An atonal challenge

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Pitch Classes and Set Theory

Pitch-class Set Theory is field of musical analysis often applied for analyzing atonal music. Pitch-class Set Theory studies sets of *pitch-classes*.

A pitch-class gathers all the notes that are n octaves apart, with $n \in \mathbb{N}$. For instance, the pitch-class of C will gather C1, C2, C3, etc.

There are 12 different pitch-classes, and each of them are associated with an integer $i \in [\![0, 11]\!]$. Table 1 provides the equivalence between pitch classes and $[\![0, 11]\!]$.

i	Pitch-class
0	C
1	C♯, D♭
2	D
3	D♯, E♭
4	E
5	F
6	F♯, G♭
7	G
8	G♯, A♭
9	A
10	A♯, B♭
11	B

Table 1: The 12 pitch-classes.

See Wikipedia "Pitch Class" for more information.

Chord

A chord is a group of 1 or more notes played at the same time. So, it converts to an integer set.

Example:

- The C-Major chord (C, E, G) corresponds to the set $\{0, 4, 7\}$.
- Let's suppose we have a C3-C4-E4-G4-C5 chord, the pitch-classes composing this chord are the C-pitch-class, the E-pitch-class and the G-pitch-class, therefore the corresponding set will be $\{0, 4, 7\}$.
- Reciprocally, a single note C3 corresponds to $\{0\}$.