Melotree Overview
Dor Rondel

Abstract:

In exploring how the mind models musical information, one must first understand the basic symbolic auditory hierarchy within the field. On the most elementary level, a sound exists in the form of a wave, oscillating at different frequencies. Specific frequencies are particularly pleasant to humans, and those are called musical notes. When you have a grouping of an exact sequence of harmonious notes, you can begin to form melodies. Refined melotrees, abstract tree-like figures, are used to model the relationship between a melody and its component notes. Much like the mind, which groups together notes when listening to a long melody, melotrees are formed of group nodes, which themselves represent a short sequence of notes, partitioned the same way the average mind would partition the scrutinized melody. Therefore, melotrees represent an abstraction, which models the way the brain hears music, and as such, is an important tool that can be used in attempting to understand the mind.

Part 1:

Now that we've established a basic idea of how the brain models musical data, lets try to make a melotree. Take the following musical JFugue string:

C5q D5q E5q C5q C5q D5q E5q C5q E5q F5q G5h E5q F5q G5h G5i A5i

G5i F5i E5q C5q G5i A5i G5i F5i E5q C5q C5q G4q C5h C5q G4h C5h

After listening to the composition, it's clear that it can be separated into the following groups based off timbre and tonality differences:

GROUPS = {

G_1: **C5q D5q E5q C5q,**

G_2: **C5q D5q E5q C5q,**

G_3: **E5q F5q G5h,**

G_4: **E5q F5q G5h,**

G_5: **G5i A5i G5i F5i E5q C5q,**

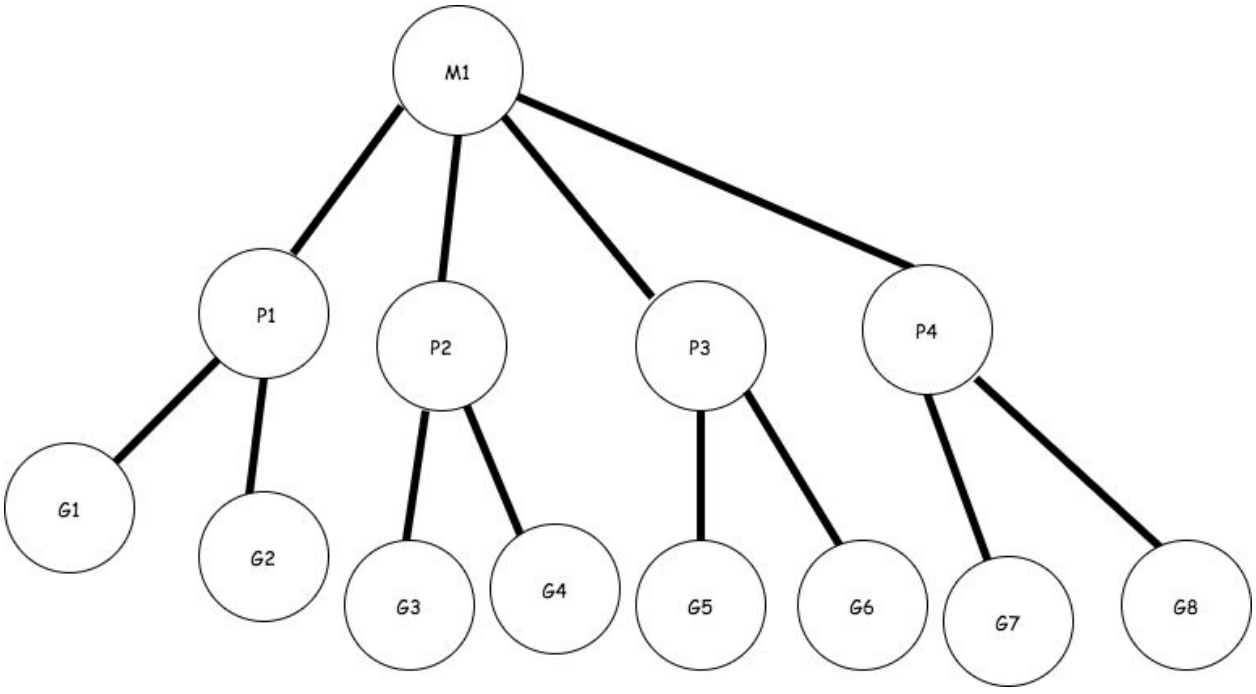
G_6: **G5i A5i G5i F5i E5q C5q,**

G_7: **C5q G4h C5h,**

G_8: **C5q G4h C5h**

}

With all the different groups of notes laid out, we can now form a melotree out of them.



Part 2:

Let's draw another melotree for a different melody. This time the melody can be modeled in JFugue as follows:

C5q E5q G5h G5i F5i E5i D5i C5h D5i D5i B4i G4i G5i G5i E5i C5i D5i

D5i B4i G4i G5i G5i E5i C5i C5i D5i E5i F5i G5h G5i F5i E5i D5i C5h

Out of the above notes, we create the following groupings:

GROUPS = {

G_1: **C5q E5q G5h,**

G_2: **G5i F5i E5i D5i C5h,**

G_3: **D5i D5i B4i G4i,**

G_4:**G5i G5i E5i C5i,**

G_5: **D5i D5i B4i G4i,**

G_6: **G5i G5i E5i C5i,**

G_7:**C5i D5i E5i F5i G5h,**

G_8: **G5i F5i E5i D5i C5h**

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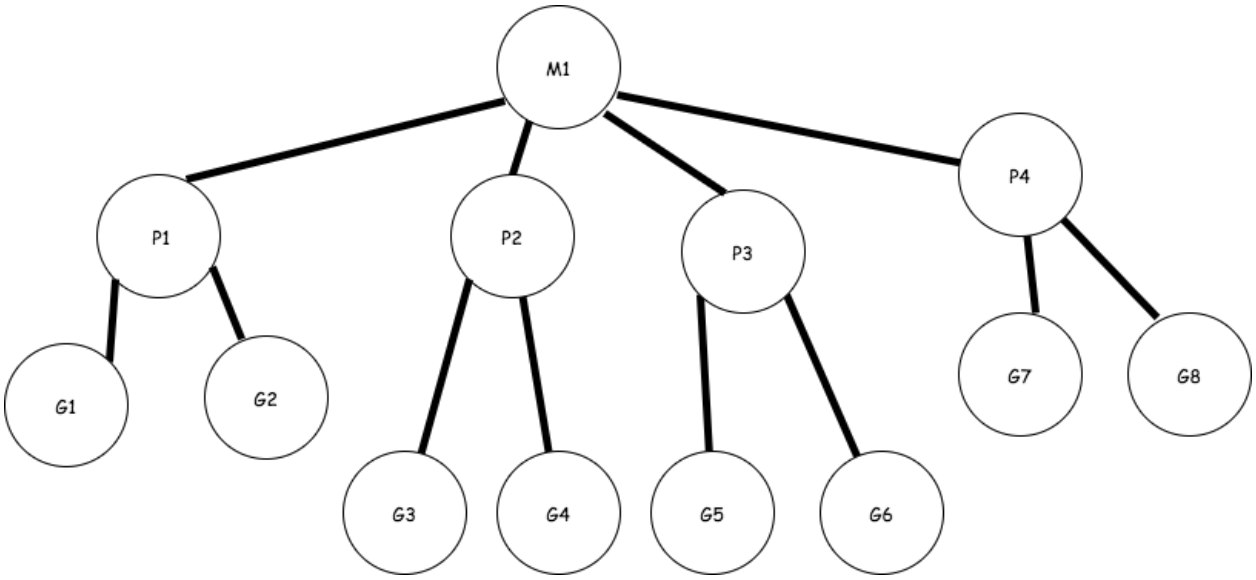

Part 3:

Forming a melotree from a list of notes can be done in the following way:

1) Listen to the notes you want to model in the appropriate sequence
2) Every time you hear a drastic change in either tone, rhythm, style, or timbre, make a mark indicating the beginning and end of the notes in that specific part of the melody
3) After splitting the entire melody into distinct groups of notes, listen to the melody again. If it is long enough there are probably drastic changes between groups of notes too, which should be grouped into the distinct parts of the melody
4) After separating the melody into its respective parts and subgroups, begin drawing the melotree from the root node, conventionally named M1.
5) Proceed completing the melotree connecting the corresponding parts to the root node and their subgroups to their parent parts, from the left to right subtree by the sequential order of the notes in the melody.

Part 4:

A sound wave makes a long journey before it is even processed by an individual's mind and then completely perceived by them. Much like a computer with thousands of files, it can quickly become overwhelming to keep track of individual artifacts, or in the brains case electrochemical information portraying physical stimuli. Even the simplest of noises can be composed of multiple varying frequency sound waves, and thus the brain can easily lose track of them and their corresponding information. To cope with this issue, the brain filters, nullifies, combines, and groups different frequencies, to make it easier to organize the stimuli's information. This abstract classification of knowledge into mental representation is an example of high level perception task. By modelling a high level perception task in the form of a reformed melotree, the melotree itself turns into a high level perception representation, and creating them a problem in high level perception.