Finding an ideal level of syncopation to elicit a groove response

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In this study, we used 72 songs from Janata et al. (2012) ranked by listener ratings on their level of perceived groove and measured the amount of syncopation in each song using Inner Metric Analysis (IMA) (Volk, 2008).

Our objective was to use IMA to predict whether a song was high or low groove using a Binary Classification task and the listener ratings as a ground truth.

We began by using Madmom (Böck et al., 2016) to extract perceptually meaningful metrical structure from the audio of each song.

Madmom uses a recurrent neural network (RNN) for detecting downbeats and beats and a convolutional neural network (CNN) to detect onsets through assessing quick changes in spectral content over time.

Next, we used Inner Metric Analysis to generate a quantifiable metric profile of the onsets return by Madmom.

For each song, its metric profile was normalized and the relevant beat subdivisions of all songs were compared.

Finally, we used the metric profiles to predict the level of groove (where ratings above 80 were considered high), using a Binary Classification task.

On average, high and low groove songs have similar metric coherence according to IMA.

Low-groove songs generally have higher metrical hierarchies (both low and high metric coherence).

In My Mind” and “Yes I Am” (r=.267).

Figure 3 might lead us to believe that either:

- The metric structure has little to do with the perceived level of groove; or,
- Viewing meter as a strict hierarchical structure might erase the unique ways a song elicits groove.

### 6. RESULTS FOR BINARY CLASSIFICATION TASK

Results of 3-Fold Cross-Validation Using ROC Curve

![Results of 3-Fold Cross-Validation Using ROC Curve](image)

Figure 7: Three folds of cross-validation in using four different models to predict high-groove songs (rating > 80) from the metric weight of beat subdivisions in 72 songs. Preliminary results indicate that the best predictive accuracy (SVM Model: 0.57 +/- 0.02) is not much better than chance, however, univariate feature selection suggests that [‘2.667’, ‘1.667’, ‘3.667’, ‘4.333’] are important beat subdivisions.

### 7. REFERENCES


