Vulcan I Generative Music Tool v1.1

TechTech Technolgies

Contents

1 Background

The function $f(t, m) = t\&m$, where & is the bitwise AND operation, generates fractal sequences possessing some familiar musical qualities. Figure 1 gives an example of the values of $f(t, m)$ for $t, m \in [0, 7]$.

$m\backslash t$	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
1	0	1	0	1	0	1	0	1
2	0	0	2	2	0	0	2	2
3	0	1	2	3	0	1	2	3
4	0	0	0	0	4	4	4	4
5	0	1	0	1	4	5	4	5
6	0	0	2	2	4	4	6	6
7	0	1	2	3	4	5	6	7

Figure 1: Bitwise AND of values between 0 and 7

Vulcan primarily uses sequences where m is fixed and $t = [a, b]$, which produces sequences that tend to elaborate on a theme and contain repeated phrases with lengths in powers of two, both of which are common characteristics in notated music. The most obvious example in figure 1 occurs when $m = 5$. The extended sequence for $m = 5$

t	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$t\&5$	0	1	0	1	4	5	4	5	0	1	0	1	4	5	4	5

reveals a theme of the form a, b, a, b established as $0, 1, 0, 1$ and expanded as $4, 5, 4, 5$. The theme is also present on a larger scale with $a = (0, 1, 0, 1)$ and $b = (4, 5, 4, 5)$. This example is very simple because the mask value m is quite small. Larger values of m can yield longer and more complex sequences with similar melodic qualities. For example $m = 85$ and $t = [92, 107]$ produce the sequence

t	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107
$t\&855$	84	85	84	85	64	65	64	65	68	69	68	69	64	65	64	65

which contains three different groups matching the a, b, a, b form arrange in a second form: a, b, c, b.

2 Interface

3 Sequencing