

Music Analysis

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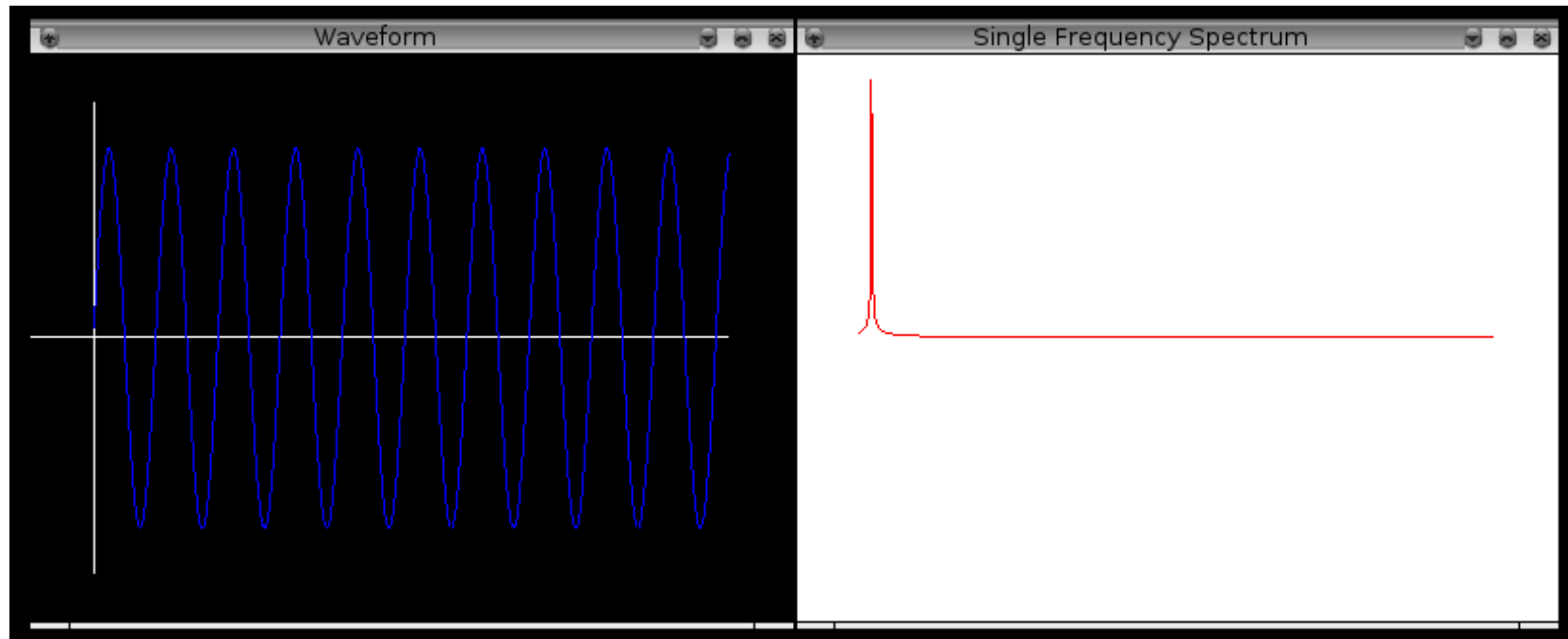
Purpose

- Run signal processing techniques on audio data
 - Discrete Fourier Transform
 - Fractal dimension
- Apply machine learning algorithms to processed data
- Autonomously identify what is music

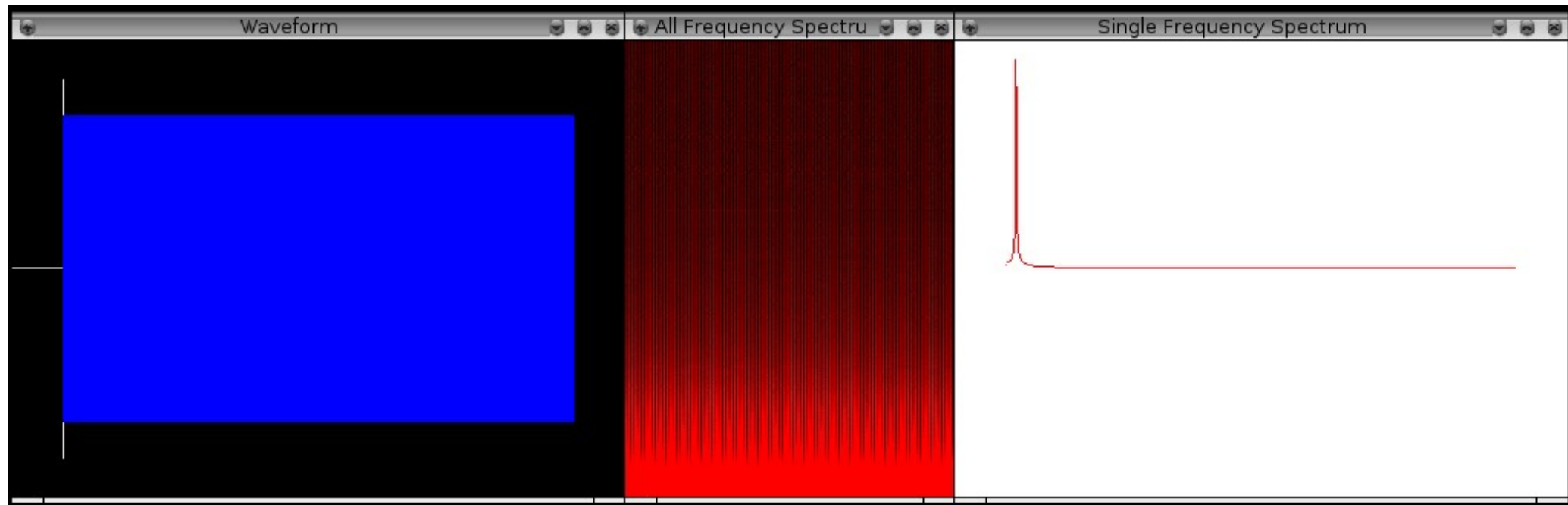
Background

- Bigarelle and Iost (1999)
 - Music genre can be identified by fractal dimension
- Basilie et al. (2004)
 - Music genre can be identified by machine learning algorithms
 - Used discrete MIDI data

Fourier Transform



Fourier Transform



Fractal Dimension

- Variation Method:

$$\lim_{\tau \rightarrow 0} \left(2 - \frac{\log \left(\frac{1}{b-a} \int_a^b \left| \max_{|x-t| < \tau} (f(t)) - \min_{|x-t| < \tau} (f(t)) \right| dx \right)}{\log \tau} \right)$$

- ANAM Method:

$$\lim_{\tau \rightarrow 0} \left(2 - \frac{\log \frac{1}{b-a} \int_{x=a}^{x=b} \left[\frac{1}{\tau^2} \int_{t_1=0}^{\tau} \int_{t_2=0}^{\tau} |f(x+t_1) - f(x-t_2)|^\alpha dt_1 dt_2 \right]^{1/\alpha} dx}{\log \tau} \right)$$

Machine Learning

Coming Soon...