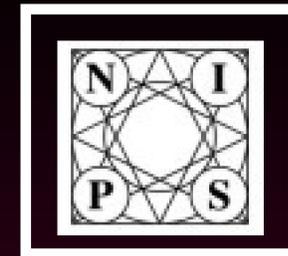




# Temporal Constraints for Sound Source Formation using the Normalized Cut

Mathieu Lagrange, Jennifer Murdoch, George Tzanetakis

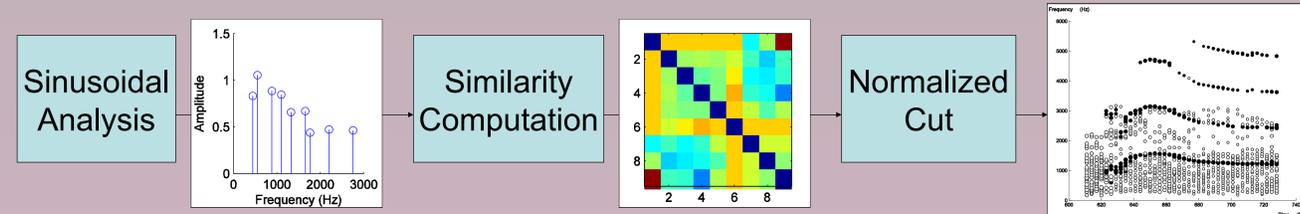
{lagrange, jmurdoch, gtzan}@uvic.ca



## Abstract

We explore the use of a graph algorithm called **the normalized cut** in order to organize prominent components of the auditory scene. We focus specifically on defining a **time-constrained similarity metric**. We show that such a metric can be successfully expressed in terms of the time and frequency **masking phenomena** and can be used to solve common problems in auditory scene analysis.

## The Algorithm

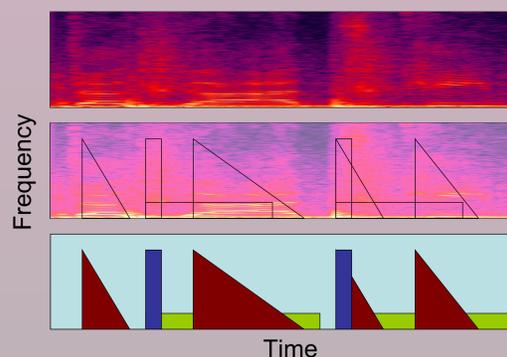


## Auditory Scene Analysis (ASA)

The perceptual process involved in forming a useful representation of the world using sound.

### Sound Integration

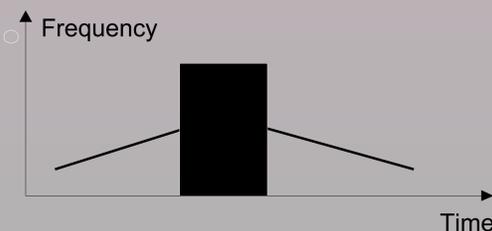
1. Spectral
2. Simultaneous
3. Sequential



### An Illusion of Sound Continuity

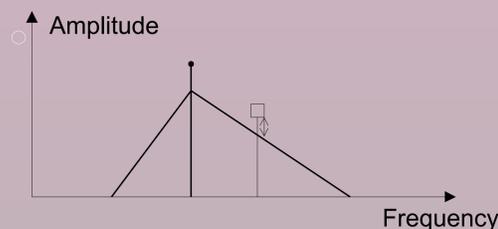
According to perceptual experiments, the maximum duration of the gap so that a continuity is still perceived depends on:

- The presence of a masker;
- Its relative energy in the frequency band.



## Temporal Continuity

- May be interpreted with consideration to the widely studied *frequency and temporal masking effects*.
- This link between temporal continuity and masking has not (as far as we know) been explored until now.



$$W_t(p_i^k, p_m^{k+n}) = F \left( \sum_{i=1}^{n-1} \text{SMR}(\hat{p}^{k+i}) \right)$$

## Results

Preliminary results are consistent with a link between:

- **perceptual continuity** and the
- **masking phenomena**.

