

Tracking the Evolution of a Band’s Live Performances over Decades

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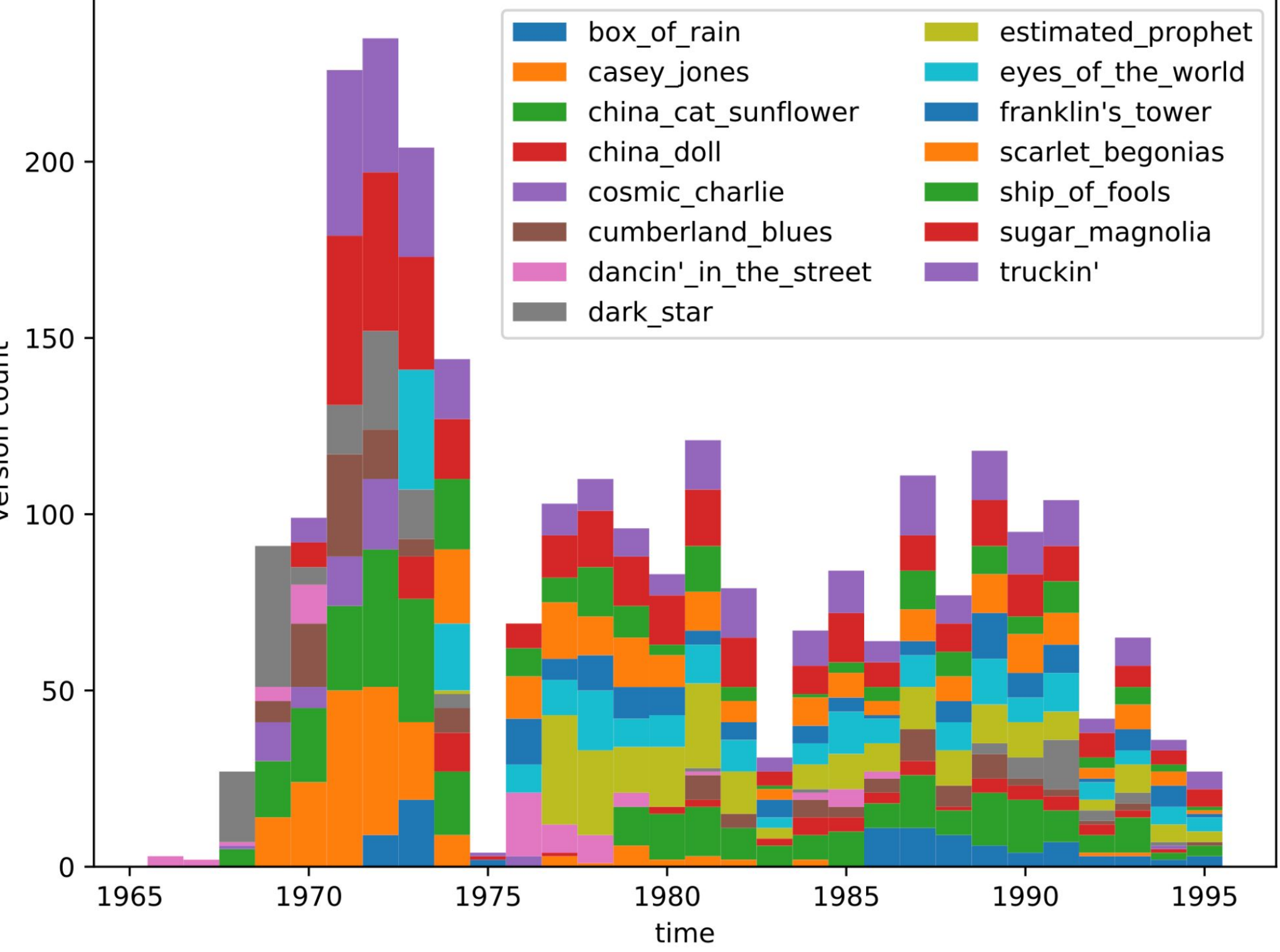


Many recent studies use MIR methods on large music collections to determine the evolution of music over time. Most of these studies look at relatively diverse musical datasets and they are able to infer general trends in music composition or production techniques. However, no study to date has focused on the music of a single band.



The Grateful Dead are well suited for such a study with one of the longest and richest recording histories of any group. Although the Dead’s music changed significantly over time due to their love of improvisation and experimentation, they kept playing many of their songs throughout their career.

The Dataset



2617 versions of 15 Grateful Dead songs over 30 years, selected from the Live Music Archive of the Internet Archive. We extracted a number of temporal, dynamic and harmonic audio features on this set.

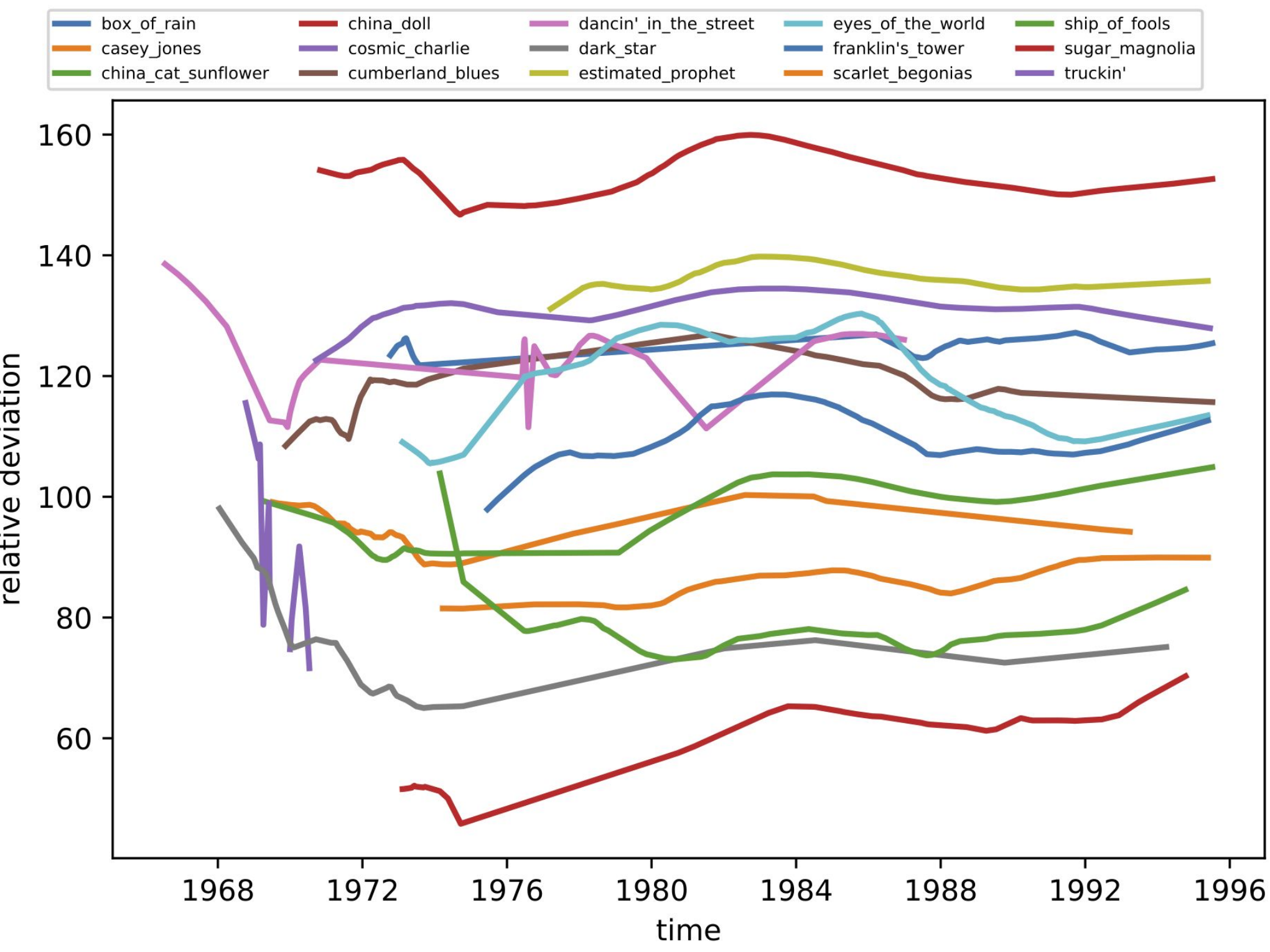
Feature Quality Improvement

An advantage when working with a single band is that we have many versions of individual songs, which we can leverage to improve the quality of extracted features. To correct detected beat times we calculated double-time and half-time feature vectors and picked for each song the combination of versions yielding the shortest overall distance in chord sequence distributions (chord ngrams), onset distributions, and tempo. Using a similar method we identified outliers such as mislabeled songs.

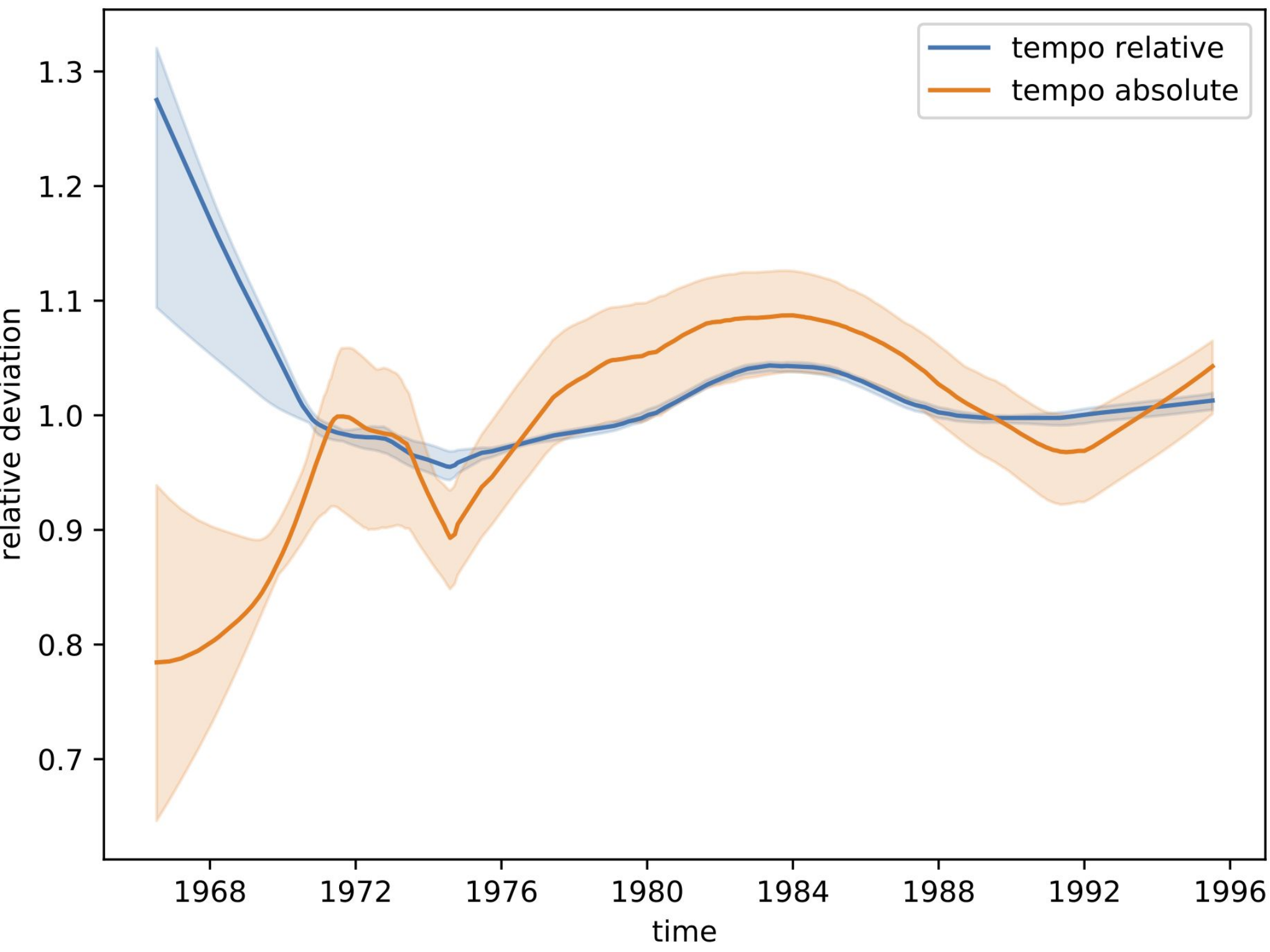
The rows in these two graphs represent chord sequences of different versions of a song, original on the left, corrected on the right. One can observe the beat corrections and a few omitted versions on the right.

The Method

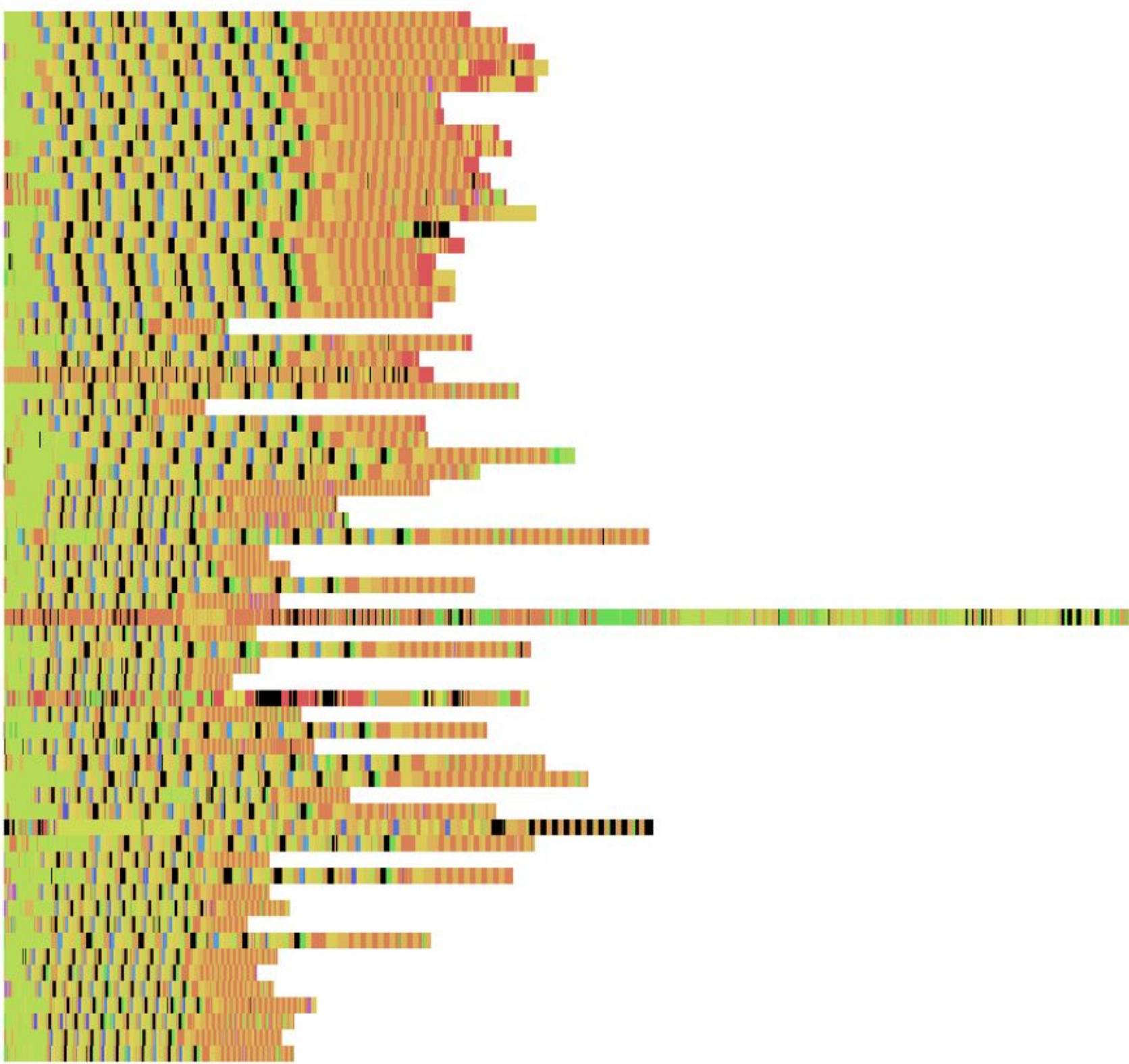
For every feature we calculated moving averages and LOWESS plots with leave-one-song-out confidence intervals. There is a large variation in feature values between songs. For example, tempo varies by almost a factor of 3:



However, we can take advantage of the fact that we are working with a limited number of songs. By considering feature values relative to each song, we were able to significantly narrow the LOWESS confidence interval:

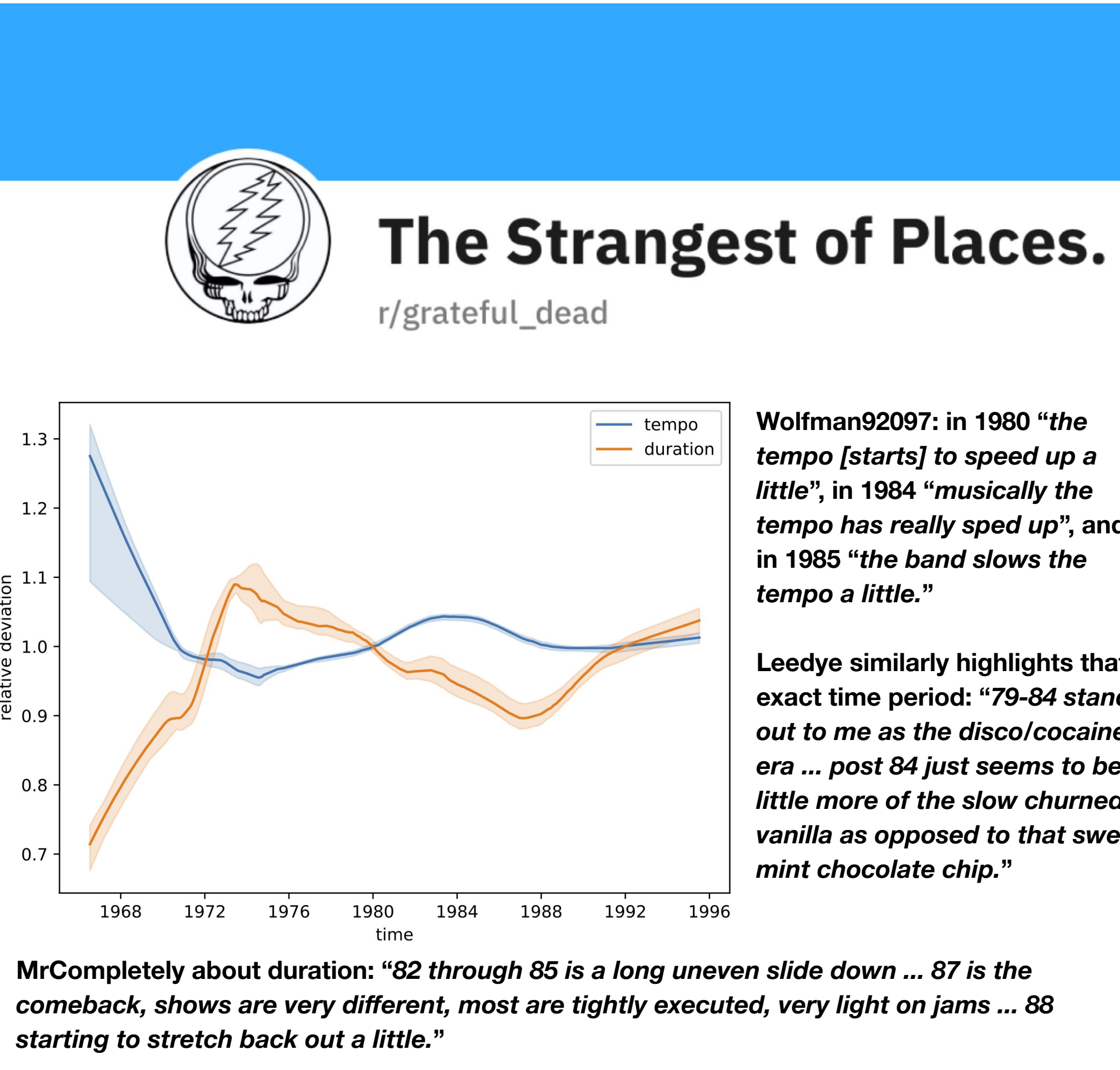


The blue LOWESS curve allows us to confidently infer that relative tempo over all 15 songs increased by more than 10% in the 1980s.



The Results

We evaluated our results by referring to the people most knowledgeable about this music, the deadheads. We searched the two largest subreddits, with almost 200'000 members, and collected all statements where users refer to specific years when speaking about the evolution of the dead’s music overall, or about individual songs. Here are a few examples:



MrCompletely about duration: “82 through 85 is a long uneven slide down ... 87 is the comeback, shows are very different, most are tightly executed, very light on jams ... 88 starting to stretch back out a little.”

