



Auditory Scene Analysis

Ian Kaminskyj

Electrical & Computer Systems Engineering, Monash University



Auditory Scene Analysis



- What is it?
- Why do it?
- How?



System Requirements



- Listen passively
- Digest
- Interpret
- Analyse
- Transcribe

- For example.....

A graphic of a musical staff with five red lines. On the left, there are three yellow musical notes with black stems and flags, ascending in pitch. On the right, there are two yellow musical notes with black stems and flags, descending in pitch. The word "Applications" is written in yellow text across the middle of the staff.

Applications

- Music
- Speech
- Music & Speech
- Environment
 - ◆ Military (eg. underwater)
 - ◆ Biological etc

A graphic of a musical staff with five red lines. On the left, there are three yellow musical notes with stems and flags, ascending in pitch. On the right, there are two yellow musical notes with stems and flags, descending in pitch. The word "Challenges" is written in the center of the staff in a bold, yellow, sans-serif font.

Challenges

- Identify sources reliably?
- Source separation?
- Noise?
- Reverberation?
- Segmentation?
- Realtime operation?

A graphic of a musical staff with five red lines. On the left, there are three yellow musical notes: a quarter note, an eighth note, and a sixteenth note. On the right, there are two yellow musical notes: a quarter note and an eighth note. The text "Musical instrument ID" is written in yellow with a black outline across the middle of the staff.

Musical instrument ID

- Current system capable of:
 - ◆ Identifying 19 instruments
 - ◆ Monophonic isolated sounds
 - ◆ Adaptive
 - ◆ Capable of up to 90-95% accuracy and reliability when adapted to a given collection of instrument sounds
 - ◆ Building block for complete system

Music Scene Analyser

Polyphonic
Continuous
Music w/Noise

Polyphonic
Continuous
Music

Monophonic
Continuous
Music

Single Notes

N Instruments

Music Notation
Generator

Music
Score

Noise
Cancellation

Source
Separation

Segmentation

Note &
Instrument ID

Segmentation

Note &
Instrument ID

Segmentation

Note &
Instrument ID

etc

etc