# Feature Weighting for Segmentation


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## Abstract

This paper proposes the use of feature weights to reveal the hierarchical nature of music audio. We describe both a global and a local approach to automatic feature weighting. The global approach assigns a single weighting to all features in a song. The local approach uses the local separability directly. Both approaches reveal structure that is obscured by standard features, and emphasize segments of a particular size.


## Goal

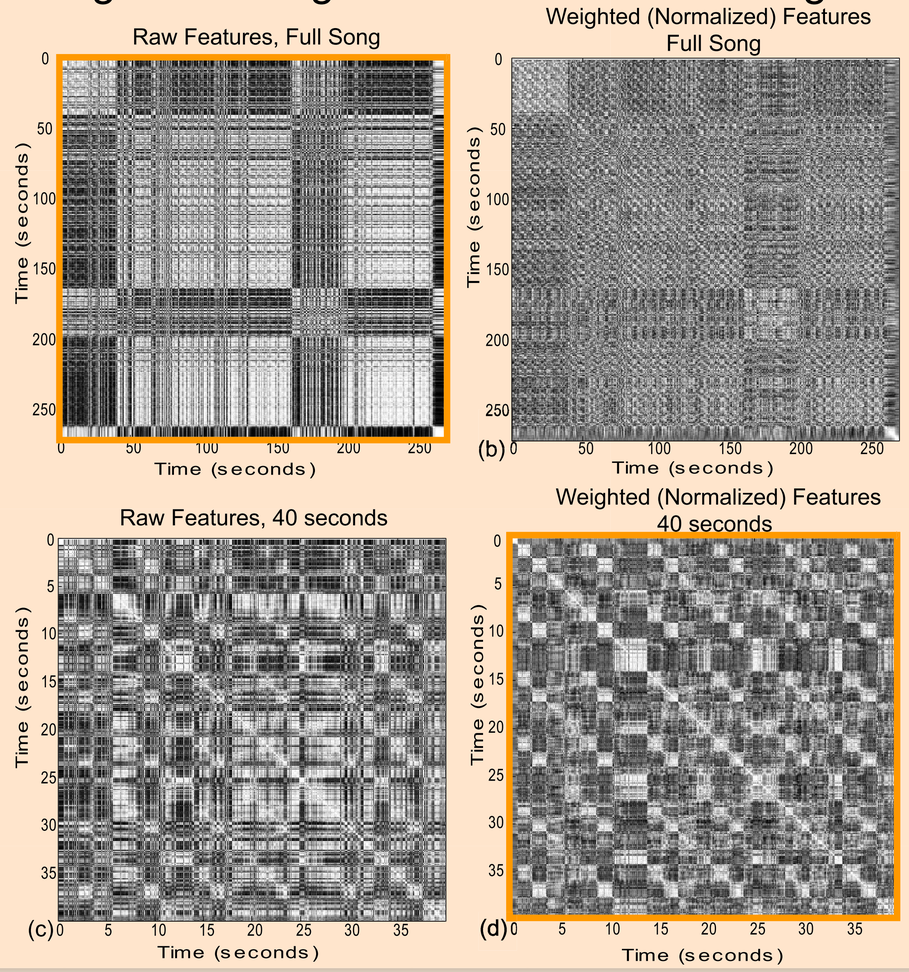
- Segment music audio in order to reveal hierarchical structure

## Our Approach

- Automatically select weights that reveal desired segment size.

## Problem

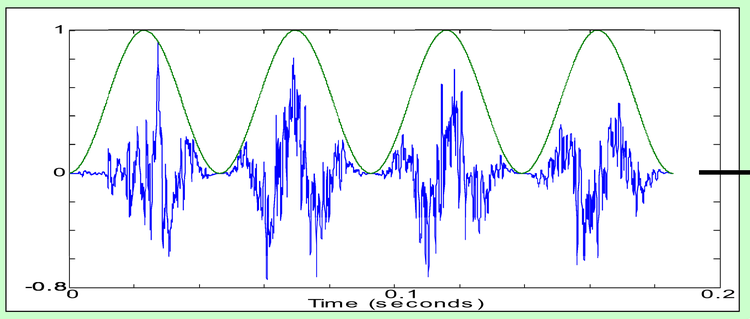
- Feature weights affect revealed segment size.
- Large white segments vs. small white segments



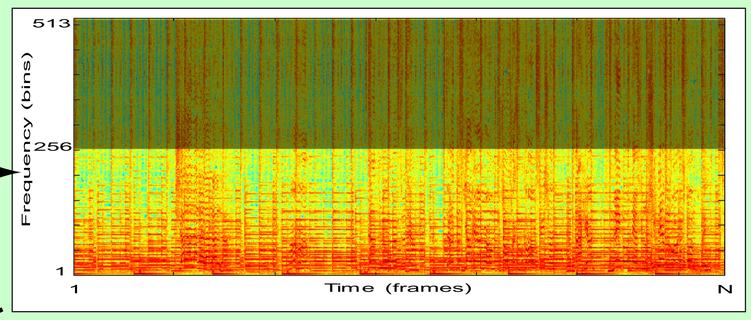

## Features

- First seven principal components of low-frequency spectrogram

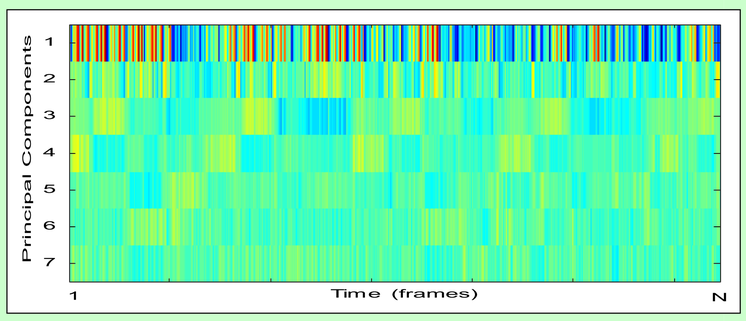
Windowed Audio Signal




Log Magnitude Short Time Fourier Transform

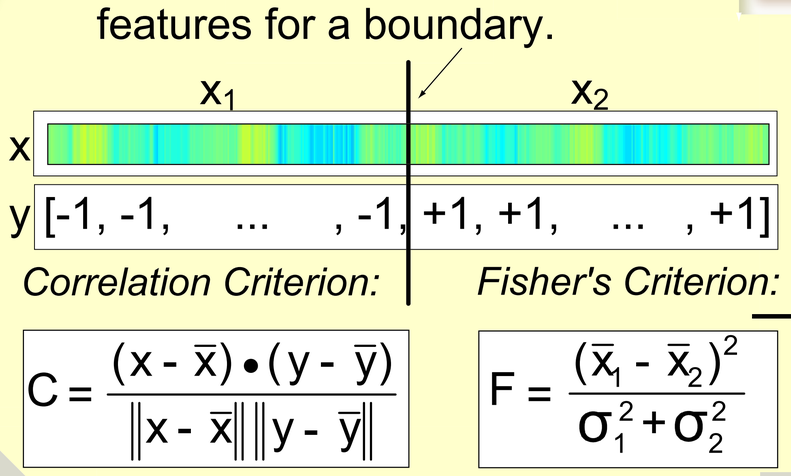



Principal Component Analysis




## Local Feature Weighting

- Use criterion functions to rate features for a boundary.



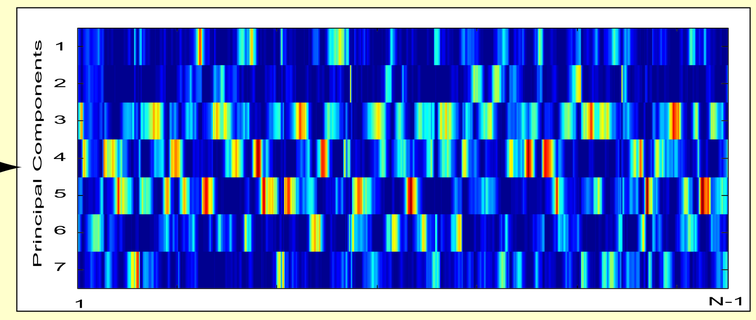

*Correlation Criterion:*

$$C = \frac{(x - \bar{x}) \bullet (y - \bar{y})}{\|x - \bar{x}\| \, \|y - \bar{y}\|}$$

*Fisher's Criterion:*

$$F = \frac{(\bar{x}_1 - \bar{x}_2)^2}{\sigma_1^2 + \sigma_2^2}$$

Local Weight Matrix (Feature x Boundary Index)



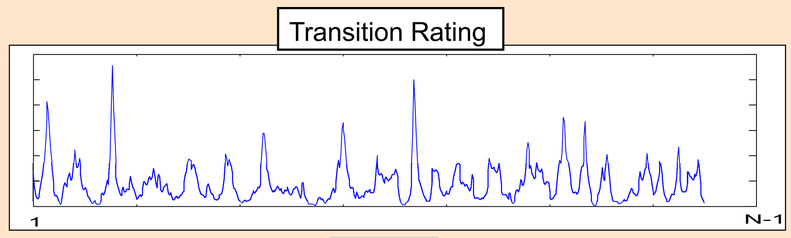

## Global Approach

- Average rows of local weight matrix.
- Apply weighting to all features.

## Local Approach

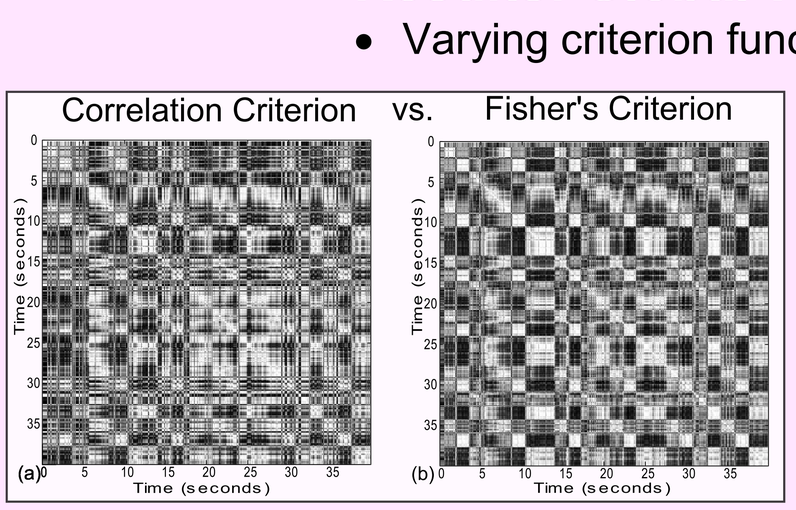
- Sum columns of local weight matrix.
- Use this as transition rating.

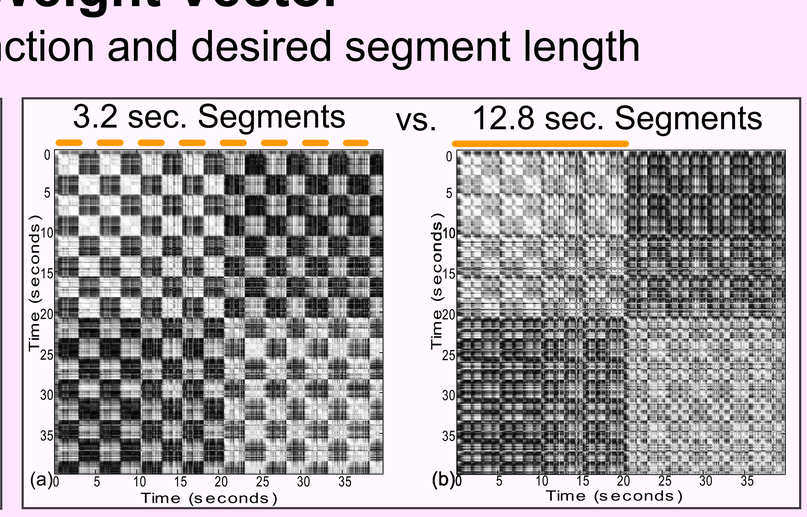
Transition Rating

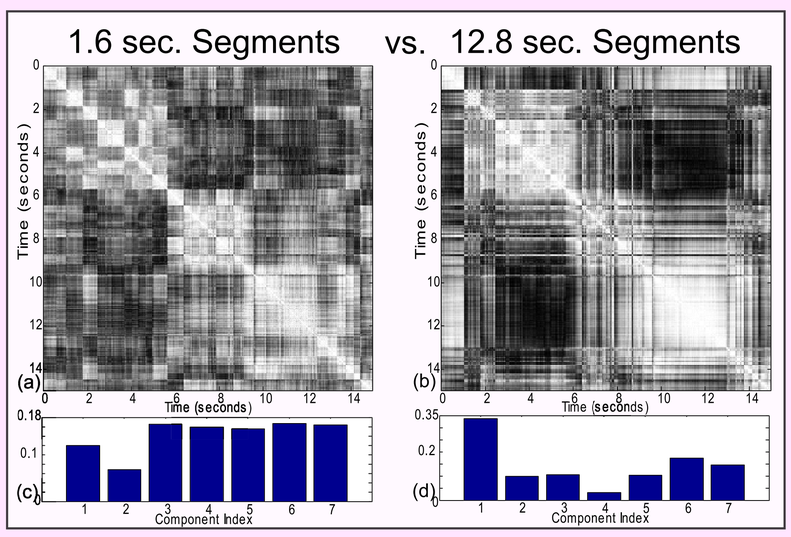


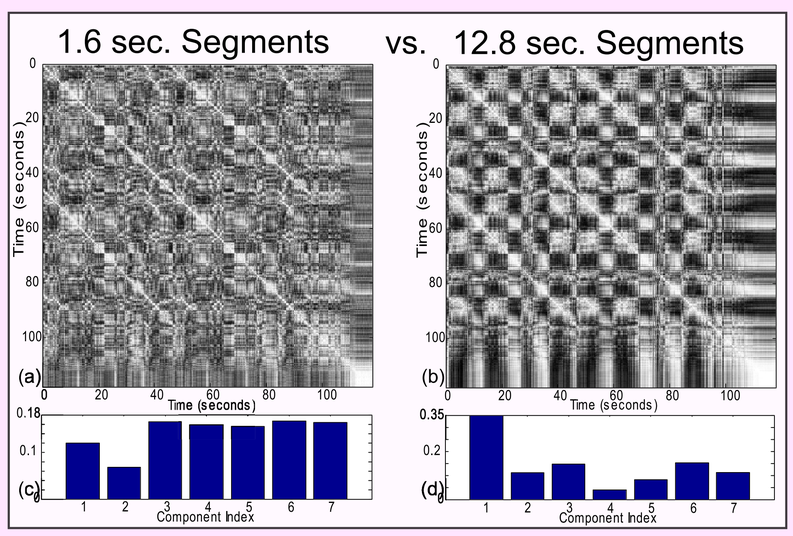
## Results: Global Weight Vector

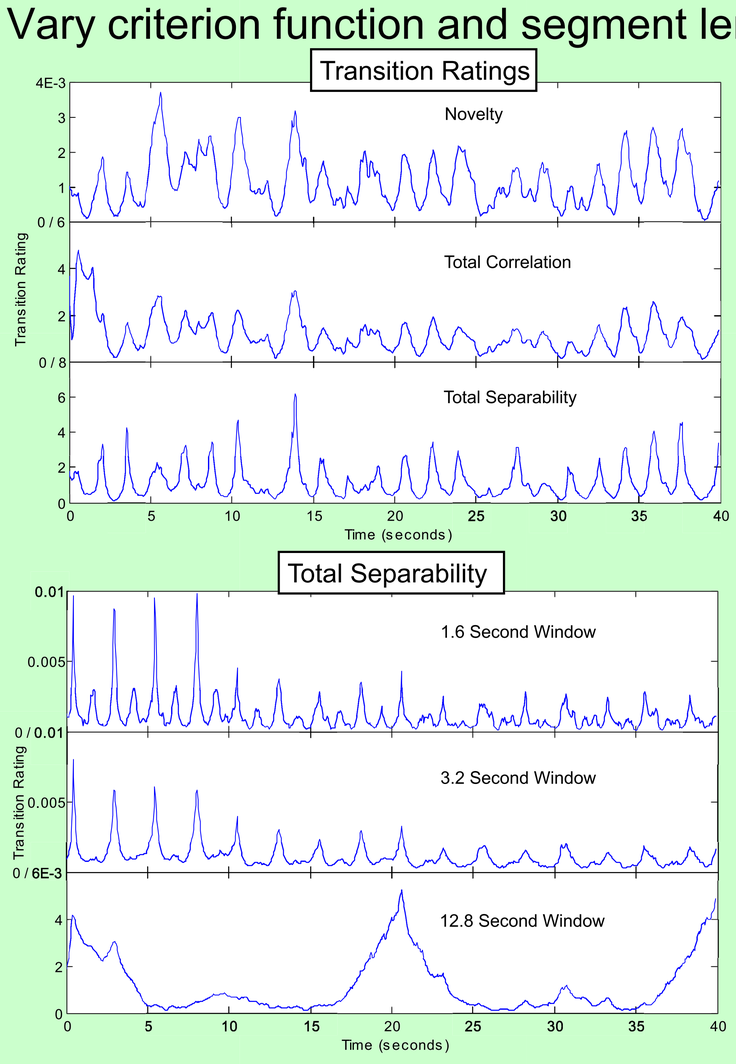
- Varying criterion function and desired segment length




## Results: Local Transition Rating

- Vary criterion function and segment length