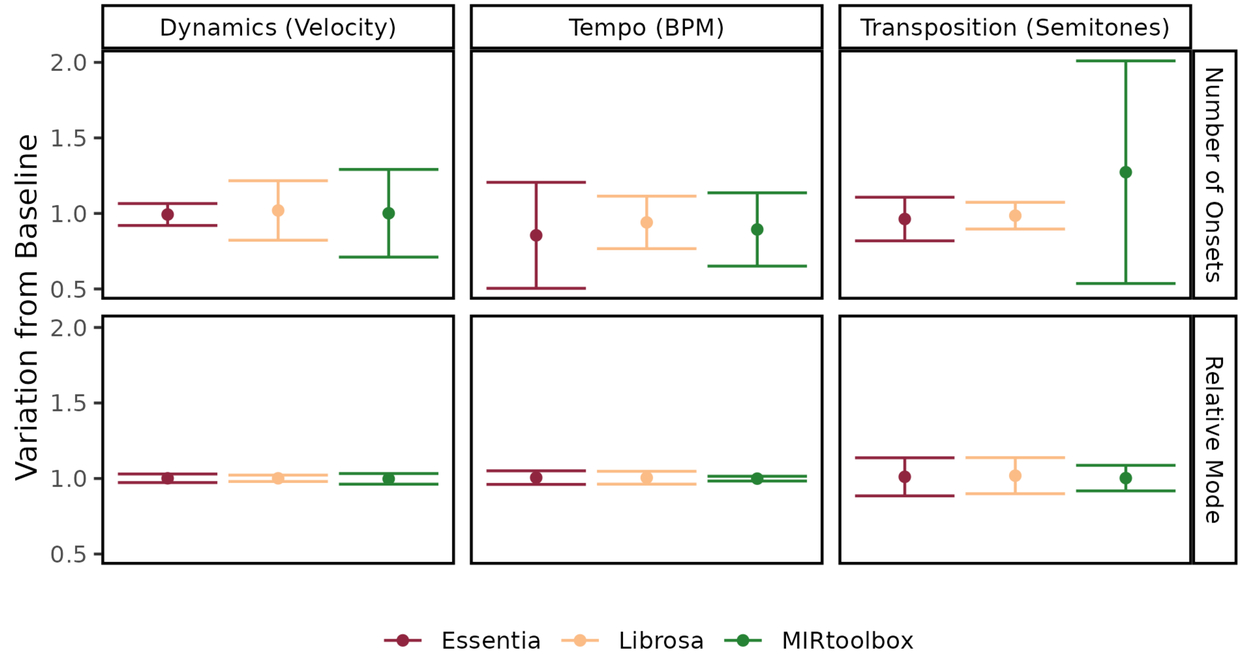

FIGURE 2*: A summary of Variation from Baseline for all manipulations and extracted feature/tool combinations. Points indicate means of all manipulations for all 72 pieces, while error bars indicate the standard deviation.*

Summary

- We propose a method for evaluating MIR features that does not rely on ground truth
- We also examine audio and acoustic manipulations (e.g., audio format, instrument)
- Relative Mode is not influenced by these manipulations
- **Applications**: evaluation, algorithm selection, parameter optimization

Acknowledgments

MINISTRY OF Ontario RESEARCH AND INNOVATION
Canada Foundation for Innovation
Fondation canadienne pour l'innovation
NSERC CRSNG
Social Sciences and Humanities Research Council of Canada
Canada
Conseil de recherches en sciences humaines du Canada