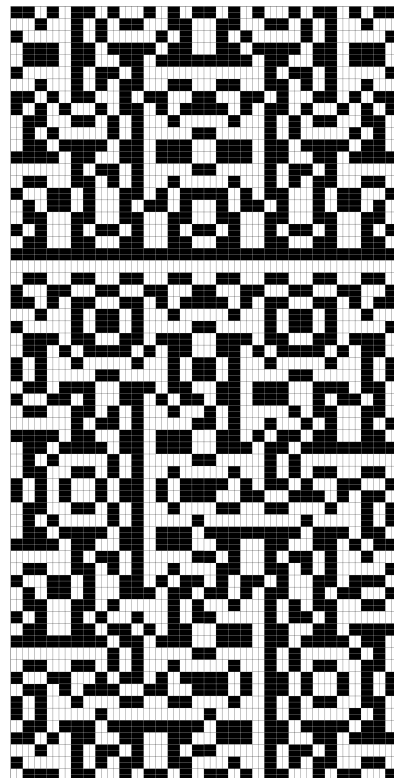
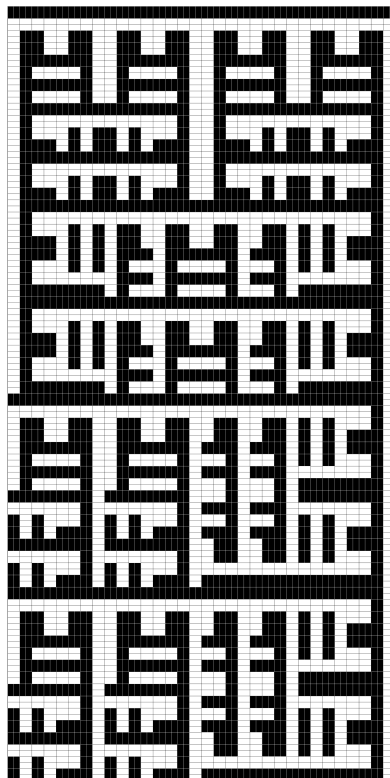
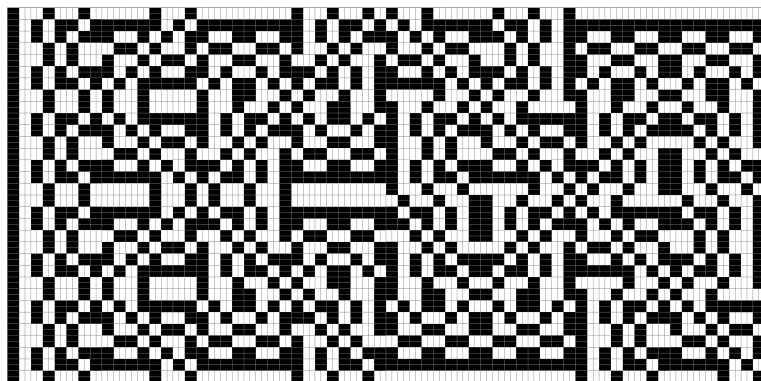
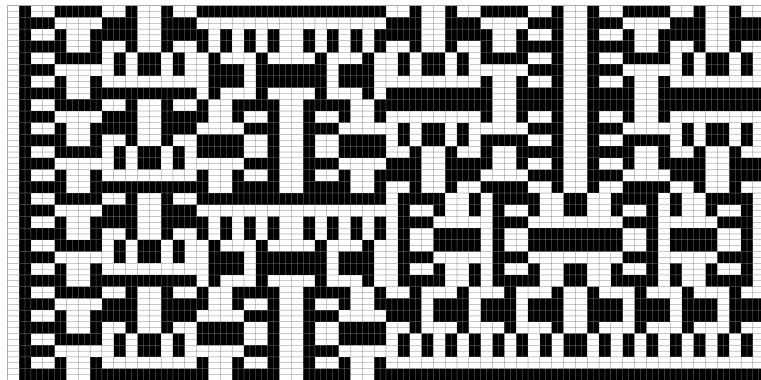


a lot of tiles (trivial scan)

4096 variations on 256 tiles dedicated to Chaim Goodman-Strauss and Omar Lopez
a performance-installation



a lot of tiles (trivial scan)

4096 variations on 256 tiles dedicated to Chaim Goodman-Strauss and Omar Lopez
a performance-installation

michael winter (cdmx, mx and nashville, usa; 2018)

Program notes

This piece is based on a set of rectangle substitution tilings (commonly referred to as tessellations) explored by Chaim Goodman-Strauss in his seminal paper *Lots of aperiodic sets of tiles*. A rectangle substitution tiling is generated by dissecting a rectangle into 4 smaller rectangles, which are then dissected into 8 even smaller rectangles, and so on. Rectangles can produce both periodic and non-periodic tilings and thus are not strictly aperiodic. A strictly aperiodic set of tiles consists of a group of geometric shapes that submit only non-periodic tilings. However, Goodman-Strauss shows in his paper that the group of rectangle substitution tilings used for this piece can be represented by 25380 aperiodic tilings using subsets of 211 non-rectangular tiles. Prior to this discovery, only a handful of strictly aperiodic tilings were known. That is, in one fell swoop, Goodman-Strauss extended the number of known aperiodic tilings by some 500+ fold.

In order to proceed with his proof of the newly discovered 25380 aperiodic tilings, Goodman-Strauss outlines how to generate the 256 rectangle substitution tilings which they represent. This piece extends his method of generating these 256 rectangle tilings to create 4096 sonic and visual variations. The parenthetical in the title ‘trivial scan’ refers to the method of sonification. A given tiling is further dissected into squares (groups of two rectangles side-by-side) which are then scanned / read such that the orientation of the pairs of subtiles which form the squares (whether they are grouped vertically or horizontally) determines sonic parameters of the piece.

Setting

The piece consists of both a visualization and sonification of the tilings generated and projected by a program written in SuperCollider. The program has a ‘continuous play’ mode for an installation setting that generates random tilings from the 4096 variations in succession. Live performers can also accompany the electronic realization of a tiling as detailed below. This allows the installation to be occasionally augmented by live performances and enables any subset of the variations (preferably at least 3) to be played in a concert setting as well. For the latter, projection of the visualization is optional.

Generally, the setting should be dark and the sonification should be clear and present.

Tile variations (transform code)

Each of the 4046 variations can be represented by a transform code of 7 digits. The first 4 digits generate the 256 archetypal tilings (visualizations of these are appended to this document) by determining the orientation of each of the 4 subtiles relative to its parent tile. This is the method outlined by Goodman Straus in his paper. The 5th and 6th digits determine the orientation and mirroring of the entire tiling. As mentioned in the program note, each tiling is further dissected into squares and scanned. The read-head always scans from left to right and top to bottom. Thus, the 5th and 6th digits of the transform code ultimately result in different read sequences. The 7th digit determines the color inversion of the subtiles: the color (black / white) based on the orientation (vertical / horizontal). These are turned into numeric values for sonic parameters.

Tile sonification (the scan)

The tiling is generated up to a depth of 6 substitutions / hierarchical levels (hls). While the tile visualization is hopefully self-explanatory, the sonification warrants detailed instructions.

hl 6 (fundamental): The maximum depth of 6 substitutions of the tiling is sonified by a highly controlled tremolo on a pitched tone sounding a low g (2 octaves and a perfect fourth below middle c or a frequency of approximately 49 hertz). The scanned white and black values map to amplitudes blurred by an exponential lag (see the SuperCollider UGen ‘Lag’). This means that amplitude curves are not linear but logarithmic.

The computer generates this tone with a sine wave oscillator. The sine tone may be doubled or replaced by a low reed woodwind instrument (such as a bass clarinet, baritone saxophone, bassoon, or contrabassoon) sounding the lowest g comfortably playable in the instrument’s range. In the score, which is engraved using the Lilypond typesetting language, a gray-scale curved gradient shows the amplitude of the tremolo such that completely black denotes the maximum volume and completely white denotes silence. Below the gradient is a rhythmic notation where the duration of each note corresponds to the amount of time before the curve changes direction (from louder to softer or softer to louder). The tempo for the quarter note strictly equals 120 beats per minute making each variation last just over 4 minutes and 15 seconds. Below each note is a numeric value indicating the target amplitude from the preceding note between: between 0 (silent) and 9 (maximum volume). For longer note durations, the curve will potentially reach the loudest or softest level before the duration indicated by the note (that is, before the volume changes direction again). The very first note of each tiling may indicate a silence if the upper left corner is a white tile which results in a starting amplitude of 0. If the upper left corner of the tile is black, this part starts at full scale / volume immediately with no fade in. However, each variation ends with a fade out some time before the end of the final measure. Performers should use the electronic tone from the application as a reference for the dynamic profile of the tremolo.

In order to breath, the performer may fade to silence on any note over which a decrease in amplitude occurs and then reenter fading in on any note in which an increase in amplitude occurs.

This should be the most present sonic element of the piece; loud and clear.

hl 6 (harmonics): The fundamental is colored by a set of 3 harmonics (the 5th, 9th, and 13th) that sonify adjacent rows of the tiling. In this sense, the piece contains a sort of a canon. The fundamental sonifies the tiling starting on the 1st row, the 5th harmonic sonifies the tiling starting on the 2nd row, and so on. While the blurring method is the same, the maximum amplitudes of each harmonic decrease directly in correspondence with the harmonic number (1 divided by the harmonic number squared). By default these parts are not included in the score as they are not played by live performers. However, there are lines in the Lilypond file that can be uncommented to view the parts. (Note that the amplitude gradient for these parts is normalized and does not represent the decreasing amplitudes of the harmonics.)

The dynamic of this part should be well below the fundamental (see more in the explanation of the SuperCollider interface). That is, the correspondence between the harmonic number and the decrease in amplitude is maintained between the harmonics, but not in relations to the fundamental, which should sound much louder. Though it is highly preferred to play the piece with the synthesized sounds, a strictly acoustic realization could be played with the harmonics omitted.

hl 5 and 4 (high noise and low noise, respectively): High and low noises sonify the 5th and 4th substitutions / hls, respectively. The SuperCollider application synthesizes these with filtered white noise: using a high pass filter with a cutoff of 5000 hertz for the high noise and a low pass filter with a cutoff of 300 hertz for the low noise. Unlike hl 6, the black / white values are not blurred. A white value results in a soft noise and a black value results in a slightly louder noise. That is, there is no smooth transition, the volume change is abrupt and binary.

Like the fundamental of hl 6, these parts can be doubled / replaced by acoustic instruments such as percussion. Pitched instruments can also be used as long as the resulting noise does not have a clearly defined pitch. In the score, the notes of these parts are accompanied by a numeric value, 0 or 1, denoting the two states (soft or slightly louder, respectively) for the duration of that note. Like the electronics, the change should be abrupt; highlighting the binary nature of the underlying structure. Performers are free to explore different methods of sonifying the two states by different types of sounds (not just considering the dynamic parameter).

These parts should be considered as secondary to the fundamental of hl 6 and any decision moving away from the synthesized version of high and low noises should maintain the subtlety of these parts in relation to the fundamental of hl 6.

SuperCollider program

The application contains a graphical user interface (gui) and a window for the visualization of the tiling. The gui has three tabbed panes shown on the following page: a ‘model’ pane, a ‘transport’ pane, and a ‘mixer’ pane. These are explained in more detail below. To launch the application, execute `supercollider/a_lot_of_tiles_trivial_scan_main.scd` in SuperCollider after booting the server (on Linux, press `ctrl+enter` with the cursor anywhere within the code block to execute the code).

The source code for the application is appended at the end of this score and can also be downloaded from a git repository at https://gitea.unboundedpress.org/mwinter/a_lot_of_tiles_trivial_scan. The generation of this document (using LaTeX) contains a version date in order to help track changes and the git repository will also detail commit changes. The piece was written using SuperCollider version 3.9.0 and Lilypond version 2.19.81.

Model pane: This pane allows the user to manipulate the transform code (which automatically updates the tile visualization), control the layout of the tile visualization, and provides display options for the tile visualization window. There are three additional buttons on the bottom right to start a ‘continuous play’ mode for an installation settings (note that this will disable the transform code buttons), to generate the Lilypond files for the current tiling / transform, and to export an image of the current tiling / transform.

There are four layout options: one for each of the hls and another view that embeds the hls together. The display options allow the user to enter into fullscreen mode (while the escape key will exit fullscreen mode). Deselecting the ‘window decorator’ button will remove the window border from the tile visualization window. This can be used to launch several instances of the application and project more than one tile visualization using the same projector.

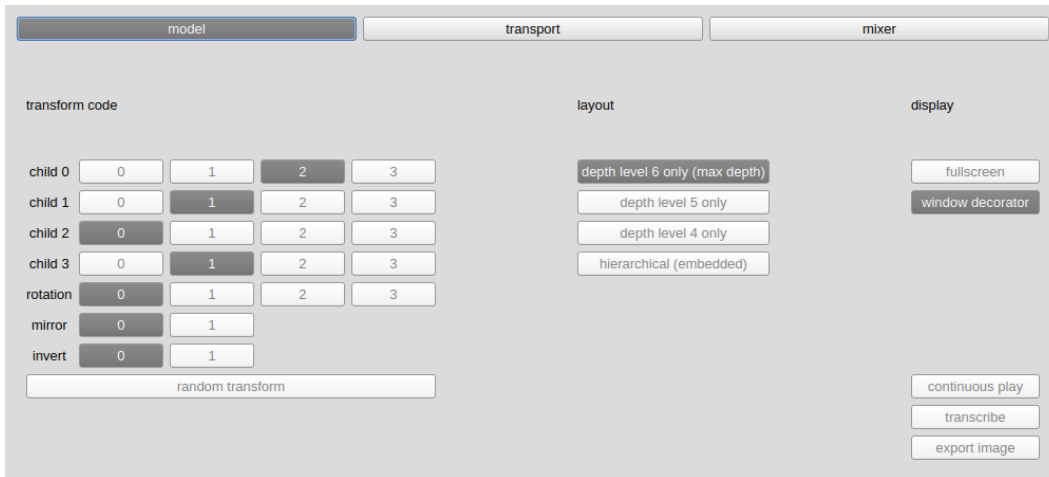
The ‘transcribe’ button will generate all the Lilypond files for the master score and the parts in the `score/transform_<code>_score/lilypond/` folder (where `<code>` is the digit sequence of the transform code; for example, `score/transform_2101000_score/lilypond/`). It will also attempt to run a Lilypond executable if it is installed in order to automatically create pdfs of the score in the folder `score/transform_<code>_score/pdf/`. Scores of 4 of the variations are included in this document.

Transport pane: This pane has playback controls for the current tiling / transform allowing the user to start from different locations. When the ‘play’ button is pressed, the application will check if the necessary audio files exist. If not, it will generate them in the `audio/transform_<code>_audio/` folder (this will delay the start a small amount of time). The generated audio files can be used for playback in an alternative environment such as a digital audio workstation. Note that if the application is in ‘continuous play’ mode, the audio files will be deleted as to not consume too much storage space.

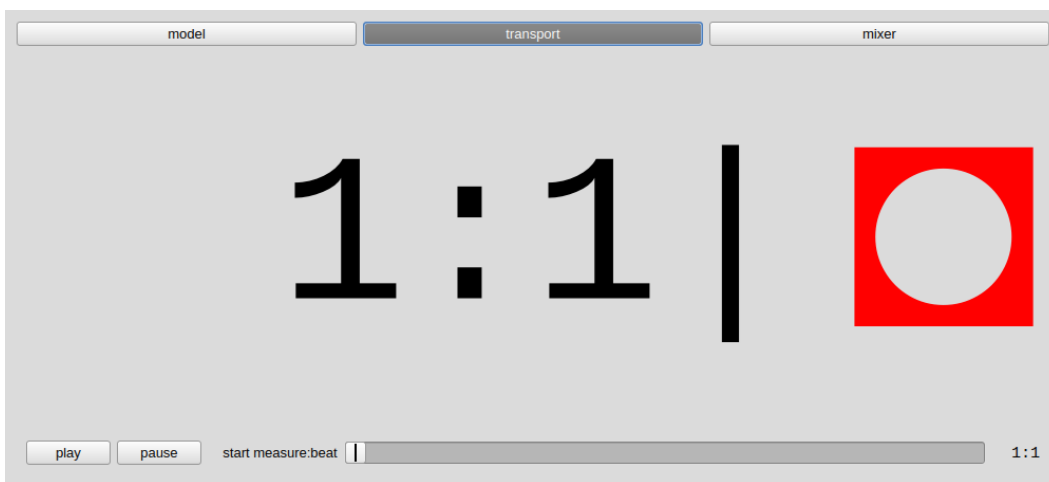
The pane also contains a visual metronome which displays the current measure and beat with respect to the score. When the ‘play’ button is pressed, the metronome will give two measures of silence before starting.

Mixer pane: This pane provides controls for playback levels of the different sonic elements allowing the user to ensure that the fundamental of hl 6 is the most present sonic element.

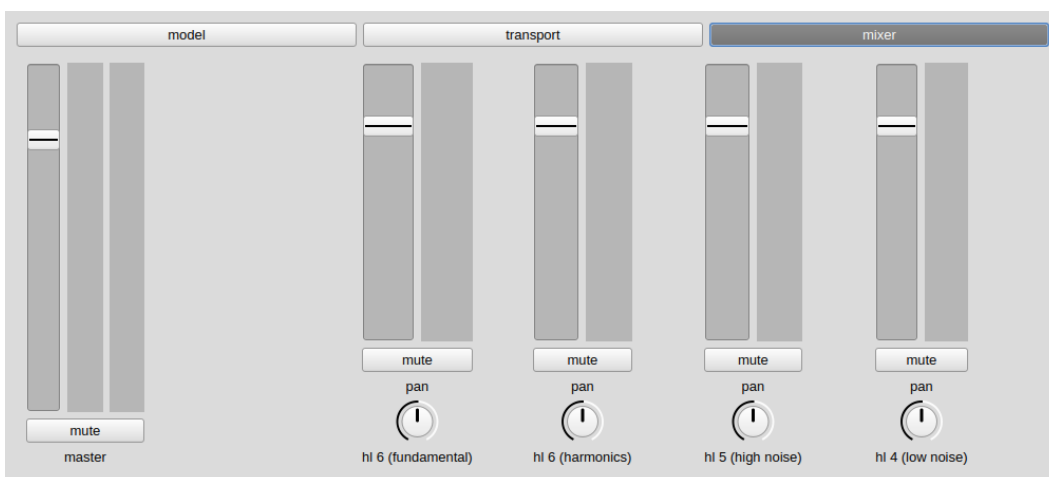
I would like to extend a special thanks to James Harkins and Thomas Morley for their generous help with SuperCollider and Lilypond, respectively.



model pane



transport pane



mixer pane

⑰

hl6 (h1)
1 4 1 8 5 7 4 7 5 6 2 5 1 4 0 4 1 4 1 4 3 7 4 6 4 8 3 5 2 5 2 8 5 7 4 7 5 6

hl5 (hn)
0 1 0 1 0 1 0 1 0

hl4 (ln)
1

⑳

hl6 (h1)
2 8 0 4 2 6 4 6 2 8 5 9 6 8 3 5 3 7 4 6 0 7 3 8 0 4 2 6 4 6

hl5 (hn)
1 0 1 0 1 0

hl4 (ln)
0

㉕

hl6 (h1)
2 5 2 4 2 4 0 7 4 9 6 8 0 3 1 4 1 4 2 4 2 4 2 4

hl5 (hn)
1 0 1 0 1 0 1 0 0 1 0

hl4 (ln)
1 0


㉙

hl6 (h1)
0 8 3 9 6 7 2 4 0 4 1 4 2 9 4 8 3 8 3

hl5 (hn)
1 0 1 0 1 0 1

hl4 (ln)
1

33



h16 (h1)

h15 (hn)


h14 (ln)

9 6 7 3 8 3 5 2 5 2 4 2 8 3 8 3 9 4 8 3 8 3

0 1 0 1 0 1 0 1 0

0 1 0 1

37



h16 (h1)

h15 (hn)


h14 (ln)

9 6 9 1 7 3 8 3 5 2 5 2 4 2 4 2 4 0 3 1 4 1 4 1 4 2 4 2 4

1 0 1 0 1 0 1 1

1 0 1

41



h16 (h1)

h15 (hn)

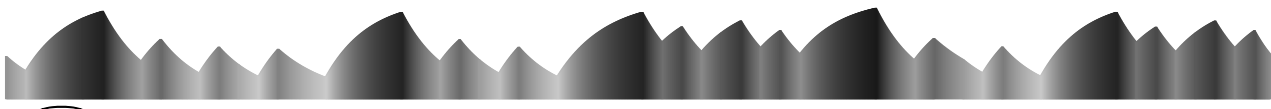
h14 (ln)

0 3 1 4 1 8 3 8 1 7 3 8 0 4 2 6 4 6 0 7 3 8 0 4 2 6 4 6

0 1 0 1 0 1 0 1 0 1

0 0

45



h16 (h1)

h15 (hn)

h14 (ln)

2 8 3 5 2 5 2 4 2 8 3 5 2 5 2 8 5 7 4 7 5 6 4 9 3 5 2 5 2 8 5 7 4 7 5 6

0 1 0 1 0 1 0

1 1

④9

hl6 (h1)
hl5 (hn)
hl4 (ln)

⑤3

hl6 (h1)
hl5 (hn)
hl4 (ln)

⑤7

hl6 (h1)
hl5 (hn)
hl4 (ln)

⑥1

hl6 (h1)
hl5 (hn)
hl4 (ln)

65

hl6 (h1)
1 4 1 8 3 5 2 5 2 9 6 9 3 6 3 8 3 7 3 8 5 7 3 8

hl5 (hn)
0 1 0 1

hl4 (ln)
1 0

69

hl6 (h1)
3 8 1 7 3 8 0 3 1 4 1 4 3 5 2 5 2 6 2 5 2 4 3 5 2 5 2 4

hl5 (hn)
0 1 0 1 0 1 0 1 0

hl4 (ln)
1

73

hl6 (h1)
2 4 2 4 2 8 3 8 5 7 4 6 4 6 2 5 3 5 3 5 3 5 3 8 0 7 0 7 0 7

hl5 (hn)
1 0 1 0 1 0 0 0

hl4 (ln)
0 1 0 1

77

hl6 (h1)
3 8 3 5 2 5 2 4 2 4 3 5 3 5 3 5 2 5 3 5 3 5 3 5 3 6 2 8 5 7 3 9 4 6 4 8 3 5

hl5 (hn)
1 0 1 0 1 0

hl4 (ln)
0 1 0 1

81

hl6 (h1)
2 5 2 8 5 7 4 7 5 6 2 5 1 4 0 4 1 4 1 4 1 8 5 7 3 9 4 6 4 8 3 5

hl5 (hn)
1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

85

hl6 (h1)
2 7 0 4 2 6 4 6 2 8 5 9 6 8 3 8 0 7 0 7 0 7

hl5 (hn)
1 0 1 0 1 0

hl4 (ln)
0 0 0 0

89

hl6 (h1)
3 5 2 5 2 4 0 7 4 9 6 8 3 5 2 5 2 4 3 5 2 5 2 6 2 5 2 4 3 5 2 5 2 4

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

93

hl6 (h1)
2 8 3 9 6 7 2 4 0 4 1 4 1 8 3 5 3 8 3 7 3 8 5 7 3 8

hl5 (hn)
1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0 1 0 0

97

hl6 (h1)
3 5 2 8 3 5 2 5 2 4 2 8 3 8 3 5 2 5 1 4 1 4 1 4 1 4 1 4 1 4

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1

101

hl6 (h1)
1 7 1 7 3 8 3 5 2 5 2 4 2 4 2 8 5 8 5 8 5 8 3 8 5 8 5 8 5

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
1 0 1

105

hl6 (h1)
8 5 7 3 5 2 8 3 8 1 7 3 8 1 7 4 8 5 8 5 8 3 8 5 8 5 8 5

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
0 1 0 1 0 1 0 1

109

hl6 (h1)
8 5 9 3 6 2 5 2 4 2 8 3 5 2 5 2 8 3 5 1 4 1 4 1 4 1 4 1 4 1 4

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
0 1 0 1 0 1 0 1

113

h16 (h1)

h15 (hn)

h14 (ln)

117

h16 (h1)

h15 (hn)

h14 (ln)

121

h16 (h1)

h15 (hn)

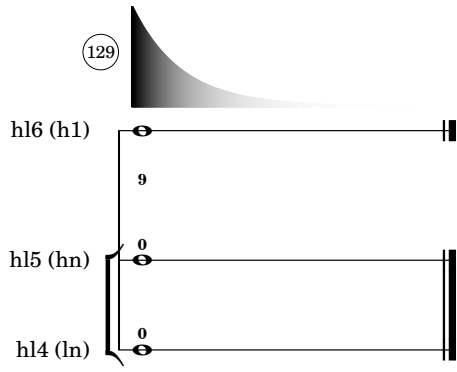
h14 (ln)

125

h16 (h1)

h15 (hn)

h14 (ln)



a lot of tiles (trivial scan)

2101000

michael winter

(cdmx, mx and nashville, usa; 2018)

part - hl 6 - 2101000

hl 6
(harm 1)

0 0 3 1 8 3 5 2 5 2 9 4 6 2 5 2 8 3 5 2 5 2 8 3 5 2 5

⑤

1 7 1 7 3 8 0 7 3 8 1 7 3 8 1 7 3

⑨

8 5 6 2 5 2 8 3 8 5 7 4 6 4 6 2 5 3 5 3 5 3 8 3 8 3 5 2 5 2 4 2 4 2 8 3

⑬

8 5 9 3 6 2 5 2 4 2 4 3 5 3 5 3 5 2 5 3 5 3 5 3 5 5 2 5 2 4 2 4 2 8 3 8 3 5 2 5 2 4

⑰

1 4 1 8 5 7 4 7 5 6 2 5 1 4 0 4 1 4 1 4 3 7 4 6 4 8 3 5 2 5 2 8 5 7 4 7 5 6

⑳

2 8 0 4 2 6 4 6 2 8 5 9 6 8 3 5 3 7 4 6 0 7 3 8 0 4 2 6 4 6

㉒

2 5 2 4 2 4 0 7 4 9 6 8 0 3 1 4 1 4 2 4 2 4 2 4

㉔

0 8 3 9 6 7 2 4 0 4 1 4 2 9 4 8 3 8 3

33

hl6 (h1)

9 6 7 3 | 8 3 5 2 5 | 2 4 2 8 3 | 8 3 | 9 4 8 3 | 8 3

37

hl6 (h1)

9 6 9 | 1 7 3 | 8 3 5 2 5 | 2 4 2 4 2 4 | 0 3 1 4 1 4 1 4 2 4 2 4

41

hl6 (h1)

0 3 1 4 1 8 3 | 8 | 1 7 3 8 | 0 4 2 6 4 6 | 0 7 3 8 | 0 4 2 6 4 6

45

hl6 (h1)

2 8 3 5 2 5 2 4 | 2 | 8 3 5 2 5 2 | 8 5 7 4 7 5 6 4 | 9 3 5 2 5 2 | 8 5 7 4 7 5 6 4

49

hl6 (h1)

2 5 2 | 8 5 7 4 7 5 6 4 | 8 3 5 2 5 2 | 8 3 5 2 5 2 4 2 | 8 3 | 8 3 5 2 5 2 4

53

hl6 (h1)

1 7 | 0 4 2 6 4 6 | 0 7 3 8 | 1 7 3 | 8 3 5 2 5 2 4 2 4 2 | 8 3

57

hl6 (h1)

8 5 6 | 2 5 2 5 | 0 3 1 4 1 4 2 4 2 4 2 | 8 3 8 | 1 7 3 8 | 1 7 3

61

hl6 (h1)

8 5 | 9 3 | 9 4 8 3 | 8 3 5 2 5 2 4 2 | 8 3 5 2 5 2 | 8 3 5 2 5

65
hl6 (h1)
1 4 1 8 3 5 2 5 2 9 6 9 3 6 3 8 3 7 3 8 5 7 3 8

69
hl6 (h1)
3 8 1 7 3 8 0 3 1 4 1 4 3 5 2 5 2 6 2 5 2 4 3 5 2 5 2 4

73
hl6 (h1)
2 4 2 4 2 8 3 8 5 7 4 6 4 6 2 5 3 5 3 5 3 5 3 5 3 8 0 7 0 7 0 7

77
hl6 (h1)
3 8 3 5 2 5 2 4 2 4 3 5 3 5 3 5 2 5 3 5 3 5 3 5 3 6 2 8 5 7 3 9 4 6 4 8 3 5

81
hl6 (h1)
2 5 2 8 5 7 4 7 5 6 2 5 1 4 0 4 1 4 1 4 1 8 5 7 3 9 4 6 4 8 3 5

85
hl6 (h1)
2 7 0 4 2 6 4 6 2 8 5 9 6 8 3 8 0 7 0 7 0 7

89
hl6 (h1)
3 5 2 5 2 4 0 7 4 9 6 8 3 5 2 5 2 4 3 5 2 5 2 6 2 5 2 4 3 5 2 5 2 4

93
hl6 (h1)
2 8 3 9 6 7 2 4 0 4 1 4 1 8 3 5 3 8 3 7 3 8 5 7 3 8

97

hl6 (h1)

3 5 2 8 3 5 2 5 2 4 2 8 3 8 3 5 2 5 1 4 1 4 1 4 1 4 1 4 1 4

101

hl6 (h1)

1 7 1 7 3 8 3 5 2 5 2 4 2 4 2 8 5 8 5 8 5 8 3 8 5 8 5 8 5

105

hl6 (h1)

8 5 7 3 5 2 8 3 8 1 7 3 8 1 7 4 8 5 8 5 8 3 8 5 8 5 8 5

109

hl6 (h1)

8 5 9 3 6 2 5 2 4 2 8 3 5 2 5 2 8 3 5 1 4 1 4 1 4 1 4 1 4 1 4

113

hl6 (h1)

1 4 1 8 5 7 4 7 5 6 4 8 3 5 2 5 2 8 5 7 4 6 4 6 4 6 4 6 3 6 3 6 3 7 4 6 4 6 4 6 4 6 3 6 3 6 3 6

117

hl6 (h1)

2 7 0 4 2 6 4 6 0 7 3 8 0 4 2 5 3 5 3 5 3 6 3 6 3 6 3 7 4 6 4 6 4 6 4 6 3 6 3 6 3 6

121

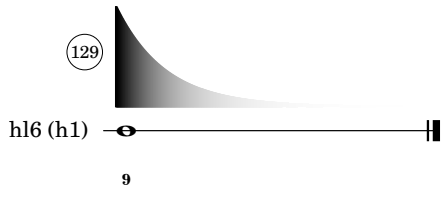
hl6 (h1)

2 5 2 4 2 4 0 3 1 4 1 4 2 4 2 4 2 4

125

hl6 (h1)

0 8 3 9 4 8 3 8 3



a lot of tiles (trivial scan)

2101000

michael winter

(cdmx, mx and nashville, usa; 2018)

part - hl 5 - 2101000

hl 5
(high noise)

Musical notation for hl 5 (high noise). The staff shows a sequence of notes with fingerings 0 and 1. The notes are: 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1. There are slurs over the first two notes of each pair (0,1) and the last two notes of each pair (1,0).

⑨

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 9. The staff shows a sequence of notes with fingerings 0 and 1. The notes are: 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1. There is a slur over the first two notes of the 7th measure (0,1).

⑰

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 17. The staff shows a sequence of notes with fingerings 0 and 1. The notes are: 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1. There are slurs over the first two notes of the 17th measure (0,1) and the last two notes of the 18th measure (1,0).

⑳

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 25. The staff shows a sequence of notes with fingerings 0 and 1. The notes are: 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1. There are slurs over the first two notes of the 25th measure (0,1) and the last two notes of the 26th measure (1,0).

㉓

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 33. The staff shows a sequence of notes with fingerings 0 and 1. The notes are: 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1. There are slurs over the first two notes of the 33rd measure (0,1) and the last two notes of the 34th measure (1,0).

㉗

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 41. The staff shows a sequence of notes with fingerings 0 and 1. The notes are: 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1. There are slurs over the first two notes of the 41st measure (0,1) and the last two notes of the 42nd measure (1,0).

㉙

hl5 (hn)

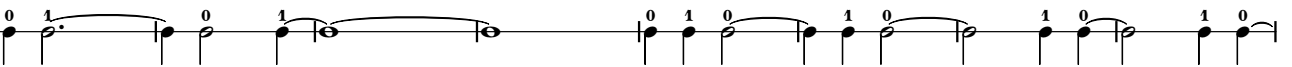
Musical notation for hl5 (hn) starting at measure 49. The staff shows a sequence of notes with fingerings 0 and 1. The notes are: 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1. There are slurs over the first two notes of the 49th measure (0,1) and the last two notes of the 50th measure (1,0).

㉝


hl5 (hn)

Musical notation for hl5 (hn) starting at measure 57. The staff shows a sequence of notes with fingerings 0 and 1. The notes are: 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1. There are slurs over the first two notes of the 57th measure (0,1) and the last two notes of the 58th measure (1,0).

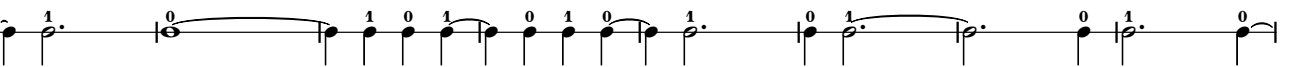
65

hl5 (hn) 


73

hl5 (hn) 


81

hl5 (hn) 


89

hl5 (hn) 

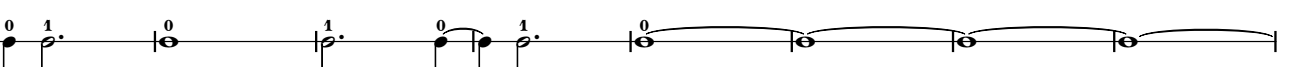
97

hl5 (hn) 

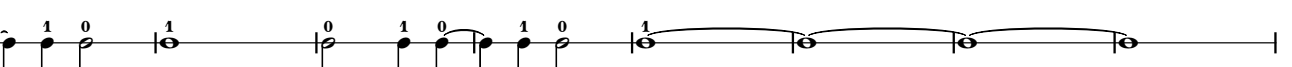
105

hl5 (hn) 

113

hl5 (hn) 

121

hl5 (hn) 

129

hl5 (hn) $\frac{0}{\mathbf{e}} \mathbf{H}$

a lot of tiles (trivial scan)

2101000

michael winter

(cdmx, mx and nashville, usa; 2018)

part - hl 4 - 2101000

hl 4
(low noise)

A musical staff with a treble clef. It contains a sequence of notes: a quarter note '0', a quarter note '1', a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, and a quarter note '1' with a slur over it. The staff ends with a bar line.

⑨

hl4 (ln)

A musical staff with a treble clef. It contains a sequence of notes: a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, and a quarter note '1' with a slur over it. The staff ends with a bar line.

⑰

hl4 (ln)

A musical staff with a treble clef. It contains a sequence of notes: a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, and a quarter note '1' with a slur over it. The staff ends with a bar line.

⑳

hl4 (ln)

A musical staff with a treble clef. It contains a sequence of notes: a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, and a quarter note '1' with a slur over it. The staff ends with a bar line.

㉓

hl4 (ln)

A musical staff with a treble clef. It contains a sequence of notes: a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, and a quarter note '0' with a slur over it. The staff ends with a bar line.

㉙

hl4 (ln)

A musical staff with a treble clef. It contains a sequence of notes: a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, and a quarter note '1' with a slur over it. The staff ends with a bar line.

㉞

hl4 (ln)

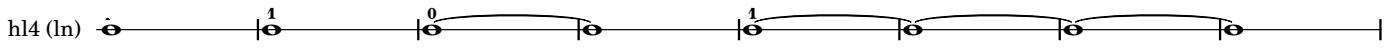
A musical staff with a treble clef. It contains a sequence of notes: a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, and a quarter note '0' with a slur over it. The staff ends with a bar line.

㉜

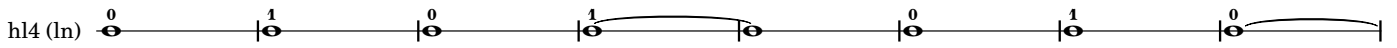
hl4 (ln)

A musical staff with a treble clef. It contains a sequence of notes: a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, a quarter note '0' with a slur over it, a quarter note '1' with a slur over it, and a quarter note '0' with a slur over it. The staff ends with a bar line.

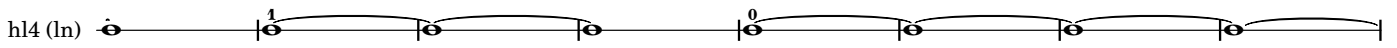
65



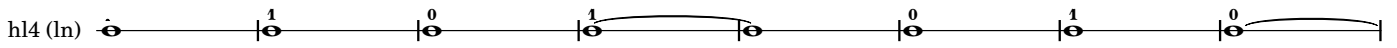
73



81



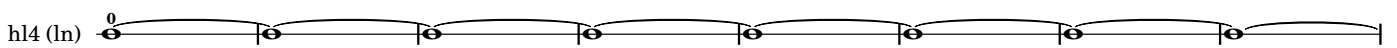
89



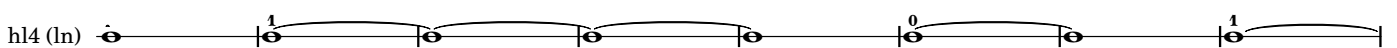
97



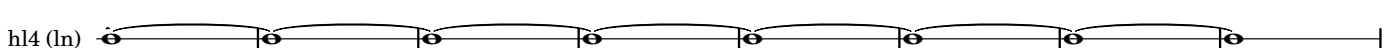
105



113



121



129

hl4 (ln) $\frac{0}{e-H}$

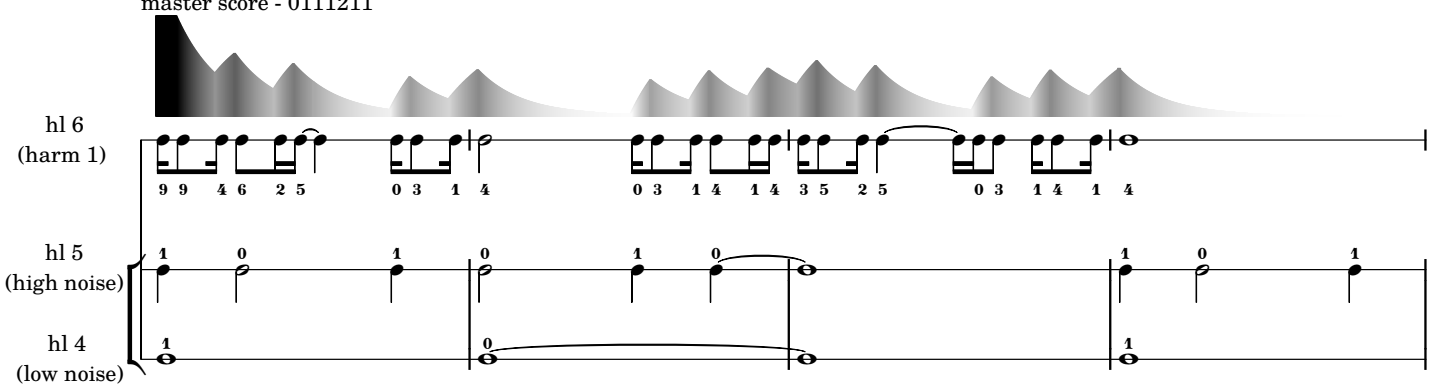
a lot of tiles (trivial scan)

0111211

michael winter

(cdmx, mx and nashville, usa; 2018)

master score - 0111211



h1 6 (harm 1)

h1 5 (high noise)

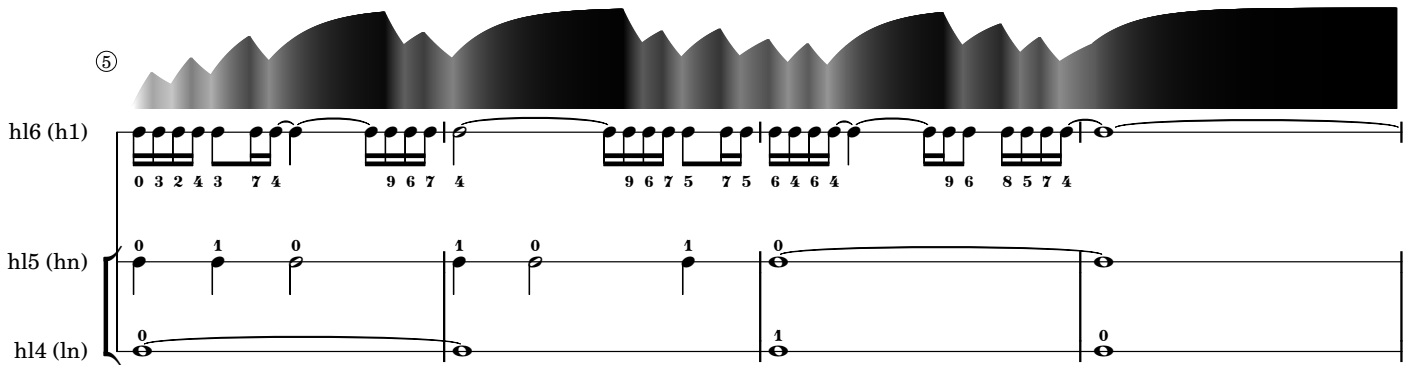
h1 4 (low noise)

9 9 4 6 2 5 0 3 1 4 0 3 1 4 1 4 3 5 2 5 0 3 1 4 1 4

1 0 1 0 1 0 1 0 1 0 1

1 0 1

⑤



h1 6 (h1)

h1 5 (hn)

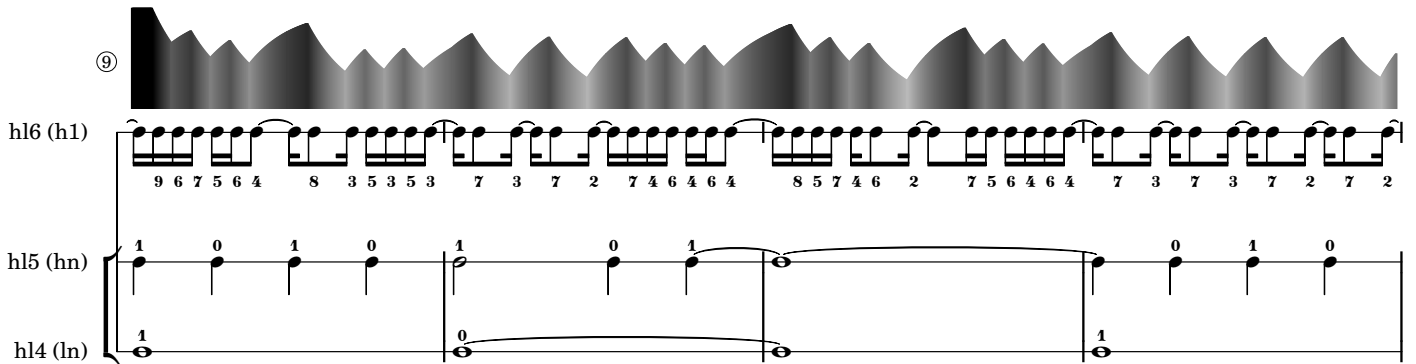
h1 4 (ln)

0 3 2 4 3 7 4 9 6 7 4 9 6 7 5 7 5 6 4 6 4 9 6 8 5 7 4

0 1 0 1 0 1 0 0 1 0 0

0 1 0

⑨



h1 6 (h1)

h1 5 (hn)

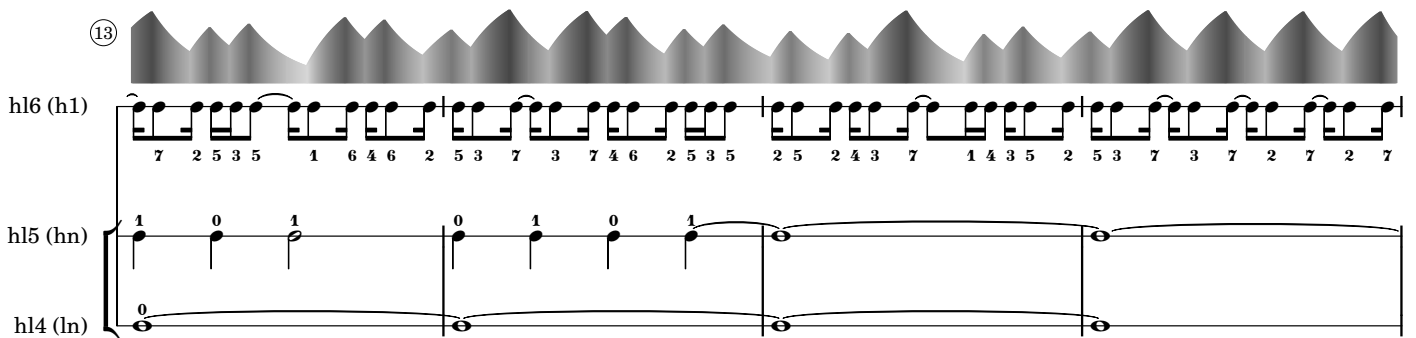
h1 4 (ln)

9 6 7 5 6 4 8 3 5 3 5 3 7 3 7 2 7 4 6 4 6 4 8 5 7 4 6 2 7 5 6 4 6 4 7 3 7 3 7 2 7 2

1 0 1 0 1 0 1 0 1 0 0 1 0 0 1 0 0

1 0 1

⑬



h1 6 (h1)

h1 5 (hn)

h1 4 (ln)

7 2 5 3 5 1 6 4 6 2 5 3 7 3 7 4 6 2 5 3 5 2 5 2 4 3 7 1 4 3 5 2 5 3 7 3 7 2 7 2 7

1 0 1 0 1 0 1 0 1 0 0 1 0 0 1 0 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

⑰

hl6 (h1)

hl5 (hn)

hl4 (ln)

⑳

hl6 (h1)

hl5 (hn)

hl4 (ln)

㉕

hl6 (h1)

hl5 (hn)

hl4 (ln)

㉙

hl6 (h1)

hl5 (hn)

hl4 (ln)

33

hl6 (h1)
7 2 5 2 4 3 5 2 5 0 4 1 4 1 4 3 5 2 6 2 6 2 5 2 4 3 5 2 5 0 4 1 4 1 4 2 4 2 4 2

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0 1 0

37

hl6 (h1)
6 4 6 4 7 4 6 4 6 4 9 6 7 4 7 5 6 4 6 4 7 4 6 4 6 4 6 4 7 4 6 4 6 4 9 6 7 4 7 5 7 5 7 5 6 4

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

41

hl6 (h1)
7 4 6 4 6 4 8 5 7 4 6 2 6 4 6 4 6 4 8 5 7 2 5 3 7 4 6 4 6 4 8 5 7 4 6 2 6 4 6 4 6 4 8 5 7 4 6 4

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
0 1 0

45

hl6 (h1)
7 3 5 3 5 2 5 2 4 3 7 4 6 2 5 3 5 2 5 2 6 2 6 2 5 3 5 2 5 2 4 3 7 4 6 2 5 3 5 1 4 2 5 2

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
1 0 1 0

④9

hl6 (h1)
6 2 5 3 5 1 6 4 6 2 5 2 4 3 5 2 5 3 7 3 7 4 6 2 5 3 5 1 6 4 6 2 5 2 4 3 5 2 6 2 5 3 5

hl5 (hn)
0 1 0 1 0 1 0 1 0 1

hl4 (ln)
0 1

⑤3

hl6 (h1)
2 5 3 5 3 5 3 8 3 5 3 5 3 8 5 6 4 6 4 7 3 7 3 7 4 6 4 6 4 8 3 5 3 5 3 8 5 7 4 6 4 7 4 6 4 6 4

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0 1 0 1

⑤7

hl6 (h1)
8 5 7 4 7 5 9 6 7 4 6 4 7 4 6 4 9 6 7 5 7 5 9 6 7 4 6 4 7 4 6 4 7 4 6 4 7 4

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1

⑥1

hl6 (h1)
7 3 5 2 5 0 3 1 4 2 5 2 4 2 4 0 3 1 4 1 4 0 3 1 4 2 5 2 4 2 6 2 5 2 4

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
0 1 0

65

hl6 (h1)
3 5 2 5 2 4 0 3 1 4 2 5 2 4 2 4 0 3 1 4 1 6 2 5 2 4 3 5 2 5 0 3 1 4 1

hl5 (hn)
0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1

69

hl6 (h1)
6 4 6 4 7 4 9 6 7 4 6 4 7 4 6 4 9 6 8 5 7 4 7 5 6 4 7 4 6 4 6 4 9 6 8 5 7 4

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0 1 0 1

73

hl6 (h1)
7 5 6 4 6 4 8 3 5 3 5 3 8 5 7 4 6 4 7 3 7 2 8 5 6 4 6 4 7 4 6 4 6 4 8 5 7 4 6 2 7 5 6 4 6 4

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
1 1 0

77

hl6 (h1)
7 3 5 3 5 1 6 4 6 2 5 2 4 3 5 2 5 3 7 3 7 1 4 3 5 2 6 2 5 3 5 2 5 2 4 3 7 1 4 3 5 2

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
1 0 1 0

81

hl6 (h1)
hl5 (hn)
hl4 (ln)

85

hl6 (h1)
hl5 (hn)
hl4 (ln)

89

hl6 (h1)
hl5 (hn)
hl4 (ln)

93

hl6 (h1)
hl5 (hn)
hl4 (ln)

97

hl6 (h1)

hl5 (hn)

hl4 (ln)

101

hl6 (h1)

hl5 (hn)

hl4 (ln)

105

hl6 (h1)

hl5 (hn)

hl4 (ln)

109

hl6 (h1)

hl5 (hn)

hl4 (ln)

113

hl6 (h1)
4 6 2 5 3 5 1 6 4 6 2 5 3 7 3 7 4 6 2 5 3 5 1 6 2 6 2 7 2 7 4 6 2 5 3 5 1 6 4 6 2

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1

117

hl6 (h1)
6 4 6 4 6 4 8 3 5 3 5 3 7 3 7 3 7 4 6 4 6 4 8 3 7 3 7 2 7 2 7 4 6 4 6 4 8 3 5 3 5 3

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
0 1 0

121

hl6 (h1)
7 4 6 4 7 4 9 6 7 4 9 6 7 4 7 5 9 6 7 5 7 5 9 6 7

hl5 (hn)
0 1 0 1 0 1 1 0 1

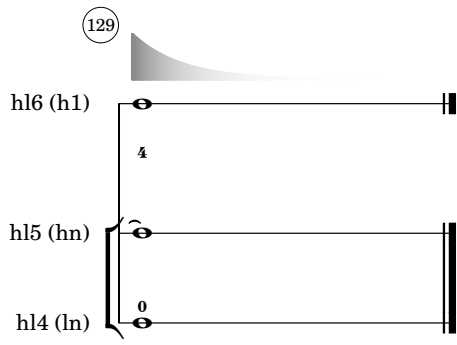
hl4 (ln)
1 0 1

125

hl6 (h1)
4 6 2 5 2 4 0 3 1 4 0 3 1 4 1 4 0 3 1 4 1 4 0 3 1

hl5 (hn)
0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1



a lot of tiles (trivial scan)

0111211

michael winter

(cdmx, mx and nashville, usa; 2018)

part - hl 6 - 0111211

hl 6
(harm 1)

9 9 4 6 2 5 0 3 1 4 0 3 1 4 1 4 3 5 2 5 0 3 1 4 1 4

⑤

hl6 (h1)

0 3 2 4 3 7 4 9 6 7 4 9 6 7 5 7 5 6 4 6 4 9 6 8 5 7 4

⑨

hl6 (h1)

9 6 7 5 6 4 8 3 5 3 5 3 7 3 7 2 7 4 6 4 6 4 8 5 7 4 6 2 7 5 6 4 6 4 7 3 7 3 7 2 7 2

⑬

hl6 (h1)

7 2 5 3 5 1 6 4 6 2 5 3 7 3 7 4 6 2 5 3 5 2 5 2 4 3 7 1 4 3 5 2 5 3 7 3 7 2 7 2 7

⑰

hl6 (h1)

4 6 2 5 3 5 2 5 2 4 3 7 4 6 2 6 2 5 2 4 3 5 2 5 3 7 4 6 2 5 2 4 3 5 2 6 2 6 2 7 2 7 2

⑳

hl6 (h1)

7 4 6 4 6 4 8 5 7 4 6 2 6 4 6 2 5 3 8 5 6 4 6 4 7 3 5 3 5 3 8 5 7 4 6 4 7 4 6 2 5 3 7 4 6 2 5 3

㉕

hl6 (h1)

7 4 6 4 7 4 6 4 6 4 9 6 7 4 7 5 6 4 6 4 7 4 6 4 9 6 7 4 6 4 7 4 6 4 6 4 6 4 7 4 6 2 5 3 7 4 6

㉙

hl6 (h1)

4 6 2 5 2 4 3 5 2 5 0 4 1 6 2 5 3 5 2 5 2 4 0 4 1 4 3 5 2 4 2 6 2 6 2 7 2 7 2

33

hl6 (h1)

7 2 5 2 4 3 5 2 5 0 4 1 4 1 4 3 5 2 6 2 6 2 5 2 4 3 5 2 5 0 4 1 4 1 4 2 4 2 4 2

37

hl6 (h1)

6 4 6 4 7 4 6 4 6 4 9 6 7 4 7 5 6 4 6 4 7 4 6 4 6 4 6 4 7 4 6 4 6 4 9 6 7 4 7 5 7 5 7 5 6 4

41

hl6 (h1)

7 4 6 4 6 4 8 5 7 4 6 2 6 4 6 4 6 4 8 5 7 2 5 3 7 4 6 4 6 4 8 5 7 4 6 2 6 4 6 4 6 4 8 5 7 4 6 4

45

hl6 (h1)

7 3 5 3 5 2 5 2 4 3 7 4 6 2 5 3 5 2 5 2 6 2 6 2 5 3 5 2 5 2 4 3 7 4 6 2 5 3 5 1 4 2 5 2

49

hl6 (h1)

6 2 5 3 5 1 6 4 6 2 5 2 4 3 5 2 5 3 7 3 7 4 6 2 5 3 5 1 6 4 6 2 5 2 4 3 5 2 6 2 5 3 5

53

hl6 (h1)

2 5 3 5 3 5 3 8 3 5 3 5 3 8 5 6 4 6 4 7 3 7 3 7 4 6 4 6 4 8 3 5 3 5 3 8 5 7 4 6 4 7 4 6 4 6 4

57

hl6 (h1)

8 5 7 4 7 5 9 6 7 4 6 4 7 4 6 4 9 6 7 5 7 5 9 6 7 4 6 4 7 4 6 4 7 4 6 4 7 4

61

hl6 (h1)

7 3 5 2 5 0 3 1 4 2 5 2 4 2 4 0 3 1 4 1 4 0 3 1 4 2 5 2 4 2 6 2 5 2 4

65

hl6 (h1)

3 5 2 5 2 4 0 3 1 4 2 5 2 4 2 4 0 3 1 4 1 6 2 5 2 4 3 5 2 5 0 3 1 4 1

69

hl6 (h1)

6 4 6 4 7 4 9 6 7 4 6 4 7 4 6 4 9 6 8 5 7 4 7 5 6 4 7 4 6 4 6 4 9 6 8 5 7 4

73

hl6 (h1)

7 5 6 4 6 4 8 3 5 3 5 3 8 5 7 4 6 4 7 3 7 2 8 5 6 4 6 4 7 4 6 4 6 4 8 5 7 4 6 2 7 5 6 4 6 4

77

hl6 (h1)

7 3 5 3 5 1 6 4 6 2 5 2 4 3 5 2 5 3 7 3 7 1 4 3 5 2 6 2 5 3 5 2 5 2 4 3 7 1 4 3 5 2

81

hl6 (h1)

6 2 5 3 5 2 5 2 4 3 7 4 6 2 5 3 5 2 5 2 6 2 6 2 5 3 5 1 4 2 5 2 4 3 7 4 6 2 5 2 4 3 5 2

85

hl6 (h1)

6 4 6 4 6 4 8 5 7 4 6 2 6 4 6 4 6 4 8 5 7 2 5 3 7 4 6 4 6 4 8 5 7 4 6 4 7 3 5 3 5 3 8 5 7 4 6 4

89

hl6 (h1)

7 4 6 4 7 4 6 4 6 4 9 6 7 4 7 5 6 4 6 4 7 4 6 4 6 4 6 4 7 4 7 5 7 5 6 4 9 6 7 4 6 4 7 4 6 4

93

hl6 (h1)

7 3 5 2 5 3 5 2 5 0 4 1 4 1 4 3 5 2 6 2 6 2 5 2 4 2 4 2 4 2 4 0 4 1 4 2 5 2 4 2

97

hl6 (h1)

6 2 5 2 4 3 5 2 5 0 4 1 6 2 5 3 5 2 5 2 6 2 6 2 7 2 7 2 7 2 5 2 4 3 5 2 5

101

hl6 (h1)

0 4 2 5 3 7 4 6 4 6 4 9 6 7 4 7 5 6 4 6 4 7 4 6 4 6 4 6 4 7 4 6 2 5 3 7 4 6 4 6 4 6 4 7 4 6 4 6 4

105

hl6 (h1)

9 6 7 4 6 4 8 5 7 4 6 2 6 4 6 2 5 3 8 5 6 4 6 4 7 4 6 2 5 3 7 4 6 2 5 3 7 4 6 4 6 4 8 5 7 4 6 2

109

hl6 (h1)

6 2 5 3 5 2 5 2 4 3 7 4 6 2 6 2 5 2 4 3 5 2 6 2 6 2 7 2 7 2 7 2 5 3 5 2 5 2 4 3 7

113

hl6 (h1)

4 6 2 5 3 5 1 6 4 6 2 5 3 7 3 7 4 6 2 5 3 5 1 6 2 6 2 7 2 7 4 6 2 5 3 5 1 6 4 6 2

117

hl6 (h1)

6 4 6 4 6 4 8 3 5 3 5 3 7 3 7 3 7 4 6 4 6 4 8 3 7 3 7 2 7 2 7 4 6 4 6 4 8 3 5 3 5 3

121

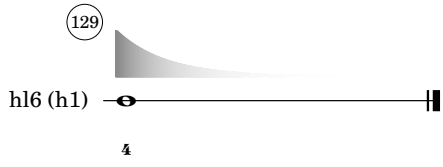
hl6 (h1)

7 4 6 4 7 4 9 6 7 4 9 6 7 4 7 5 9 6 7 5 7 5 9 6 7

125

hl6 (h1)

4 6 2 5 2 4 0 3 1 4 0 3 1 4 1 4 0 3 1 4 1 4 0 3 1



a lot of tiles (trivial scan)

0111211

michael winter

(cdmx, mx and nashville, usa; 2018)

part - hl 5 - 0111211

hl 5
(high noise)

Musical notation for hl 5 (high noise). The staff shows a sequence of notes corresponding to the binary sequence 1 0 1 0 1 0 1 0 1 0 1 0 1 0. The notes are quarter notes, with some tied across bar lines. The sequence ends with a long note that spans across the final bar line.

⑨

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 9. The staff shows a sequence of notes corresponding to the binary sequence 1 0 1 0 1 0 1 0 1 0 1 0 1 0. The notes are quarter notes, with some tied across bar lines. The sequence ends with a long note that spans across the final bar line.

⑰

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 17. The staff shows a sequence of notes corresponding to the binary sequence 0 1 0 1 0 1 0 1 0 1 0 1 0 1. The notes are quarter notes, with some tied across bar lines. The sequence ends with a long note that spans across the final bar line.

⑳

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 25. The staff shows a sequence of notes corresponding to the binary sequence 0 1 0 1 0 1 0 1 0 1 0 1 0 1. The notes are quarter notes, with some tied across bar lines. The sequence ends with a long note that spans across the final bar line.

㉓

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 33. The staff shows a sequence of notes corresponding to the binary sequence 1 0 1 0 1 0 1 0 1 0 1 0 1 0. The notes are quarter notes, with some tied across bar lines. The sequence ends with a long note that spans across the final bar line.

㉙

hl5 (hn)

Musical notation for hl5 (hn) starting at measure 41. The staff shows a sequence of notes corresponding to the binary sequence 0 1 0 1 0 1 0 1 0 1 0 1 0 1. The notes are quarter notes, with some tied across bar lines. The sequence ends with a long note that spans across the final bar line.

㉞

hl5 (hn)

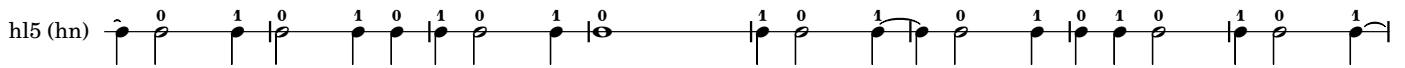
Musical notation for hl5 (hn) starting at measure 49. The staff shows a sequence of notes corresponding to the binary sequence 0 1 0 1 0 1 0 1 0 1 0 1 0 1. The notes are quarter notes, with some tied across bar lines. The sequence ends with a long note that spans across the final bar line.

㉟

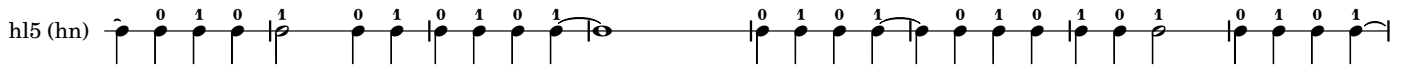
hl5 (hn)

Musical notation for hl5 (hn) starting at measure 57. The staff shows a sequence of notes corresponding to the binary sequence 1 0 1 0 1 0 1 0 1 0 1 0 1 0. The notes are quarter notes, with some tied across bar lines. The sequence ends with a long note that spans across the final bar line.

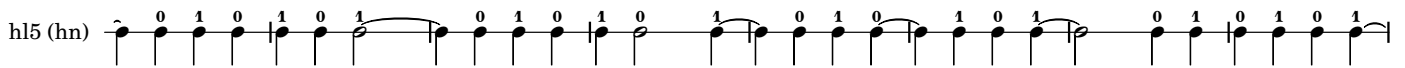
65



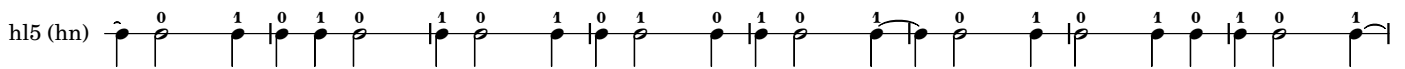
73



81



89



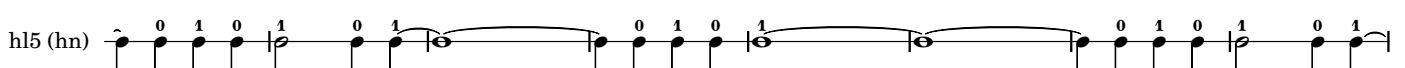
97



105




113



121



129

hl5 (hn) 

a lot of tiles (trivial scan)

0111211

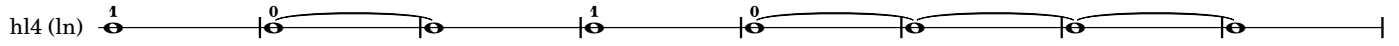
michael winter

(cdmx, mx and nashville, usa; 2018)

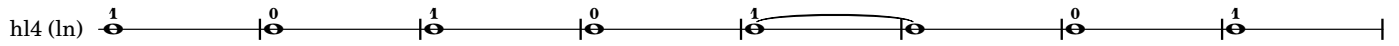
part - hl 4 - 0111211



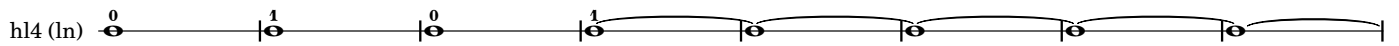
⑨



⑰



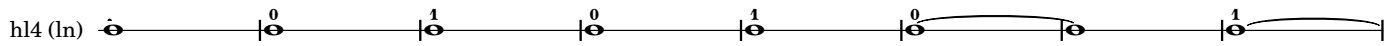
⑳



㉓



㉕



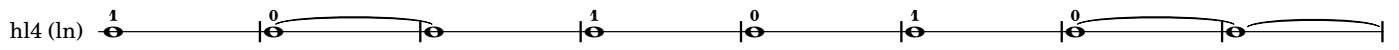
㉗



㉙



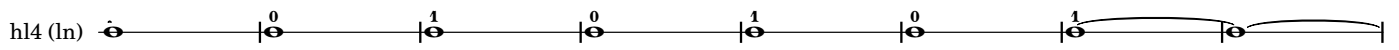
65



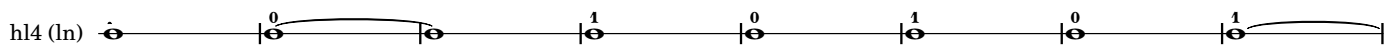
73



81



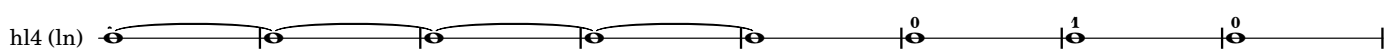
89



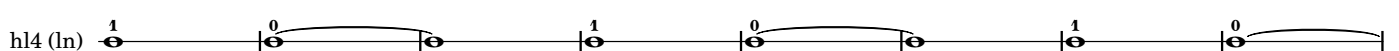
97



105



113



121



129

hl4 (ln) $\frac{0}{e-H}$

a lot of tiles (trivial scan)

2321111

michael winter

(cdmx, mx and nashville, usa; 2018)

master score - 2321111

hl 6 (harm 1)
9 9

hl 5 (high noise)
1

hl 4 (low noise)
1

⑤

hl 6 (h1)
0 5 2 6 2 6 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7

hl 5 (hn)
0

hl 4 (ln)
0

⑨

hl 6 (h1)
2 9 3 9 4 9 4 9 4 6 1 4 1 4 0 4 1 4 0 4 1 4 0 4

hl 5 (hn)
1 0 1 0 1 0 1 0

hl 4 (ln)
0

⑬

hl 6 (h1)
1 9 3 9 4 9 4 9 4 6 1 4 1 4 0 4 1 4 0 4 1 4 0 4

hl 5 (hn)
1 0 1 0 1 0 1 0

hl 4 (ln)
0

⑰

hl6 (h1)

hl5 (hn)

hl4 (ln)

⑳

hl6 (h1)

hl5 (hn)

hl4 (ln)

㉕

hl6 (h1)

hl5 (hn)

hl4 (ln)

㉙

hl6 (h1)

hl5 (hn)

hl4 (ln)

33

hl6 (h1)

hl5 (hn)

hl4 (ln)

37

hl6 (h1)

hl5 (hn)

hl4 (ln)

41

hl6 (h1)

hl5 (hn)

hl4 (ln)

45

hl6 (h1)

hl5 (hn)

hl4 (ln)

④9

hl6 (h1)
hl5 (hn)
hl4 (ln)

⑤3

hl6 (h1)
hl5 (hn)
hl4 (ln)

⑤7

hl6 (h1)
hl5 (hn)
hl4 (ln)

⑥1

hl6 (h1)
hl5 (hn)
hl4 (ln)

65

h16 (h1)
6 9 0 3

h15 (hn)
1 0

h14 (ln)
1 0

69

h16 (h1)
1 6 2 6 2 6 2 7 2 7 2 7 4 6 4 6 1 4 1 6 2 6 2 7 2 7 2 7 2 7 4 6 4 6 4 8

h15 (hn)
1 0

h14 (ln)
0 0

73

h16 (h1)
3 9 4 9 6 8 5 8 5 7 4 6 4 8 3 5 1 4 1 4 0 4 1 4 1 4 2 5 3 5 1 4

h15 (hn)
1 0 1 0 1 0 1 0 1 0

h14 (ln)
0 0

77

h16 (h1)
1 9 3 9 6 8 5 8 0 3 1 4 0 4 1 4 0 4 1 4 1 4 2 9

h15 (hn)
1 0 1 0 1 0 1 0 1 0

h14 (ln)
1 0

81

hl6 (h1)
6 9 6 9 2 5 1 4 2 9 0 3 0 3 2 7 5 8 0 3

hl5 (hn)
1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

85

hl6 (h1)
2 5 3 5 1 4 2 5 3 5 1 4 1 4 1 4 2 5 3 5 1 4 2 5 3 5 3 8 5 6 4 6 4 8 5 8 5 8 5 7 4 6 4 8

hl5 (hn)
1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

89

hl6 (h1)
5 9 6 9 4 7 3 7 4 6 4 6 4 8 0 3 0 3 1 6 2 6 4 6 4 6 1 4

hl5 (hn)
1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

93

hl6 (h1)
2 5 3 5 1 4 2 5 3 5 1 4 0 3 2 4 3 5 3 8 5 6 4 6 4 8 5 9

hl5 (hn)
1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

97

hl6 (h1)
6 9 0 3

hl5 (hn)
1

hl4 (ln)
1

101

hl6 (h1)
1 6 2 6 2 6 2 7 2 7 2 7 4 6 4 6 1 4 1 6 2 6 2 7 2 7 2 7 2 7 4 6 4 6 4 8

hl5 (hn)
1 0

hl4 (ln)
0

105

hl6 (h1)
3 9 4 9 6 8 5 8 5 7 4 6 4 8 3 5 1 4 1 4 0 4 1 4 1 4 2 5 3 5 1 4

hl5 (hn)
1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0

109

hl6 (h1)
1 9 3 9 6 8 5 8 0 3 1 4 0 4 1 4 0 4 1 4 1 4 2 9

hl5 (hn)
1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0

113

hl6 (h1)
6 9 6 9 2 5 1 4 2 9 0 3 0 3 2 7 5 8 0 3

hl5 (hn)
1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

117

hl6 (h1)
2 5 3 5 1 4 2 5 3 5 1 4 1 4 1 4 2 5 3 5 1 4 2 5 3 5 3 8 5 6 4 6 4 8 5 8 5 8 5 7 4 6 4 8

hl5 (hn)
1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

121

hl6 (h1)
5 9 6 9 4 7 3 7 4 6 4 6 4 8 0 3 0 3 1 6 2 6 4 6 4 6 1 4

hl5 (hn)
1 0 1 0 1 0 1 0

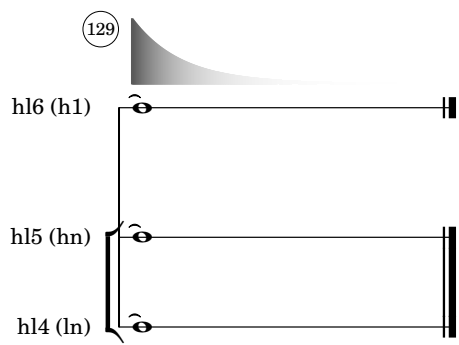
hl4 (ln)
1 0 1 0

125

hl6 (h1)
2 5 3 5 1 4 2 5 3 5 1 4 0 3 2 4 3 5 3 8 5 6 4 6 4 8 5 9

hl5 (hn)
1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0



33

hl6 (h1)

3 9 4 6 0 3

Detailed description: This block shows musical notation for measure 33. A large blacked-out area covers the upper portion of the staff. The notation below consists of a few notes with a slur. Fingerings are indicated as 3, 9, 4, 6, 0, and 3.

37

hl6 (h1)

1 4 1 4 2 5 3 7 3 7 2 7 2 7 4 6 4 6 1 4 1 7 5 6 4 6 4 7 3 7 2 7 2 7 4 6 4 6 4 8

Detailed description: This block shows musical notation for measure 37. A sawtooth waveform is drawn above the staff. The notation is a continuous sequence of notes with slurs. Fingerings are indicated by numbers 1-8.

41

hl6 (h1)

3 8 5 6 4 6 4 8 5 9 6 8 5 7 4 6 4 8 3 5 1 4 2 5 3 5 1 4 0 4 1 4 2 5 3 5 1 4

Detailed description: This block shows musical notation for measure 41. A sawtooth waveform is drawn above the staff. The notation is a continuous sequence of notes with slurs. Fingerings are indicated by numbers 0-8.

45

hl6 (h1)

1 4 0 7 4 9 6 8 0 3 1 9 6 7 2 4 0 4 1 4 2 9

Detailed description: This block shows musical notation for measure 45. A sawtooth waveform is drawn above the staff. The notation is a continuous sequence of notes with slurs. Fingerings are indicated by numbers 0-9.

49

hl6 (h1)

4 9 4 6 0 3

Detailed description: This block shows musical notation for measure 49. A large blacked-out area covers the upper portion of the staff. The notation below consists of a few notes with a slur. Fingerings are indicated as 4, 9, 4, 6, 0, and 3.

53

hl6 (h1)

1 4 1 4 2 5 3 7 3 7 2 7 2 7 4 6 4 6 1 4 1 7 5 6 4 6 4 7 3 7 2 7 2 7 4 6 4 6 4 8

Detailed description: This block shows musical notation for measure 53. A sawtooth waveform is drawn above the staff. The notation is a continuous sequence of notes with slurs. Fingerings are indicated by numbers 1-8.

57

hl6 (h1)

3 8 5 6 4 6 4 8 5 9 6 8 5 7 4 6 4 8 3 5 1 4 2 5 3 5 1 4 0 4 1 4 2 5 3 5 1 4

Detailed description: This block shows musical notation for measure 57. A sawtooth waveform is drawn above the staff. The notation is a continuous sequence of notes with slurs. Fingerings are indicated by numbers 0-8.

61

hl6 (h1)

1 4 0 7 4 9 6 8 0 3 1 9 6 7 2 4 0 4 1 4 2 9

Detailed description: This block shows musical notation for measure 61. A sawtooth waveform is drawn above the staff. The notation is a continuous sequence of notes with slurs. Fingerings are indicated by numbers 0-9.

65

hl6 (h1)

6 9 0 3

69

hl6 (h1)

1 6 2 6 2 6 2 7 2 7 2 7 4 6 4 6 1 4 1 6 2 6 2 7 2 7 2 7 2 7 4 6 4 6 4 8

73

hl6 (h1)

3 9 4 9 6 8 5 8 5 7 4 6 4 8 3 5 1 4 1 4 0 4 1 4 1 4 2 5 3 5 1 4

77

hl6 (h1)

1 9 3 9 6 8 5 8 0 3 1 4 0 4 1 4 0 4 1 4 1 4 2 9

81

hl6 (h1)

6 9 6 9 2 5 1 4 2 9 0 3 0 3 2 7 5 8 0 3

85

hl6 (h1)

2 5 3 5 1 4 2 5 3 5 1 4 1 4 1 4 2 5 3 5 1 4 2 5 3 5 3 8 5 6 4 6 4 8 5 8 5 8 5 7 4 6 4 8

89

hl6 (h1)

5 9 6 9 4 7 3 7 4 6 4 6 4 8 0 3 0 3 1 6 2 6 4 6 4 6 1 4

93

hl6 (h1)

2 5 3 5 1 4 2 5 3 5 1 4 0 3 2 4 3 5 3 8 5 6 4 6 4 8 5 9

97
hl6 (h1)
6 9 0 3

101
hl6 (h1)
1 6 2 6 2 6 2 7 2 7 2 7 4 6 4 6 1 4 1 6 2 6 2 7 2 7 2 7 2 7 4 6 4 6 4 8

105
hl6 (h1)
3 9 4 9 6 8 5 8 5 7 4 6 4 8 3 5 1 4 1 4 0 4 1 4 1 4 2 5 3 5 1 4

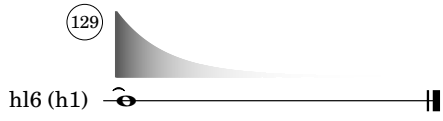
109
hl6 (h1)
1 9 3 9 6 8 5 8 0 3 1 4 0 4 1 4 0 4 1 4 1 4 2 9

113
hl6 (h1)
6 9 6 9 2 5 1 4 2 9 0 3 0 3 2 7 5 8 0 3


117
hl6 (h1)
2 5 3 5 1 4 2 5 3 5 1 4 1 4 1 4 2 5 3 5 1 4 2 5 3 5 3 8 5 6 4 6 4 8 5 8 5 8 5 7 4 6 4 8

121
hl6 (h1)
5 9 6 9 4 7 3 7 4 6 4 6 4 8 0 3 0 3 1 6 2 6 4 6 4 6 1 4

125
hl6 (h1)
2 5 3 5 1 4 2 5 3 5 1 4 0 3 2 4 3 5 3 8 5 6 4 6 4 8 5 9



129

hl5 (hn) 

a lot of tiles (trivial scan)


2321111

michael winter

(cdmx, mx and nashville, usa; 2018)


part - hl 4 - 2321111

hl 4
(low noise)




⑨

hl4 (ln)




⑰

hl4 (ln)




⑳

hl4 (ln)




㉓

hl4 (ln)




㉖

hl4 (ln)




㉙

hl4 (ln)

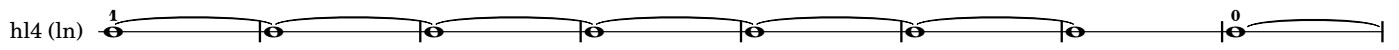


㉛

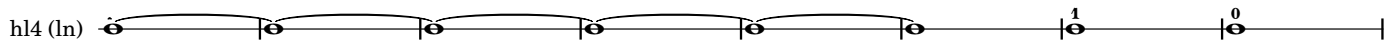
hl4 (ln)



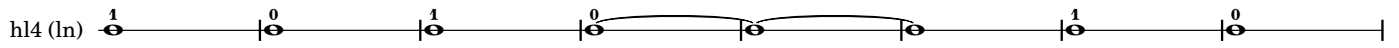
65



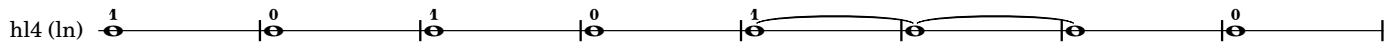
73



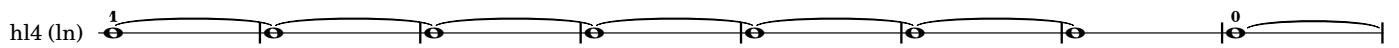
81



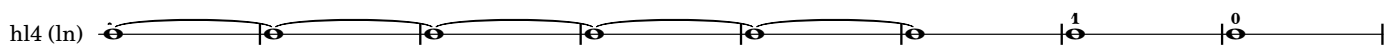
89



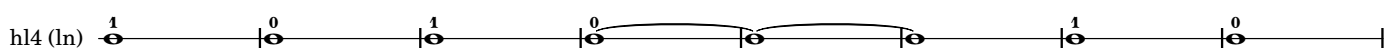
97



105




113



121



129

hl4 (ln) 

⑰

hl6 (h1)
8 5 7 4 6 2 5 3 7 4 6 4 8 5 7 4 7 5 6 2 5 3 5 3 5 3 7 3 7 4 6 4 6 2 5 0 4 1 4 3 5 3 7 3 7

hl5 (hn)
1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

⑳

hl6 (h1)
2 5 3 5 1 4 2 5 0 6 1 4 2 5 0 4 2 5 2 6 4 8 5 8 5 8 3 8 5 8 5 9 5 8

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

㉕

hl6 (h1)
5 9 5 8 3 7 4 8 3 8 5 8 3 7 4 9 1 4 2 6 4 6 1 6 1 4 2 6 4 6

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0 1 0

㉙

hl6 (h1)
0 5 2 6 4 6 4 6 2 5 0 4 1 4 3 5 3 7 3 7 4 6 2 6 4 6 2 6 4 6 4 8 5 7 4 7 3 5 3 7 3

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

33

hl6 (h1)
5 3 5 3 7 4 6 2 5 3 7 4 6 2 5 3 7 4 6 2 5 3 7 4 6 2 6 2 7 2 7 2 7 2 7 2 7 2 7 2 7

hl5 (hn)
0 1 0 1 0 1 0 1

hl4 (ln)
1

37

hl6 (h1)
4 6 4 6 2 5 3 7 4 6 2 5 3 7 4 6 2 5 3 7 4 6 2 5 3 5 3 7 3 7 3 7 2 7 2 7 2 7 2 7 2 7

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1

41

hl6 (h1)
4 9

hl5 (hn)
0

hl4 (ln)
0

45

hl6 (h1)
0 5 2 6 2 6 2 7 2 7 2 7 2 7 2 7 2 7 4 6 2 6 2 6 2 7 2 7 2 7 2 7 2

hl5 (hn)
1

hl4 (ln)
1

④9

hl6 (h1)
8 5 6 4 7 3 7 4 6 4 8 5 7 4 7 3 7 4 6 4 7 3 5 2 5 3 7 4 6 2 5 0 4 1 4 3 7 4 6 2 5

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0

⑤3

hl6 (h1)
2 4 0 4 2 6 4 6 1 6 1 4 2 6 4 6 1 4 2 8 5 7 3 7 4 8 3 8 5 8 3 7 4 8

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
1 0

⑤7

hl6 (h1)
3 7 4 6 4 8 5 7 4 7 3 7 4 6 4 8 5 7 4 7 5 6 4 6 2 5 0 4 1 4 3 7 4 6 2 5 0 4 1 4 3

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1

⑥1

hl6 (h1)
7 4 6 1 6 1 4 2 6 4 6 1 6 1 4 2 5 3 7 4 8 3 8 5 8 3 7 4 8 3 8 5 8

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0 1

65

hl6 (h1)
5 6 2 6 4 6 2 6 4 6 4 7 4 7 5 8 3 5 3 7 4 6 2 6 2 7 4 6 4 6 2 5 2 4 3 5 0 4 2 6 2 6

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
0 1 0

69

hl6 (h1)
0 3 2 6 4 6 1 6 4 6 2 5 2 4 3 5 2 5 3 9 6 8 3 7 4 8 3 7 4 6 4 7 4 7 3 7

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

73

hl6 (h1)
3 7 4 9 5 8 5 8 3 8 5 8 5 9 6 7 4 6 1 4 2 5 0 6 1 4 2 5

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0 0 1 0

77

hl6 (h1)
0 5 2 6 4 6 4 6 2 5 0 4 1 4 3 5 3 7 3 7 4 6 4 6 4 6 2 5 3 7 4 6 4 8 5 7 4 7 5 6 2 6 2

hl5 (hn)
1 0 1 0 1 0 1 0 1

hl4 (ln)
0 1 0 0 1

81

hl6 (h1)
7 4 6 4 6 2 5 3 7 4 6 4 8 3 7 3 8 5 6 4 7 3 7 3 7 4 6 4 6 2 5 1 6 2 6 1 4 1 4 3

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

85

hl6 (h1)
5 3 5 3 5 1 4 2 5 0 4 0 3 0 3 2 5 3 7 4 9 5 8 5 8 5 9 6 8 5 8

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

89

hl6 (h1)
5 9 5 8 3 7 4 8 3 7 3 7 2 7 4 6 4 7 0 4 2 6 4 6 1 6 4 6 2 5 3 7 4 6 2 5

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0 1 0 1


93

hl6 (h1)
1 6 2 6 4 6 4 6 2 5 1 6 2 6 4 6 4 6 1 6 2 6 4 6 2 6 4 6 4 7 4 6 4 7 4 6 2 6 4 8

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1 0

97




hl6 (h1)
3 5 3 7 4 6 2 8 5 7 5 7 5 6 4 7 3 5 3 7 3 5 3 7 3 7 4 6 1 4 2 5 2 4 2 4 3 5 3 7 3 7

hl5 (hn)
0 1 0 1 0 1 0 1 0 1

hl4 (ln)
1 0 1

101

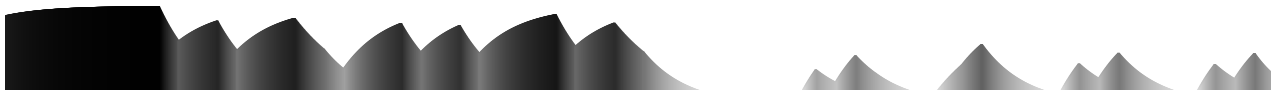


hl6 (h1)
4 6 4 6 2 5 3 5 2 5 2 4 3 7 1 4 2 6 4 6 0 5 2 6 4 7 4 6 4 7 3 8 5 7 3 7 4

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

hl4 (ln)
0 1 0

105

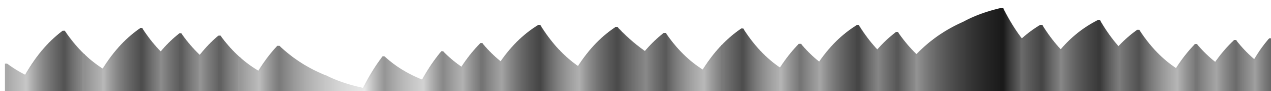


hl6 (h1)
9 6 8 5 8 3 8 5 8 5 9 5 8 0 3 2 5 0 6 1 4 2 5 0 4 2 5

hl5 (hn)
1 0 1 0 1 0 1 0 1

hl4 (ln)
1 0 0

109



hl6 (h1)
2 6 2 6 4 6 4 6 2 5 0 4 1 4 3 5 3 7 3 7 4 6 2 6 2 5 3 7 4 6 4 8 5 7 4 7 5 6 2 5 3 5 3

hl5 (hn)
0 1 0 1 0 1 0 1 0

hl4 (ln)
1 0 1

113

hl6 (h1)
5 3 7 4 6 4 8 3 7 3 8 5 6 4 7 5 6 2 5 3 5 3 7 4 6 2 5 1 6 2 6 1 4 1 4 3 5 3 7 3 7

hl5 (hn)
1 0 1 0 1 0 1 0

hl4 (ln)
0 0 0 0

117

hl6 (h1)
4 6 4 6 1 4 0 3 0 3 2 5 0 4 2 5 2 6 4 8 5 9 6 8 5 8 5 9 5 8

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
1 0 1

121

hl6 (h1)
5 8 5 6 4 7 3 7 3 7 2 8 5 7 3 7 4 9 3 5 2 5 3 7 4 6 2 5 3 7 1 4 2 6 4 6

hl5 (hn)
0 1 0 1 0 1 0 1 0 1 0 1 0 1 0

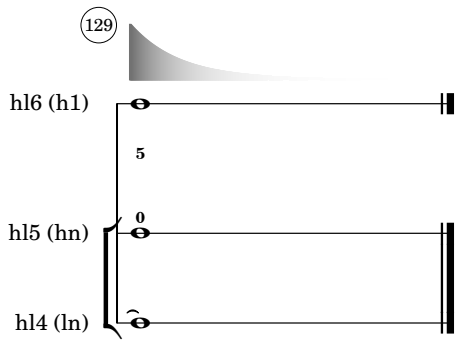
hl4 (ln)
0 1 0

125

hl6 (h1)
0 3 0 3 2 5 3 7 3 7 1 4 2 4 3 5 3 7 3 7 3 8 5 7 3 5 3 7 4 6 4 7 4 6 4 7 3 5 3 7 3

hl5 (hn)
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

hl4 (ln)
0 1 0



a lot of tiles (trivial scan)

3231110

michael winter

(cdmx, mx and nashville, usa; 2018)

part - hl 6 - 3231110

hl 6
(harm 1)

9 9 6 7 5 7 5 6 2 5 3 5 3 7 4 6 4 6 2 5 3 7 4 6 4 7 3 5 2 5 3 5 3 7 3 7 3 7 2 7 4 6 4 6 2 5

⑤

hl6 (h1)

2 4 0 4 2 5 0 4 2 5 2 4 3 5 1 4 2 5 0 4 2 7 5 7 5 9 5 8 3 7 4 9 5 8 5 8

⑨

hl6 (h1)

3 8 5 8 3 7 4 9 6 8 3 7 4 8 5 7 1 4 2 6 4 6 0 3 2 6 4 6 1

⑬

hl6 (h1)

4 1 4 1 4 3 5 3 7 3 7 2 7 2 7 4 6 4 6 2 5 2 6 4 6 4 7 3 5 3 7 3 7 3 7 4 6 2 6 4 6 4

⑰

hl6 (h1)

8 5 7 4 6 2 5 3 7 4 6 4 8 5 7 4 7 5 6 2 5 3 5 3 5 3 7 3 7 4 6 4 6 2 5 0 4 1 4 3 5 3 7 3 7

⑳

hl6 (h1)

2 5 3 5 1 4 2 5 0 6 1 4 2 5 0 4 2 5 2 6 4 8 5 8 5 8 3 8 5 8 5 9 5 8

㉓

hl6 (h1)


5 9 5 8 3 7 4 8 3 8 5 8 3 7 4 9 1 4 2 6 4 6 1 6 1 4 2 6 4 6

㉙

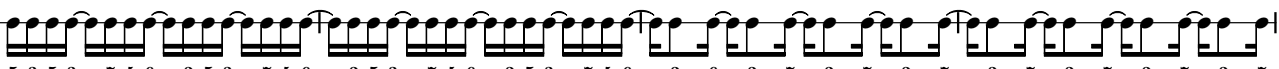
hl6 (h1)

0 5 2 6 4 6 4 6 2 5 0 4 1 4 3 5 3 7 3 7 4 6 2 6 4 6 2 6 4 6 4 8 5 7 4 7 3 5 3 7 3

33

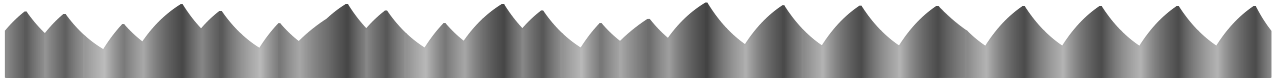


hl6 (h1)

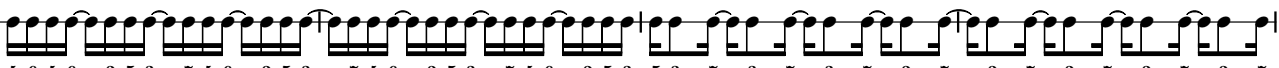


5 3 5 3 7 4 6 2 5 3 7 4 6 2 5 3 7 4 6 2 5 3 7 4 6 2 6 2 7 2 7 2 7 2 7 2 7 2 7

37




hl6 (h1)

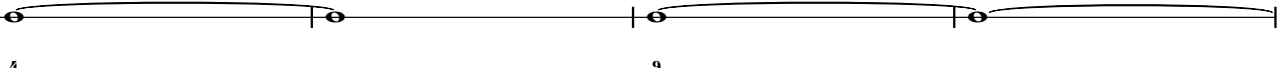


4 6 4 6 2 5 3 7 4 6 2 5 3 7 4 6 2 5 3 7 4 6 2 5 3 5 3 7 3 7 3 7 2 7 2 7 2 7 2 7 2 7

41

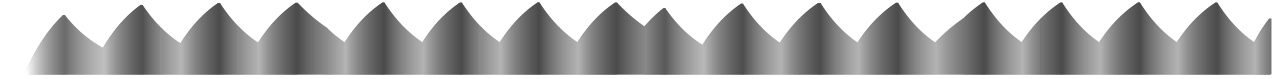


hl6 (h1)

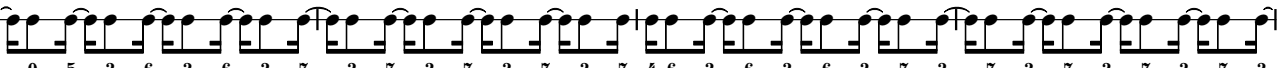


4 9

45

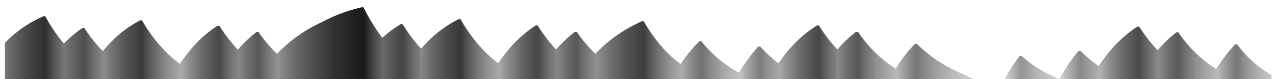


hl6 (h1)

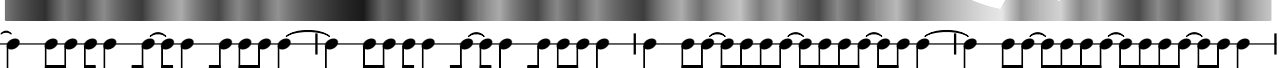


0 5 2 6 2 6 2 7 2 7 2 7 2 7 2 7 4 6 2 6 2 6 2 7 2 7 2 7 2 7 2 7 2

49




hl6 (h1)




8 5 6 4 7 3 7 4 6 4 8 5 7 4 7 3 7 4 6 4 7 3 5 2 5 3 7 4 6 2 5 0 4 1 4 3 7 4 6 2 5

53

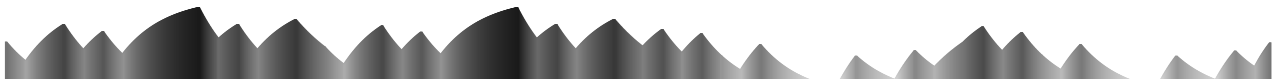


hl6 (h1)




2 4 0 4 2 6 4 6 1 6 1 4 2 6 4 6 1 4 2 8 5 7 3 7 4 8 3 8 5 8 3 7 4 8

57




hl6 (h1)




3 7 4 6 4 8 5 7 4 7 3 7 4 6 4 8 5 7 4 7 5 6 4 6 2 5 0 4 1 4 3 7 4 6 2 5 0 4 1 4 3

61



hl6 (h1)



7 4 6 1 6 1 4 2 6 4 6 1 6 1 4 2 5 3 7 4 8 3 8 5 8 3 7 4 8 3 8 5 8

65

hl6 (h1)

5 6 2 6 4 6 2 6 4 6 4 7 4 7 5 8 3 5 3 7 4 6 2 6 2 7 4 6 4 6 2 5 2 4 3 5 0 4 2 6 2 6

69

hl6 (h1)

0 3 2 6 4 6 1 6 4 6 2 5 2 4 3 5 2 5 3 9 6 8 3 7 4 8 3 7 4 6 4 7 4 7 3 7

73

hl6 (h1)

3 7 4 9 5 8 5 8 3 8 5 8 5 9 6 7 4 6 1 4 2 5 0 6 1 4 2 5

77

hl6 (h1)

0 5 2 6 4 6 4 6 2 5 0 4 1 4 3 5 3 7 3 7 4 6 4 6 4 6 2 5 3 7 4 6 4 8 5 7 4 7 5 6 2 6 2

81

hl6 (h1)

7 4 6 4 6 2 5 3 7 4 6 4 8 3 7 3 8 5 6 4 7 3 7 3 7 4 6 4 6 2 5 1 6 2 6 1 4 1 4 3

85

hl6 (h1)

5 3 5 3 5 1 4 2 5 0 4 0 3 0 3 2 5 3 7 4 9 5 8 5 8 5 9 6 8 5 8

89

hl6 (h1)


5 9 5 8 3 7 4 8 3 7 3 7 2 7 4 6 4 7 0 4 2 6 4 6 1 6 4 6 2 5 3 7 4 6 2 5

93

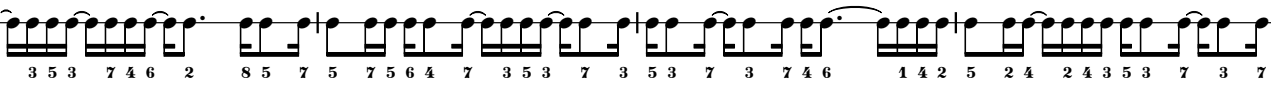
hl6 (h1)

1 6 2 6 4 6 4 6 2 5 1 6 2 6 4 6 4 6 1 6 2 6 4 6 2 6 4 6 4 7 4 6 4 7 4 6 2 6 4 8

97




hl6 (h1)

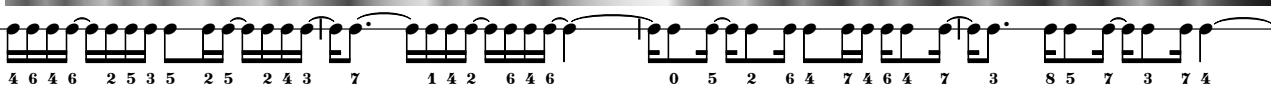


3 5 3 7 4 6 2 8 5 7 5 7 5 6 4 7 3 5 3 7 3 5 3 7 3 7 4 6 1 4 2 5 2 4 2 4 3 5 3 7 3 7

101

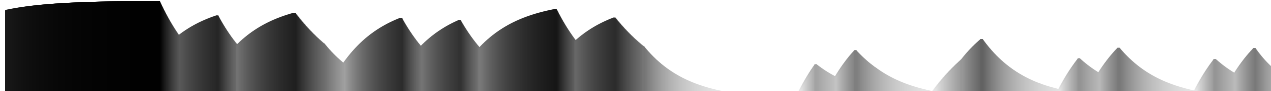


hl6 (h1)

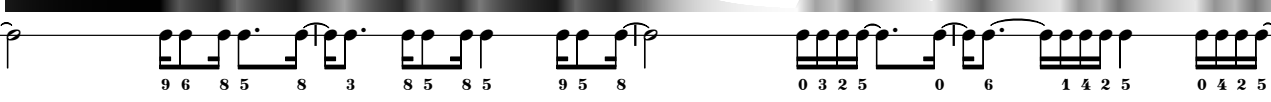


4 6 4 6 2 5 3 5 2 5 2 4 3 7 1 4 2 6 4 6 0 5 2 6 4 7 4 6 4 7 3 8 5 7 3 7 4

105

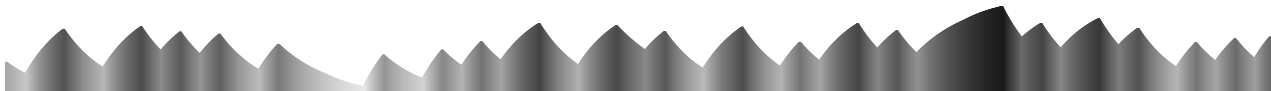


hl6 (h1)

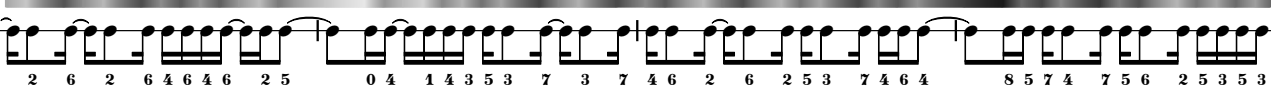


9 6 8 5 8 3 8 5 8 5 9 5 8 0 3 2 5 0 6 1 4 2 5 0 4 2 5

109

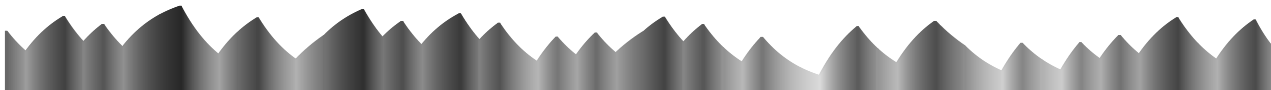


hl6 (h1)




2 6 2 6 4 6 4 6 2 5 0 4 1 4 3 5 3 7 3 7 4 6 2 6 2 5 3 7 4 6 4 8 5 7 4 7 5 6 2 5 3 5 3

113

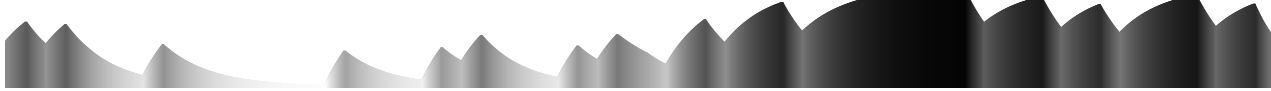


hl6 (h1)

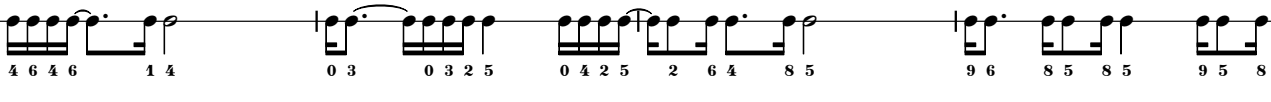


5 3 7 4 6 4 8 3 7 3 8 5 6 4 7 5 6 2 5 3 5 3 7 4 6 2 5 1 6 2 6 1 4 1 4 3 5 3 7 3 7

117

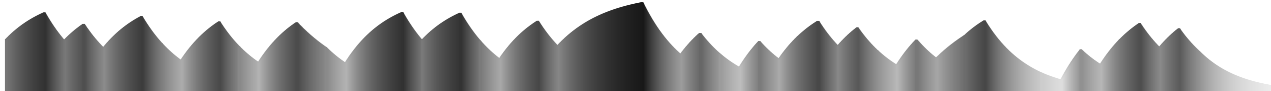


hl6 (h1)

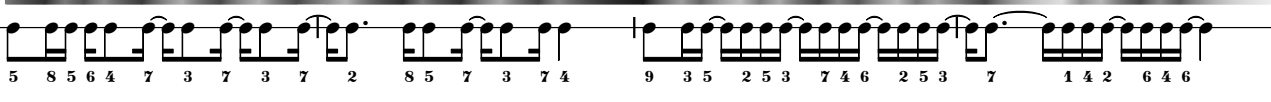


4 6 4 6 1 4 0 3 0 3 2 5 0 4 2 5 2 6 4 8 5 9 6 8 5 8 5 9 5 8

121

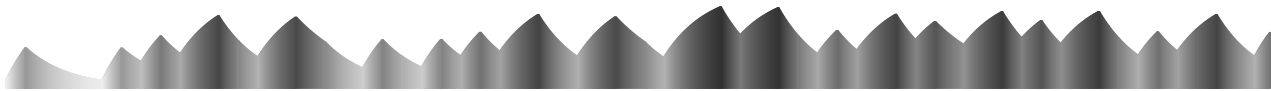


hl6 (h1)

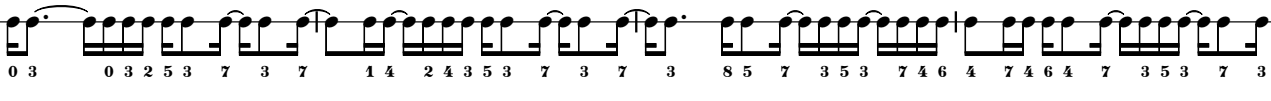


5 8 5 6 4 7 3 7 3 7 2 8 5 7 3 7 4 9 3 5 2 5 3 7 4 6 2 5 3 7 1 4 2 6 4 6

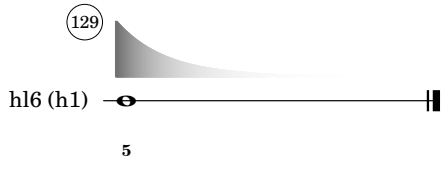
125



hl6 (h1)



0 3 0 3 2 5 3 7 3 7 1 4 2 4 3 5 3 7 3 7 3 8 5 7 3 5 3 7 4 6 4 7 4 6 4 7 3 5 3 7 3



129

hl5 (hn) $\frac{0}{\mathbf{e}} \mathbf{H}$

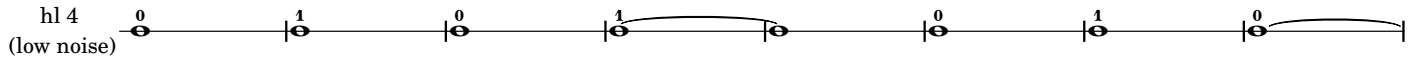
a lot of tiles (trivial scan)

3231110

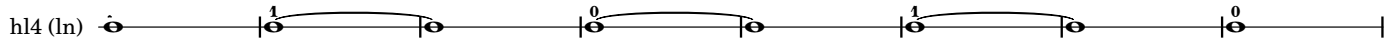
michael winter

(cdmx, mx and nashville, usa; 2018)

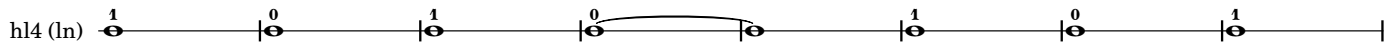
part - hl 4 - 3231110



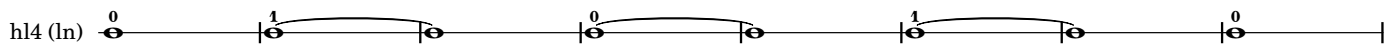
9



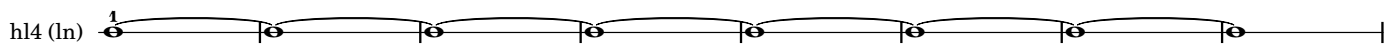
17



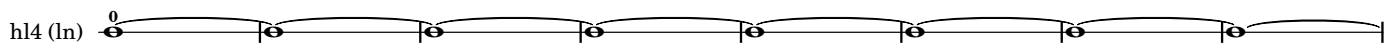
25



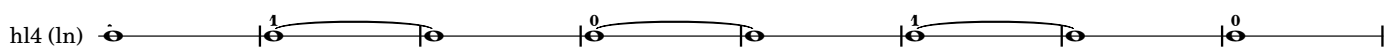
33



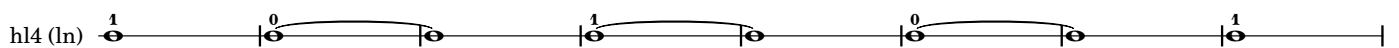
41



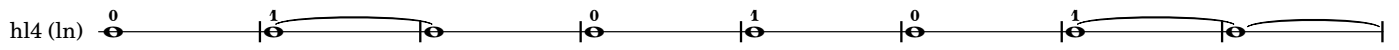
49



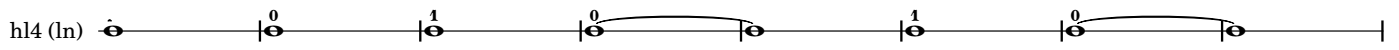
57



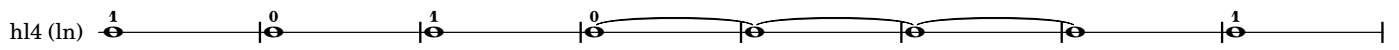
65



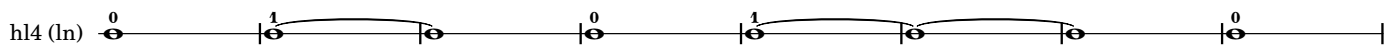
73



81



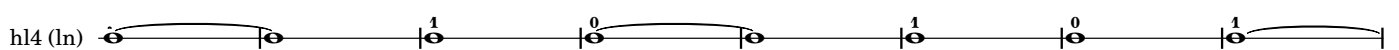
89



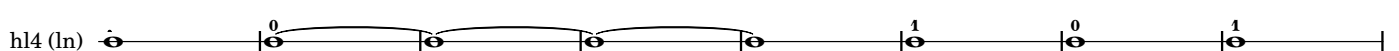
97



105




113



121



129

hl4 (ln) 

a_lot_of_tiles_trivial_scan_main.scd

```

1 (
2 // MAIN LAUNCH (loads necessary files and definitions)
3
4 var appEnvironment, cond;
5
6 s.boot;
7
8 appEnvironment = Environment.make;
9 appEnvironment.push;
10
11 // load
12 "a_lot_of_tiles_trivial_scan_tiler.scd".loadRelative;
13 "a_lot_of_tiles_trivial_scan_visualizer.scd".loadRelative;
14 "a_lot_of_tiles_trivial_scan_sonifier.scd".loadRelative;
15 "a_lot_of_tiles_trivial_scan_gui.scd".loadRelative;
16 "a_lot_of_tiles_trivial_scan_transcriber.scd".loadRelative;
17
18 // init
19 `dir = thisProcess.nowExecutingPath.dirname;
20 `loadedTransform = nil;
21 `transform = [2, 1, 0, 1, 0, 0, 0];
22 `tileMap = `mapAll.value(6 /*max depth*/, `transform);
23 `layoutState = 0;
24 `tempo = 120;
25 `dur = 0.125 * (120/`tempo);
26 `continuousPlay = false;
27
28 // launch
29 `launchTileVisualizer.value;
30 `launchGui.value;
31
32 appEnvironment.pop;
33 )

```

a_lot_of_tiles_trivial_scan_tiler.scd

```

1 (
2 var substitute, resamp, read, readPos = [0, 0];
3
4 // this function is the tiler
5 // it is essentially the generator of the underlying structure of the piece and all the variations
6 substitute = {arg parent, transform; var s, t, u, v, sub;
7   s = 4.collect({arg i; parent[0] + ((parent[i] - parent[0]) / 2)});
8   t = [parent[2] + ((parent[3] - parent[2]) / 2), parent[2], s[3], s[2]];
9   u = [t[0], s[1], t[0] + ((parent[1] - s[1]) / 2), s[1] + ((parent[1] - s[1]) / 2)];
10  v = [parent[1], parent[3], u[3], u[2]];
11  sub = [s, t, u, v].collect({arg child, i; if(transform[i] == nil, {nil},
12    {4.collect({arg j; child[(j.asDigits(2, 2) + transform[i].asDigits(2, 2)) % 2].convertDigits(2)}]});
13    sub.removeEvery({nil})});
14
15 // these functions either tile a specific depth (mapDepth) or up to a specific depth (mapAll)
16 `mapDepth = {arg depth, transform; var tiles = [[0, 0], [2, 0], [0, 1], [2, 1]];
17   depth.do({arg i; tiles = tiles.collect({arg tile; substitute.value(tile, transform)}).flatten});
18   [tiles];
19
20 `mapAll = {arg depth, transform; var tiles = Array.fill(depth + 1, {1});
21   tiles[0].add([0, 0], [2, 0], [0, 1], [2, 1]);
22   depth.do({arg i; tiles[i].do({arg tile; tiles[i + 1] = tiles[i + 1].addAll(substitute.value(tile, transform))});
23   tiles};
24
25 // utility to resample the matrix output by `matricize
26 resamp = {arg matrixOrig, resampLevel; var mult, matrixNew = [];
27   mult = pow(2, resampLevel);
28   matrixOrig.do({arg rowOrig; var rowNew = [];
29     rowOrig.do({arg elem; mult.do({rowNew = rowNew.add(elem)});
30     mult.do({matrixNew = matrixNew.add(rowNew)});
31   matrixNew};
32
33 // function to turn the tile map into a matrix of 1s and 0s by reading blocks of 2 vertical or horizontal tiles
34 `matricize = {
35   arg tileMap, depth = 6, resampLevel = 0, transform;
36   var rotationState = transform[4], mirrorState = transform[5], invertState = transform[6], matrix;
37   matrix = Array.fill2D(pow(2, depth - 1), pow(2, depth), {0});
38   tileMap[tileMap.size-1].do({arg tile; var transpose, xMin, xMax, yMin, yMax;
39     transpose = (tile * pow(2, depth)).flop;
40     xMin = minItem(transpose[0]); xMax = maxItem(transpose[0]);
41     yMin = minItem(transpose[1]); yMax = maxItem(transpose[1]);
42     if(xMin + yMin % 2 == 1, {if(xMax - xMin == 1,
43       {matrix[yMin / 2][xMin / 2] = (invertState + 1) % 2}, {matrix[yMin / 2][xMin / 2] = invertState}});
44   if(resampLevel > 0, {matrix = resamp.value(matrix, resampLevel)});
45   matrix = switch(rotationState, 0, {matrix}, 1, {matrix.reverse.flop},
46     2, {matrix.reverse.flop.reverse.flop}, 3, {matrix.reverse.flop.reverse.flop.reverse.flop});
47   if(mirrorState == 1, {matrix = matrix.flop.reverse.flop});
48   matrix};
49
50 // tape reading model that reads matrix from `genData function
51 // wordShift and letterShift are only used if readPos is not reset elsewhere.
52 read = {
53   arg matrix, wordLen = 1, wordShift = [0, 1], letterShift = [0, 1], wrap = true;
54   var width = matrix.shape[1], height = matrix.shape[0], startReadPos = readPos, word = [];
55   wordLen.do({arg i;
56     word = word.add(matrix[readPos[0] % height][readPos[1] % width]);
57     readPos = readPos + letterShift};
58   readPos = startReadPos + wordShift; word.convertDigits(2)};
59
60 // read the matrix - this data is ultimately used to generate the piece
61 `genData = {arg matrix, transform, partSize, shift = 0, pad = 16, minScale = 0, maxScale = 1;
62   var width = matrix.shape[1], height = matrix.shape[0], res;
63   readPos = [0, 0];
64   res = partSize.collect({arg p; height.collect({arg i;
65     readPos[0] = 1 + p + shift;
66     width.collect({arg j; var val = read.value(matrix);
67       minScale + ((maxScale - minScale) * val)});
68   }).flatten.addAll(Array.fill(pad, {0}));
69 }

```

a.lot_of_tiles_trivial_scan_sonifier.scd

```

1 (
2 // synth for hl 6
3 SynthDef(\hl6.sine, {arg freq, amp = 1, pos = 0;
4   Out.ar(0, Pan2.ar(SinOsc.ar(freq, 0, Lag.kr(amp, 2)), pos))
5 }).store;
6
7 // synth for hl 5
8 SynthDef(\hl5.high.noise, {arg amp = 1, pos = 0;
9   Out.ar(0, Pan2.ar(HPF.ar(WhiteNoise.ar(Lag.kr(amp * (1 / 128), 0.05)), 5000), pos))
10 }).store;
11
12 // synth for hl 4
13 SynthDef(\hl4.low.noise, {arg amp = 1, pos = 0;
14   Out.ar(0, Pan2.ar(LPF.ar(WhiteNoise.ar(Lag.kr(amp * (1 / 4), 0.05)), 300), pos))
15 }).store;
16
17 // synth for click (only generates files for practice purposes)
18 SynthDef(\click, {arg tick;
19   Out.ar([0, 1], 10 * BPF.ar(
20     WhiteNoise.ar * EnvGen.kr(Env.perc(0.01, 0.1), tick % 2 <= 0),
21     440 * ((tick % 8 <= 0) + 1), 0.02))
22 }).store;
23
24 // synth for amp curves for score
25 SynthDef(\lamp, {arg freq, amp = 1;
26   Out.ar(0, Lag.ar(K2A.ar(amp), 2))
27 }).store;
28
29 // synth for playback
30 SynthDef(\play, {arg sinePlayer1, sinePlayer2, highNoisePlayer, lowNoisePlayer,
31   sineBuf1 = 0, sineBuf2 = 1, highNoiseBuf = 2, lowNoiseBuf = 3,
32   eTracks, eTracksPanned, eMaster,
33   eVol = #[0.8, 0.8, 0.8, 0.8], eMute = #[1, 1, 1, 1], ePan = #[0, 0, 0, 0], masterVol = 1, masterMute = 1,
34   playRate = 0, startPos = 0, startTrig = 0, hash, tempo;
35   var dStartTrig, phasor, countOff, imp, curBeat;
36
37   countOff = PulseCount.kr(impulse.kr(4 * (tempo/120)), startTrig) * startTrig;
38   dStartTrig = countOff > 17;
39   phasor = Phasor.ar(dStartTrig, Select.kr(playRate * dStartTrig, [0, BufRateScale.kr(sineBuf1)]),
40     0, BufFrames.kr(sineBuf1), startPos * BufFrames.kr(sineBuf1));
41   curBeat = ((AZK.kr(phasor) / BufFrames.kr(sineBuf1)) * BufDur.kr(sineBuf1) * 4 * (tempo/120)).trunc;
42   curBeat = Select.kr(dStartTrig, [countOff - 18, curBeat]);
43
44   sinePlayer1 = PlayBuf.ar(2, sineBuf1, playRate * dStartTrig, dStartTrig, startPos * BufFrames.kr(sineBuf1));
45   sinePlayer2 = PlayBuf.ar(2, sineBuf2, playRate * dStartTrig, dStartTrig, startPos * BufFrames.kr(sineBuf2));
46   highNoisePlayer = PlayBuf.ar(2, highNoiseBuf, playRate * dStartTrig, dStartTrig, startPos * BufFrames.kr(highNoiseBuf));
47   lowNoisePlayer = PlayBuf.ar(2, lowNoiseBuf, playRate * dStartTrig, dStartTrig, startPos * BufFrames.kr(lowNoiseBuf));
48
49   eTracks = {arg i;
50     [Mix.new(sinePlayer1), Mix.new(sinePlayer2), Mix.new(highNoisePlayer), Mix.new(lowNoisePlayer)][i] * eVol[i] * eMute[i] ! 4;
51     eTracksPanned = {arg i; Pan2.ar(eTracks[i], ePan[i])} ! 4;
52     eMaster = Mix.new(eTracksPanned) * masterVol * masterMute * dStartTrig.lag;
53     Out.ar(0, eMaster);
54
55     // optional click - uncomment and send to an output not used
56     // Out.ar(1, 10 * BPF.ar(WhiteNoise.ar * EnvGen.kr(Env.perc(0.01, 0.1), curBeat % 2 <= 0), 440 * ((curBeat % 8 <= 0) + 1), 0.02));
57     SendTrig.kr(Changed.kr(curBeat), hash, curBeat);
58     imp = Impulse.kr(10);
59     SendReply.kr(imp, 'masterLevel', [Amplitude.kr(eMaster)], hash);
60     SendReply.kr(imp, 'trackLevels', [Amplitude.kr(eTracks)], hash)}.add;
61
62 // generate audio for playback
63 genPattern = {arg data, ins, durMult, genAudio = false, cond = nil;
64   var pattern;
65   pattern = Ppar(data.collect({
66     arg seq, p;
67     switch(ins,
68       "hl6.fundamental", {Pmono(\hl6.sine, \freq, 31.midicps,
69         \dur, \dur, \amp, Pseq(seq, \pos, 0)},
70       "hl6.harmonics", {Pmono(\hl6.sine, \freq, 31.midicps + ((31.midicps * 4) * (p + 1)),
71         \dur, \dur, \amp, Pseq(seq * (1 / pow(1 + ((p + 1) * 4), 1))), \pos, 0)},
72       "hl5.high.noise", {Pmono(\hl5.high.noise, \dur, \dur * durMult, \amp, Pseq(seq, \pos, 0)},
73       "hl4.low.noise", {Pmono(\hl4.low.noise, \dur, \dur * durMult, \amp, Pseq(seq, \pos, 0)},
74       "click", {Pmono(\click, \tick, Pseq(seq, \dur, \dur * durMult)}}));
75   if(genAudio, {File.mkdir("dir +/" + "." + "audio" +/" + "transform" + "transform.join ++ "audio");
76     pattern.render("dir +/" + "." + "audio" +/" + "transform" + "transform.join ++ "audio" +/" + ins ++ ".wav", \dur * durMult * data[0].size,
77     headerFormat: "WAV", sampleRate: s.sampleRate, action: {if(cond != nil, {cond.unhang}})});
78   pattern;
79 }

```

a_lot_of_tiles_trivial_scan_visualizer.scd

```

1  (
2  var normalizeTile, getMasterRect, tileDrawFunc;
3
4  // provide scaled coordinate for the tiles
5  normalizeTile = {arg child, parent;
6    var parentXMin, parentYMin, parentWidth, parentHeight, p1, p2, p3, p4;
7    parentXMin = minItem(parent.slice(nil, 0));
8    parentYMin = minItem(parent.slice(nil, 1));
9    parentWidth = (maxItem(parent.slice(nil, 0)) - parentXMin);
10   parentHeight = (maxItem(parent.slice(nil, 1)) - parentYMin);
11   p1 = [(minItem(child.slice(nil, 0)) - parentXMin) / parentWidth, (minItem(child.slice(nil, 1)) - parentYMin) / parentHeight];
12   p2 = [(maxItem(child.slice(nil, 0)) - parentXMin) / parentWidth, p1[1]];
13   p3 = [p1[0], (maxItem(child.slice(nil, 1)) - parentYMin) / parentHeight];
14   p4 = [p2[0], p3[1]];
15   [p1, p2, p3, p4];
16
17  // get the master rectangle for the tiling based on orientation
18  getMasterRect = {arg tileWin, rotationState;
19    var rectWidth, rectHeight;
20    case({(rotationState % 2 == 0) && (tileWin.bounds.width <= (tileWin.bounds.height * 2))},{
21      rectWidth = tileWin.bounds.width - 20;
22      rectHeight = rectWidth / 2},
23      {(rotationState % 2 == 0) && (tileWin.bounds.width > (tileWin.bounds.height * 2))},{
24      rectHeight = tileWin.bounds.height - 20;
25      rectWidth = rectHeight * 2},
26      {(rotationState % 2 == 1) && (tileWin.bounds.height <= (tileWin.bounds.width * 2))},{
27      rectWidth = tileWin.bounds.height - 20;
28      rectHeight = rectWidth / 2},
29      {(rotationState % 2 == 1) && (tileWin.bounds.height > (tileWin.bounds.width * 2))},{
30      rectWidth = tileWin.bounds.width - 20;
31      rectHeight = rectWidth / 2});
32    Rect.new((tileWin.bounds.width - rectWidth) / 2, (tileWin.bounds.height - rectHeight) / 2, rectWidth, rectHeight);
33
34  // draw the tiling
35  tileDrawFunc = {arg tileWin, tileMap, transform, layoutState;
36    var rotationState = transform[4], mirrorState = transform[5], invertState = transform[6],
37    masterRect, parentRects, depthLevels;
38
39    masterRect = getMasterRect.value(tileWin, rotationState);
40    parentRects = [[masterRect], [], []];
41
42    Pen.width = (masterRect.width + masterRect.height) / 8000;
43    Pen.scale(abs(mirrorState - 1) * 2 - 1, 1);
44    Pen.translate(mirrorState * -1 * tileWin.bounds.width, 0);
45    Pen.rotate(0.5 * rotationState * pi, tileWin.bounds.width / 2, tileWin.bounds.height / 2);
46
47    depthLevels = switch(layoutState, 0, {[6]}, 1, {[5]}, 2, {[4]}, 3, {[4, 5, 6]});
48    depthLevels.do({arg depth, dIndex;
49      tileMap[depth].do({arg childTile, cIndex;
50        var childTileNorm, parentRect, p1, p2, childRect;
51
52        childTileNorm = if(dIndex > 0, {normalizeTile.value(childTile, tileMap[depth - 1][(cIndex / 4).trunc]}), {childTile});
53        parentRect = if(dIndex > 0, {parentRects[dIndex][(cIndex / 4).trunc]}, {parentRects[0][0]});
54        if((layoutState == 3) && (dIndex > 0), {parentRect = parentRect.insetBy(parentRect.width * 0.04, parentRect.height * 0.04)});
55
56        p1 = Point.new(childTileNorm[0][0] * parentRect.width / if(dIndex > 0, {1}, {2}), childTileNorm[0][1] * parentRect.height);
57        p2 = Point.new(childTileNorm[3][0] * parentRect.width / if(dIndex > 0, {1}, {2}), childTileNorm[3][1] * parentRect.height);
58
59        childRect = Rect.fromPoints(p1, p2).moveBy(parentRect.left, parentRect.top);
60        if((layoutState == 3) && (depth < 6), {parentRects[dIndex + 1] = parentRects[dIndex + 1].add(childRect)});
61
62        if(if(invertState == 0, {abs(p1.x - p2.x) > abs(p1.y - p2.y)}, {abs(p1.x - p2.x) < abs(p1.y - p2.y)}),
63          {Pen.color = Color.white; Pen.fillRect(childRect); Pen.color = Color.black; Pen.strokeRect(childRect)},
64          {Pen.color = Color.black; Pen.fillRect(childRect); Pen.color = Color.white; Pen.strokeRect(childRect)});
65      }));
66
67  // launch the visualization
68  launchTileVisualizer = {
69    arg border = true, isLaunch = true;
70    var tileWin;
71    tileWin = Window("tile", if(isLaunch, {Rect(200, 500, 1000, 500)}, {"tileWin.bounds}), true, border);
72    tileWin.view.background(Color.gray(0.2));
73    tileWin.drawFunc = {arg win; tileDrawFunc.value(win, "tileMap", "transform", "layoutState)}.inEnvir;
74    tileWin.front;
75    tileWin.refresh;
76  )

```


a_lot_of_tiles_trivial_scan_transcriber.scd

```

1  (
2  -transcribe = {arg data, durMult, subName, drawAmps = false;
3
4  data.do({arg seq, p;
5  fork {var basePath, cond, pattern, ampFilePath, ampSampleRate, ampBuf, amps,
6  lilyFile, lastVal, curTime = 0, lilyString = "";
7
8  basePath = "dir +/" + "." + "/" + "score" + "/" + "transform." + "transform.join" + "score" + "/" + "lilypond";
9
10 // writes the template files for the master score and parts
11 if(File.exists(basePath).not, {arg template, writeTemplate;
12 writeTemplate = {arg template, part; var fileAppend, scoreType, systemsPerPage, lilyFile, formattedTemplate;
13 fileAppend = switch(part, nil, {"master.score"}, 6, {"part.h16"}, 5, {"part.h15"}, 4, {"part.h14"});
14 scoreType = switch(part, nil, {"master.score"}, 6, {"part - h1 6"}, 5, {"part - h1 5"}, 4, {"part - h1 4"});
15 lilyFile = File(basePath +/"a.lot.of.tiles.trivial.scan.transform." + "transform.join
16 + "/" + fileAppend + ".ly".standardizePath,"w");
17 formattedTemplate = template.replace("`score.type`", scoreType);
18 if(part != nil, {formattedTemplate = formattedTemplate
19 .replace("systems-per-page = 4", "systems-per-page = 8");
20 [4, 5, 6].difference([part]).do({arg p; formattedTemplate = formattedTemplate
21 .replace("%`h1`" ++ p ++ "start`", "%`h1`" ++ p.asString ++ "`");
22 .replace("%`h1`" ++ p.asString ++ "end`", "%`");});
23 if(part != 6, {formattedTemplate = formattedTemplate
24 .replace("unfold 33", "unfold 17").replace("unfold 3", "unfold 7")});});
25 lilyFile.write(formattedTemplate);
26 lilyFile.close});
27
28 File.mkdir(basePath);
29 File.mkdir(basePath +/"includes");
30 File.mkdir(basePath +/".." +/"pdf");
31 template = File.readAllString("dir +/" + "." + "/" + "score" + "/" + "score.template"
32 +/"a.lot.of.tiles.trivial.scan.score.template.ly".standardizePath);
33 template = template.replace("`transform`", "transform.join");
34
35 writeTemplate.value(template, nil);
36 writeTemplate.value(template, 6);
37 writeTemplate.value(template, 5);
38 writeTemplate.value(template, 4);
39 });
40
41 cond = Condition.new;
42
43 // generate pattern and get amplitude values for h16
44 pattern = Pmono(\lamp, \dur, \dur * durMult, \amp, Pseq(seq));
45 if(drawAmps, {
46 ampFilePath = basePath +/"amp_curve_tmp_h16.harm." ++ (1 + (p * 4)).asString() ++ ".wav";
47 pattern.render(ampFilePath, \dur * durMult * seq.size, action: {cond.unhang}); cond.hang;
48 ampSampleRate = SoundFile(ampFilePath).sampleRate;
49 Buffer.readChannel(s, ampFilePath, channels: [0], action: {arg ampBuf;
50 ampBuf.loadToFloatArray(action: {arg array; amps = array; cond.unhang});}); cond.hang});
51
52 lilyFile = if(data.size > 1, {lilyFile = subName ++ "_harm." ++ (1 + (p * 4)).asString()}, {subName});
53 lilyFile = File(basePath +/"includes" +/"a.lot.of.tiles.trivial.scan." ++ lilyFile + ".ly".standardizePath,"w");
54
55 // main transcribe code which groups data into beats and creates lilypond code accordingly
56 lastVal = nil;
57 seq.collect({arg v; durMult.collect({v}).flat.cdump(4).do({arg beat, i;
58 beat.separate({arg a, b; a != b}).do({arg group; var noteLength, target = 0, colors = "", lilyNote;
59 noteLength = group.size;
60 lilyNote = switch(noteLength, 1, {"b'16 "}, 2, {"b'8 "}, 3, {"b'8. "}, 4, {"b'4 "});
61
62 // lilypond directives to draw amplitude gradients for h16
63 if(drawAmps, {
64 colors = amps[(ampSampleRate * curTime).asInteger..(ampSampleRate * (curTime + (noteLength / 8))).asInteger];
65 target = colors[0];
66 colors = 1 - (colors.resamp0(noteLength * 50));
67 colors = colors.collect({arg color; color.round(0.0001).asString});
68 colors = "\override Glissando.details.colors = #' " ++ (" " ++ colors.join(" ") ++ " "));
69
70 // 0 or 1 above every note based on data
71 if(drawAmps.not, {lilyNote = lilyNote ++ "" ++ group[0].asString ++ " "});
72
73 // ties notes
74 lilyString = lilyString ++ if(group[0] == lastVal, {" "}, {" "});
75 lilyString = lilyString ++ if((curTime % 2 == 0), {" "}, {" "});
76 lilyString = lilyString ++ colors ++ lilyNote;
77 lilyString = lilyString ++ if(drawAmps && (group[0] != lastVal),
78 {"-\tweak Y-offset #-5.5 ." ++ (target.trunc(0.1) * 10).asString}, {" "});
79 lilyString = lilyString ++ if(drawAmps, {"\n"}, {" "});
80
81 lastVal = group[0];
82 curTime = curTime + (noteLength / 8);
83 });
84 });
85
86 // consolidates tied quarters for h14 and h15
87 if(drawAmps.not, {
88 lilyString.findRegexp("b'4 \\\` (0|1) - b'4 \\\` (0|1) - b'4 \\\` (0|1) - b'4 \\\` (0|1) ").clump(5).do(
89 {arg match; lilyString = lilyString.replace(match[0][1], "b'1 -" ++ match[1][1]);});
90 lilyString.findRegexp("b'4 \\\` (0|1) - b'4 \\\` (0|1) - b'4 \\\` (0|1) ").clump(4).do(
91 {arg match; lilyString = lilyString.replace(match[0][1], "b'2. -" ++ match[1][1]);});
92 lilyString.findRegexp("b'4 \\\` (0|1) - b'4 \\\` (0|1) ").clump(3).do(
93 {arg match; lilyString = lilyString.replace(match[0][1], "b'2 -" ++ match[1][1]);});
94 lilyString.findRegexp(" \\\` |b' (1|2.|2|4) \\\` (0|1) ").clump(3).do(
95 {arg match; lilyString = lilyString.replace(match[0][1], " " |b'" ++ match[1][1]);});
96
97 // prettify
98 lilyString = lilyString.replace(" ", "\n\n");
99 lilyString = lilyString.replace("\n ", "\n");
100
101 // consolidates tied quarters for h16 (very tricky)
102 if(drawAmps, {var replaceFirst, tmp;
103 replaceFirst = { arg string, find, replace = "", offset = 0;
104 var index, out = "", array = string, findSize = max(find.size, 1);
105 index = array.find(find, offset: offset);
106 out = out ++ array.keep(index) ++ replace;
107 array = array.drop(index + findSize);
108 out ++ array;});
109
110 tmp = lilyString;
111 lilyString.split($).do({arg bar; var beats, groups, offset = 0;
112 beats = bar.split($);
113 groups = beats.separate({arg a, b; (a.contains("b'4") && a.contains("")) && b.contains("b'4")).not });
114 groups.do({arg group;
115 if(group.size > 1, {
116 var ampList, noteLength, tweak, tie, replace, find;
117 ampList = group.collect({arg note; note[(note.find("(") + 1)..(note.find(")") - 1)]}.join(" "));
118 noteLength = switch(group.size, 2, {"2 "}, 3, {"2. "}, 4, {"1 "});
119 tweak = if(group[0].contains("tweak"), {group[0].find("#-\tweak")..(group[0].find("#-5.5") + 8)}, {" "});
120 tie = if(group.last.contains("("), {" -" }, {" "});
121 replace = "\override Glissando.details.colors = #' (" ++ ampList ++ " ) b'" ++ noteLength ++ tweak ++ tie;

```

```

122         find = group.join("\n");
123         tmp = replaceFirst.value(tmp, find, replace, offset));
124         offset = lilyString.find("|", offset: offset)}});
125         lilyString = tmp});
126
127
128 // final lilypond directives and write files
129 if(drawAmps, {
130     lilyString = "\override Glissando.stencil = #my-gliss \\addGliss { \\override Glissando.details.thickness = 1.15 " ++ lilyString ++ " }";
131     lilyString = "{ " ++ lilyString ++ " \\bar \".\" \\stopStaff \\hide b'l}";
132     lilyFile.write(lilyString);
133     lilyFile.close;
134
135 // this deletes the tmp files and creates the pdfs on the last call.
136 if(drawAmps, {
137     File.delete(ampFilePath);
138     if(p == 3, {
139         "which lilypond".unixCmd({ arg res1, pid1;
140             if(res1 == 0, {
141                 PathName(basePath).files.do({arg path;
142                     ("lilypond -o " ++ basePath + "/" + "." + "/" + "pdf " ++ path.fullPath).unixCmd({ arg res2, pid2;
143                         if(res2 != 0, {{var win, text;
144                             win = Window.new.front;
145                             text = StaticText(win, Rect(10, 10, 300, 200));
146                             text.string = "Something went wrong creating the pdfs, \n" ++
147                                 "but the lilypond files likely generated just fine".defer});
148                             [[\done, res2, pid2].postln]]}, {{var win, text;
149                                 win = Window.new.front;
150                                 text = StaticText(win, Rect(10, 10, 300, 200));
151                                 text.string = "Something went wrong creating the pdfs. \nLikely Lilypond is not installed, \n" ++
152                                     "but the Lilypond files probably generated just fine.".defer});
153                                 [[\done, res1, pid1].postln]]}}}});
154     });
155 )

```

a_lot_of_tiles_trivial_scan_gui.scd

```

1  (
2  var modelView, transportView, mixerView, guiLayout, playButton, randButton;
3
4  // model / transform
5  modelView = {var transformGrid, transformButtons, layouts, layoutGrid, layoutButtons,
6  fullScreenButton, decoratorButton, transcribeButton, contPlayButton, exportButton, displayGrid, model;
7
8  // sets transform
9  transformGrid = GridLayout();
10 transformButtons = Array.fill2D(7, 4, {arg r, c; Button().states(
11   [[c.asString, Color.grey, Color.white], [c.asString, Color.white, Color.grey]]));
12 transformButtons.do({arg row, rIndex;
13   row.do({arg button, cIndex;
14     if((rIndex < 5) || (cIndex < 2), {
15       transformGrid.add(button, rIndex, cIndex + 1);
16       button.action = {transformButtons[rIndex].do(
17         {arg b, i; if(button == b, {b.value = 1}, {b.value = 0});
18         ^transform[rIndex] = cIndex; if(rIndex < 4, {tileMap = ^mapAll.value(6, ^transform)}; ^tileWin.refresh.inEnvir}});
19       transformGrid.add(if(rIndex < 4,
20         {StaticText().string("child " ++ rIndex.asString).align(\center)},
21         {StaticText().string(("rotation", "mirror", "invert")[rIndex - 4])
22           .align(\center)}), rIndex, 0);
23 ^transform.do({arg v, rIndex; transformButtons[rIndex][v].value = 1});
24
25 // sets layout
26 layouts = ["depth level 6 only (max depth)", "depth level 5 only", "depth level 4 only", "hierarchical (embedded)",
27   "", "", ""];
28 layoutGrid = GridLayout();
29 layoutButtons = layouts.collect({arg l, i; Button().states(
30   [[layouts[i], Color.grey, Color.white], [l, Color.white, Color.grey]]));
31 layoutButtons.do({arg button, bIndex; if(bIndex < 4,
32   {layoutGrid.add(button, bIndex, 0);
33   button.action = {layoutButtons.do({arg b; if(button == b, {b.value = 1}, {b.value = 0});
34     ^layoutState = bIndex; ^tileWin.refresh}}).inEnvir,
35   {layoutGrid.add(StaticText().string(""), bIndex, 0)}});
36 layoutButtons[0].value = 1;
37
38 randButton = Button().states(["random transform", Color.grey, Color.white]).action({
39   ^transform = Array.fill(7, {arg i; if(i < 5, {4.rand}, {2.rand})});
40   ^tileMap = ^mapAll.value(6, ^transform);
41   ^tileWin.refresh;
42   transformButtons.do({arg row; row.do({arg button; button.value = 0});
43   ^transform.do({arg v, rIndex; transformButtons[rIndex][v].value = 1}).inEnvir);
44
45 // sets display
46 fullScreenButton = Button().states(["fullscreen", Color.grey, Color.white],
47   ["fullscreen", Color.white, Color.grey]).action({arg button;
48   if(button.value == 0, {^tileWin.endFullScreen}, {^tileWin.fullScreen}).inEnvir);
49
50 ^tileWin.view.keyDownAction = {arg doc, char, mod, unicode, keycode, key;
51   case
52   // <ctrl + f> = enter full screen
53   {mod == 262144 && key == 70} {^tileWin.fullScreen; fullScreenButton.value = 1}
54   // <esc> = exit full screen
55   {mod == 0 && key == 16777216} {^tileWin.endFullScreen; fullScreenButton.value = 0}.inEnvir;
56
57 decoratorButton = Button().states(["window decorator", Color.grey, Color.white],
58   ["window decorator", Color.white, Color.grey]).action({arg button;
59   ^tileWin.close;
60   if(button.value == 0, {^launchTileVisualizer.value(false, false)},
61   {^launchTileVisualizer.value(true, false)}.inEnvir);
62 decoratorButton.value = 1;
63
64 // set continuous play option (disables transform buttons when set)
65 contPlayButton = Button().states(["continuous play", Color.grey, Color.white],
66   ["continuous play", Color.white, Color.grey]).action({arg elem;
67   if(elem.value == 0, {^continuousPlay = false;
68   transformButtons.do({arg row; row.do({arg button; button.enabled = true});
69   randButton.enabled = true}, {
70   transformButtons.do({arg row; row.do({arg button; button.enabled = false});
71   randButton.enabled = false;
72   if(playButton.value == 0, {
73     fork({
74       ^continuousPlay = true;
75       randButton.valueAction = 0;
76       l.wait;
77       playButton.valueAction = 1, AppClock}}).inEnvir);
78
79 // transcribe
80 transcribeButton = Button().states(["transcribe", Color.grey, Color.white]).action({
81   var matrixH4, matrixH5, matrixH6, dataH4, dataH5, dataH6;
82   matrixH4 = ^matricize.value([tileMap[4]], 4, 0, ^transform);
83   matrixH5 = ^matricize.value([tileMap[5]], 5, 0, ^transform);
84   matrixH6 = ^matricize.value([tileMap[6]], 6, 0, ^transform);
85   dataH4 = ^genData.value(matrixH4, ^transform, 1, 0, 1);
86   dataH5 = ^genData.value(matrixH5, ^transform, 1, 0, 4);
87   dataH6 = ^genData.value(matrixH6, ^transform, 4, 0, 16);
88   ^transcribe.value(dataH4, 16, "hl.4");
89   ^transcribe.value(dataH5, 4, "hl.5");
90   ^transcribe.value(dataH6, 1, "hl.6", true)
91 }.inEnvir);
92
93 // export tile image
94 exportButton = Button().states(["export image", Color.grey, Color.white]).action({var img;
95   img = if(^transform[4] % 2 == 0, {Image.new(6000, 3000)}, {Image.new(3000, 6000)});
96   img.draw({tileDrawFunc.value(img, ^tileMap, ^transform, ^layoutState)});
97   FileDialog({ arg path; img.write(path[0]), {}, 0, 1}).inEnvir);
98
99 displayGrid = GridLayout();
100 displayGrid.add(fullScreenButton, 0, 0);
101 displayGrid.add(decoratorButton, 1, 0);
102 5.do({arg i; displayGrid.add(StaticText().string("", i + 2, 0));
103
104 model = GridLayout();
105 model.add(StaticText().string("transform code", 0, 0);
106 model.add(transformGrid, 1, 0); model.add(randButton, 2, 0);
107 model.add(StaticText().string("", 3, 0); model.add(StaticText().string("", 4, 0);
108 model.add(StaticText().string("", 0, 1);
109 model.add(StaticText().string("layout", 0, 2);
110 model.add(layoutGrid, 1, 2);
111 model.add(StaticText().string("", 0, 3);
112 model.add(StaticText().string("display", 0, 4);
113 model.add(displayGrid, 1, 4); model.add(contPlayButton, 2, 4); model.add(transcribeButton, 3, 4); model.add(exportButton, 4, 4);
114 model};
115
116 // transport
117 transportView = {
118   arg hash; var clockStringFunc, metronomeStringFunc, metronomeColorFunc,
119   transport, posSlider, startPos = 0, startPosText, pauseButton, clock, metronome;
120
121 // update clock and metronome

```

```

122 clockStringFunc = {
123     arg curBeat; var measure, beat;
124     beat = ((curBeat / 2) % 4 + 1).trunc.asInteger.asString;
125     measure = ((curBeat / 8) + 1).trunc.asInteger.asString;
126     if (measure.size == 1, {measure = " " ++ measure});
127     if (measure.size == 2, {measure = " " ++ measure});
128     measure ++ ":" ++ beat;
129     // [-30, -105, -104] and [-30, -105, -113] are unicode inverse bullet and normal bullet, respectively
130     metronomeStringFunc = {arg curBeat; case {curBeat % 8 < 1} {[-30, -105, -104].collect({arg int; int.asAscii}).as(String)}
131     {curBeat % 2 < 1} {[-30, -105, -113].collect({arg int; int.asAscii}).as(String)} {true} {" "}};
132     metronomeColorFunc = {arg curBeat; case {curBeat % 32 < 1} {Color.red} {curBeat % 8 < 1} {Color.blue} {true} {Color.black}};
133
134     // get current time and call update clock and metronome
135     OSCFunc({arg msg, time; {
136         if (msg[2] == hash, {
137             if (msg[3] > 0, {clock.string = clockStringFunc.value(msg[3])});
138             metronome.stringColor = metronomeColorFunc.value(msg[3]);
139             metronome.string = metronomeStringFunc.value(msg[3]);
140             // if continuous play, when finished, delete all autogenerated files, reselect a transform, and then start
141             if (msg[3] == 1031, {
142                 playButton.valueAction = 0;
143                 fork({
144                     if ('ContinuousPlay, {var baseDir;
145                     baseDir = "dir +/" ++ "." ++ "audio" ++ "transform." ++ "transform.join ++ "audio";
146                     File.delete(baseDir ++ "hl.6.fundamental.wav");
147                     File.delete(baseDir ++ "hl.6.harmonics.wav");
148                     File.delete(baseDir ++ "hl.5.high.noise.wav");
149                     File.delete(baseDir ++ "hl.4.low.noise.wav");
150                     File.delete(baseDir);
151                     randButton.valueAction = 0;
152                     posSlider.valueAction = 0;
153                     2.wait;
154                     playButton.valueAction = 1
155                 })), AppClock})).inEnvir.defer}.inEnvir, 'tr', s.addr);
156
157 // transport gui items
158 transport = HLayout(
159     // play / stop button
160     playButton = Button().states(["play", Color.black], ["stop", Color.black, Color.grey]).action({arg elem;
161     fork {var cond, baseDir;
162     cond = Condition.new;
163     baseDir = "dir +/" ++ "." ++ "audio" ++ "transform." ++ "transform.join ++ "audio";
164     // generate audio files if they do not exist
165     if (File.exists(baseDir ++ "hl.6.fundamental.wav").not ||
166     File.exists(baseDir ++ "hl.6.harmonics.wav").not ||
167     File.exists(baseDir ++ "hl.5.high.noise.wav").not ||
168     File.exists(baseDir ++ "hl.4.low.noise.wav").not ||
169     File.exists(baseDir ++ "click.wav").not, {
170         var matrixH4, matrixH5, matrixH6, dataH4, dataH5, dataH6,
171         patternH4, patternH5, patternH6Fund, patternH6Harms, click;
172         matrixH4 = "matricize.value(['tileMap[4]', 4, 0, 'transform');
173         matrixH5 = "matricize.value(['tileMap[5]', 5, 0, 'transform');
174         matrixH6 = "matricize.value(['tileMap[6]', 6, 0, 'transform');
175         dataH4 = "genData.value(matrixH4, 'transform, 1, 0, 1, 0.5, 1);
176         dataH5 = "genData.value(matrixH5, 'transform, 1, 0, 4, 0.5, 1);
177         dataH6 = "genData.value(matrixH6, 'transform, 4, 0, 16);
178         patternH4 = "genPattern.value(dataH4, "hl.4.low.noise", 16, true, cond); cond.hang;
179         patternH5 = "genPattern.value(dataH5, "hl.5.high.noise", 4, true, cond); cond.hang;
180         patternH6Fund = "genPattern.value([dataH6[0]], "hl.6.fundamental", 1, true, cond); cond.hang;
181         patternH6Harms = "genPattern.value(dataH6[1..3], "hl.6.harmonics", 1, true, cond); cond.hang;
182         click = "genPattern.value((0..7).wrapExtend(8 * 129)), "click", 2, true, cond); cond.hang});
183
184     // load buffers if the transform has changed
185     if ('loadedTransform != "transform, {var baseDir;
186     baseDir = "dir +/" ++ "." ++ "audio" ++ "transform." ++ "transform.join ++ "audio";
187     "buf1 = Buffer.read(s, baseDir ++ "hl.6.fundamental.wav", action: {cond.unhang}); cond.hang;
188     "buf2 = Buffer.read(s, baseDir ++ "hl.6.harmonics.wav", action: {cond.unhang}); cond.hang;
189     "buf3 = Buffer.read(s, baseDir ++ "hl.5.high.noise.wav", action: {cond.unhang}); cond.hang;
190     "buf4 = Buffer.read(s, baseDir ++ "hl.4.low.noise.wav", action: {cond.unhang}); cond.hang);
191     "loadedTransform = "transform.deepCopy;
192
193
194     // play / stop functionality (create synth if it does not exist
195     {if ("play == nil, {play = Synth.new(\play, [\hash, hash, \playRate, 0, \startTrig, 0,
196     \sineBuf1, "buf1, \sineBuf2, "buf2, \highNoiseBuf, "buf3, \lowNoiseBuf, "buf4, \tempo, "tempo]);
197     pauseButton.value = 0;
198     if (elem.value == 0, {
199         clock.string = clockStringFunc.value((startPos * 129).trunc * 8);
200         "play.set(\playRate, 0, \startTrig, 0,
201         \sineBuf1, "buf1, \sineBuf2, "buf2, \highNoiseBuf, "buf3, \lowNoiseBuf, "buf4);
202         clock.string = clockStringFunc.value((startPos * 129).trunc * 8);{
203         "play.set(\startPos, startPos, \playRate, 1, \startTrig, 1,
204         \sineBuf1, "buf1, \sineBuf2, "buf2, \highNoiseBuf, "buf3, \lowNoiseBuf, "buf4)}).inEnvir.defer}.inEnvir);
205
206 // pause button
207 pauseButton = Button().states(["pause", Color.black], ["pause", Color.black, Color.grey]).action({arg elem;
208     if (elem.value == 1, {play.set(\playRate, 0), {play.set(\playRate, 1)}).inEnvir);
209
210 // start position slider
211 StaticText().string(" start measure:beat"),[
212     posSlider = Slider(bounds: Rect(0, 0, 30, 5)).action({arg pos; var min, sec;
213     startPosText.string = clockStringFunc.value((pos.value * 129).trunc * 8);
214     startPos = ((pos.value * 129).trunc * 8) / (129 * 8);
215     clock.string = clockStringFunc.value((startPos * 129).trunc * 8).inEnvir, stretch: 1];
216     startPosText = StaticText().string(" 1:1").font(Font("Liberation Mono", 15), nil);
217
218 HLayout([VLayout(HLayout(
219     clock = StaticText().string(" 1:1").font(Font("Liberation Mono", 200)),
220     StaticText().string(" ").font(Font("Liberation Mono", 200)),
221     metronome = StaticText().string([-30, -105, -104].collect({arg int; int.asAscii}).as(String)).font(Font("Liberation Mono", 300)).stringColor(Color.red);
222     nil, transport),
223     alignment: \top]);
224
225 // mixer
226 mixerView = {arg hash; var masterIndicators, trackIndicators, master, tracks,
227     eVol = [0.8, 0.8, 0.8, 0.8], eMute = [1, 1, 1, 1], ePan = [0, 0, 0, 0],
228     eNames = ["hl 6 (fundamental)", "hl 6 (harmonics)", "hl 5 (high noise)", "hl 4 (low noise)"];
229
230 // init indicators
231 masterIndicators = {LevelIndicator() ! 2;
232 trackIndicators = {LevelIndicator() ! 4;
233
234 // get amp values for indicators
235 OSCFunc.new({arg msg; {
236     if (msg[2] == hash, {{arg i;
237     masterIndicators[i].value = msg[3 + i].ampdb.linlin(-60, 0, 0, 1) ! 2}}.defer,
238     'masterLevel', s.addr);
239 OSCFunc.new({arg msg; {
240     if (msg[2] == hash, {{arg i;
241     trackIndicators[i].value = msg[3 + i].ampdb.linlin(-60, 0, 0, 1) ! 4}}.defer,
242     'trackLevels', s.addr);
243
244 // master faders

```

```

244 master = HLayout(
245   VLayout([HLayout(
246     Slider().value(0.8).action({arg elem;
247       ^play.set(\masterVol, elem.value * 1.25)}.inEnvir),
248     masterIndicators[0], masterIndicators[1]), stretch: 2],
249   Button().states([["mute", Color.black], ["mute", Color.black, Color.grey]]).action({arg elem;
250     ^play.set(\masterMute, (1 - elem.value).abs)}.inEnvir),
251   StaticText().string-"      master      ").align(\center), nil);
252 // track faders
253 tracks = {arg part;
254   HLayout(VLayout(HLayout(
255     Slider().value(0.8).action({arg elem;
256       eVol[part] = elem.value * 1.25; ^play.set("eVol", eVol)}.inEnvir),
257     trackIndicators[part]),
258   Button().states([["mute", Color.black], ["mute", Color.black, Color.grey]]).action({arg elem;
259     eMute[part] = (1 - elem.value).abs; ^play.set("eMute", eMute)}.inEnvir),
260   StaticText().string-"pan").align(\center),
261   Knob().value(0.5).action({arg elem;
262     ePan[part] = elem.value * 2 - 1; ^play.set("ePan", ePan)}.inEnvir),
263   StaticText().string-(eNames[part]).align(\center), nil) ! 4;
264   HLayout(master, nil, *tracks);
265
266 // all gui
267 guiLayout = {var tabButtonReset, modelViewButton, transportViewButton, mixerViewButton, hash, tabs;
268   tabButtonReset = {modelViewButton.value = 1; transportViewButton.value = 1; mixerViewButton.value = 1};
269   VLayout(HLayout(
270     modelViewButton = Button().states([["model", Color.white, Color.grey], ["model", Color.black]]).action(
271     {tabButtonReset.value; modelViewButton.value = 0; tabs.index = 0 }.value(0),
272     transportViewButton = Button().states([["transport", Color.white, Color.grey], ["transport", Color.black]]).action(
273     {tabButtonReset.value; transportViewButton.value = 0; tabs.index = 1 }.value(1),
274     mixerViewButton = Button().states([["mixer", Color.white, Color.grey], ["mixer", Color.black]]).action(
275     {tabButtonReset.value; mixerViewButton.value = 0; tabs.index = 2 }.value(1)),
276     hash = 10000000.rand;
277     tabs = StackLayout();
278     tabs.add(Window.new.layout_(mixerView.value(hash)));
279     tabs.insert(Window.new.layout_(transportView.value(hash)));
280     tabs.insert(Window.new.layout_(modelView.value(hash)));
281     tabs.index = 0);
282
283 // launch the gui
284 ^launchGui = {var guiWin;
285   guiWin = Window.new("a lot of tiles (trivial scan) - gui", Rect(200, 25, 1000, 450)).front;
286   guiWin.layout = guiLayout.value;
287   guiWin.front}
288 )

```

a_lot_of_tiles_trivial_score_template.ly

```

1 \version "2.19.81"
2
3 % systems-per-page, unfold vars, and strings delimited by tildes
4 % are changed by the Supercollider transcriber
5
6 \paper {
7   #(set-paper-size "a4" 'portrait)
8   top-margin = 1 \cm
9   bottom-margin = 1 \cm
10  left-margin = 2.5 \cm
11
12  top-system-spacing =
13  #'((basic-distance . 25 )
14  (minimum-distance . 25 )
15  (padding . 0 )
16  (stretchability . 0))
17
18  last-bottom-spacing =
19  #'((basic-distance . 15 )
20  (minimum-distance . 15 )
21  (padding . 0 )
22  (stretchability . 0))
23
24  % manually change systems-per-page to 2 if the harmonics of h1 6 are uncommented below
25  systems-per-page = 4
26
27  print-page-number = ##t
28  oddHeaderMarkup = \markup { \on-the-fly #not-first-page {"~score.type~ - ~transform~"} }
29  evenHeaderMarkup = \markup { \on-the-fly #not-first-page {"~score.type~ - ~transform~"} }
30  oddFooterMarkup = \markup { \fill-line {
31    \on-the-fly #not-first-page
32    \concat {
33      "- "
34      \fontsize #1.5
35      \on-the-fly #print-page-number-check-first
36      \fromproperty #'page:page-number-string
37      "-"} } }
38  evenFooterMarkup = \markup { \fill-line {
39    \on-the-fly #not-first-page
40    \concat {
41      "- "
42      \fontsize #1.5
43      \on-the-fly #print-page-number-check-first
44      \fromproperty #'page:page-number-string
45      "-"} } }
46 }
47
48 \header {
49  title = \markup { \italic {a lot of tiles (trivial scan)} }
50  subtitle = \markup { \normal-text {"~transform~"} }
51  composer = \markup { \left-column {"michael winter" " (cdmx, mx and nashville, usa; 2018)"} }
52  piece = \markup { \normal-text {"~score.type~ - ~transform~"} }
53  tagline = ""
54 }
55
56 #(set-global-staff-size 15)
57
58 \layout {
59  indent = 0.0 \cm
60  line-width = 17 \cm
61  ragged-last = ##t
62
63  \context {
64    \Score
65    \override BarNumber.extra-offset = #'(0 . 5)
66    \override BarNumber.stencil =
67    #(make-stencil-circler 0.1 0.25 ly:text-interface::print)
68  }
69  \context {
70    \Staff
71    \override StaffSymbol.line-count = #1
72    \override Clef.stencil = #point-stencil
73    \override Clef.space-alist.first-note = #'(extra-space . 1)
74    \remove "Time.signature-engraver"
75  }
76  \context {
77    \Voice
78    \override Glissando.minimum-length = #0
79    \override Glissando.layer = 500
80    \override Glissando.breakable = ##t
81    \override Glissando.bound-details =
82    #'((right
83      (attach-dir . -1)
84      (end-on-accidental . #f)
85      (padding . 0))
86      (right-broken
87        (padding . 0.5))
88      (left-broken
89        (padding . 0.5)
90        (attach-dir . 1))
91      (left
92        (attach-dir . -1)
93        (padding . -0.25)
94        (start-at-dot . #f)))
95  }
96 }
97
98 % this draws a curve and a gradient
99 #(define (make-grey-filled-curve-stencil-list x-coords colors half-thick r1)
100 (if (null? (cdr x-coords))
101   r1
102   (make-grey-filled-curve-stencil-list
103     (cdr x-coords)
104     (cdr colors)
105     half-thick
106     (cons
107       (stencil-with-color
108         (make-filled-box-stencil
109           (interval-widen (cons (car x-coords) (cdr x-coords)) 0.1)
110           (cons (- half-thick) (- 9 (* 10 (car colors))))))
111       (list (car colors) (car colors) (car colors))
112       r1))))
113
114 % this draws a just a line with a gradient
115 #(define (make-grey-filled-box-stencil-list x-coords colors half-thick r1)
116 (if (null? (cdr x-coords))
117   r1
118   (make-grey-filled-box-stencil-list
119     (cdr x-coords)
120     (cdr colors)
121     half-thick

```

```

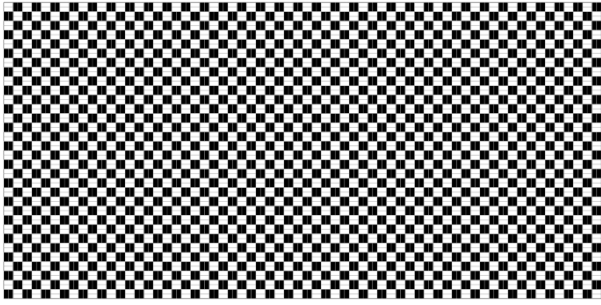
122 (cons
123 (stencil-with-color
124 (make-filled-box-stencil
125 (interval-widen (cons (car x-coords) (cadr x-coords)) 0.1)
126 (cons (- half-thick) half-thick))
127 (list (car colors) (car colors) (car colors)))
128 rl)))
129
130 #define my-gliss
131 (lambda (grob)
132 (if (ly:stencil? (ly:line-spanner::print grob))
133 (let* ((stencil (ly:line-spanner::print grob))
134 (X-ext (ly:stencil-extent stencil X))
135 (Y-ext (ly:stencil-extent stencil Y))
136 (Y-length (- (cdr Y-ext) (car Y-ext)))
137 (left-bound-info (ly:grob-property grob 'left-bound-info))
138 (left-Y (assoc-get 'Y left-bound-info))
139 (thick
140 (assoc-get 'thickness (ly:grob-property grob 'details) 0.5))
141 (layout (ly:grob-layout grob))
142 (blot (ly:output-def-lookup layout 'blot-diameter))
143 (right-bound (ly:spanner-bound grob RIGHT))
144 (right-par (ly:grob-parent right-bound X))
145 (stem
146 (if (grob::has-interface right-par 'note-column-interface)
147 (ly:grob-object right-par 'stem)
148 ' ()))
149 (stem-stencil
150 (if (ly:grob? stem)
151 (ly:grob-property stem 'stencil)
152 #f))
153 (stem-thick
154 (if (ly:stencil? stem-stencil)
155 (interval-length (ly:stencil-extent stem-stencil X))
156 0))
157 (corr-delta-X (- (interval-length X-ext)
158 Y-length
159 blot
160 stem-thick
161 ; mmh, why this value??
162 -0.05))
163 (colors
164 (assoc-get 'colors (ly:grob-property grob 'details)
165 (list 0 .5 .8)))
166 (steps
167 (length colors))
168 (raw-x-coords
169 (iota (1+ (abs steps)) 0 (/ corr-delta-X (abs steps))))
170 (x-coords
171 (map
172 (lambda (e)
173 (+ (car X-ext) Y-length blot e))
174 raw-x-coords)))
175
176 ;; create a flat glissando
177 (ly:grob-set-nested-property! grob '(right-bound-info Y) left-Y)
178
179 ;; return the stencil of added boxes
180 (ly:stencil-translate-axis
181 (apply
182 ly:stencil-add
183 ;; change this to make-grey-filled-box-stencil-list to eliminate curve and just use gradient
184 (make-grey-filled-curve-stencil-list
185 x-coords
186 colors
187 thick
188 ' ()))
189 ;; the actual offset is TODO, hardcoded here
190 3.5
191 Y))
192 #f)))
193
194 #define (add-gliss m)
195 (case (ly:music-property m 'name)
196 ((NoteEvent)
197 (set! (ly:music-property m 'articulations)
198 (append
199 (ly:music-property m 'articulations)
200 (list (make-music 'GlissandoEvent))))
201 m)
202 (else #f)))
203
204 addGliss =
205 #define-music-function (music)
206 (ly:music?)
207 (map-some-music add-gliss music))
208
209
210 \new Score
211 \with {proportionalNotationDuration = #(ly:make-moment 1 16)}
212 <<
213 \new StaffGroup \with{
214 \override StaffGrouper.staff-staff-spacing =
215 #'((basic-distance . 13)
216 (minimum-distance . 13)
217 (padding . 0)
218 (stretchability . 0))
219 \override StaffGrouper.staffgroup-staff-spacing =
220 #'((basic-distance . 13)
221 (minimum-distance . 13)
222 (padding . 0)
223 (stretchability . 0))
224 }
225 <<
226 % uncomment these lines to view harmonics of h1 6
227 % also change systems-per-page to 2 manually above
228 %{
229 \new Staff \with {
230 instrumentName = \markup \center-column {"h1 6 " " (harm 13) " }
231 shortInstrumentName = #"h16 (h13) "
232 }
233 <<
234 \repeat unfold 33 { \repeat unfold 3 { s1 \noBreak } s1 \break }
235 \include "includes/a.lot.of.tiles.trivial.scan.h1.6.harm.13.ly"
236 }
237 >>
238 \new Staff \with {
239 instrumentName = \markup \center-column {"h1 6 " " (harm 9) " }
240 shortInstrumentName = #"h16 (h9) "
241 }
242 <<
243 \repeat unfold 33 { \repeat unfold 3 { s1 \noBreak } s1 \break }
244 \include "includes/a.lot.of.tiles.trivial.scan.h1.6.harm.9.ly"

```

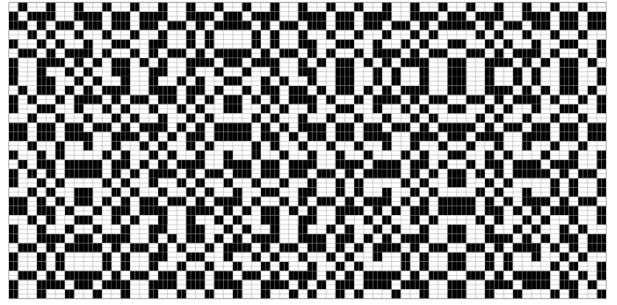
```

245 >>
246 \new Staff \with {
247   instrumentName = \markup \center-column {"h1 6 " "(harm 5) " }
248   shortInstrumentName = #"h16 (h5) "
249 }
250 <<
251 \repeat unfold 33 { \repeat unfold 3 { s1 \noBreak } s1 \break }
252 \include "includes/a.lot.of.tiles.trivial.scan.h1.6.harm.5.ly"
253 >>
254 %}
255 %~h16-start~
256 \new Staff \with {
257   instrumentName = \markup \center-column {"h1 6 " "(harm 1) " }
258   shortInstrumentName = #"h16 (h1) "
259 }
260 <<
261 \repeat unfold 33 { \repeat unfold 3 { s1 \noBreak } s1 \break }
262 \include "includes/a.lot.of.tiles.trivial.scan.h1.6.harm.1.ly"
263 >>
264 %~h16-end~
265 >>
266
267 \new StaffGroup \with{
268   \override StaffGrouper.staff-staff-spacing =
269   #'((basic-distance . 9)
270     (minimum-distance . 9)
271     (padding . 0)
272     (stretchability . 0))
273 }
274 <<
275 %~h15-start~
276 \new Staff \with {
277   instrumentName = \markup \center-column {"h1 5" "(high noise)" }
278   shortInstrumentName = #"h15 (hn) "
279 }
280 <<
281 \repeat unfold 33 { \repeat unfold 3 { s1 \noBreak } s1 \break }
282 \include "includes/a.lot.of.tiles.trivial.scan.h1.5.ly"
283 >>
284 %~h15-end~
285
286 %~h14-start~
287 \new Staff \with {
288   instrumentName = \markup \center-column {"h1 4 " "(low noise)" }
289   shortInstrumentName = #"h14 (ln) "
290 }
291 <<
292 \repeat unfold 33 { \repeat unfold 3 { s1 \noBreak } s1 \break }
293 \include "includes/a.lot.of.tiles.trivial.scan.h1.4.ly"
294 >>
295 %~h14-end~
296 >>
297 >>
298 >>

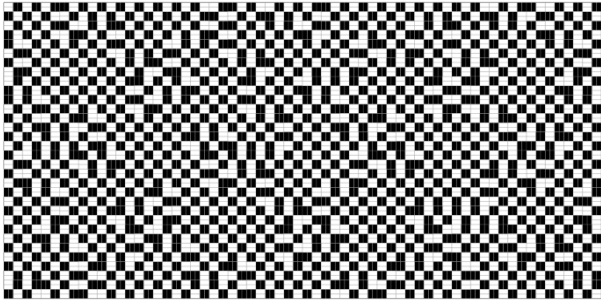
```

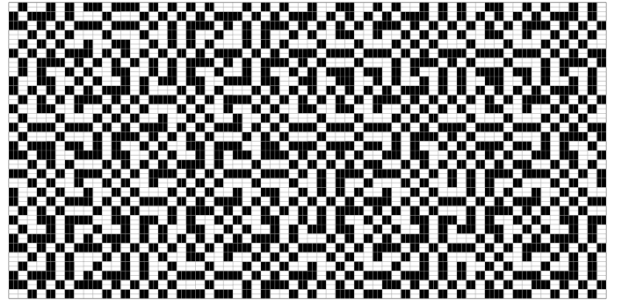
0000



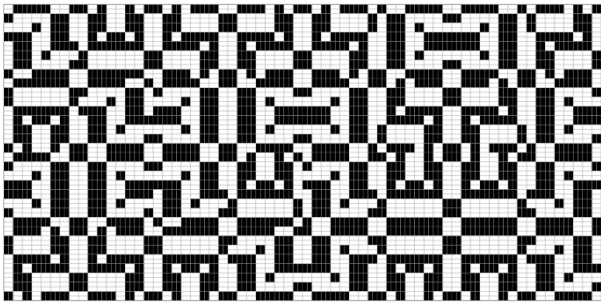
0001



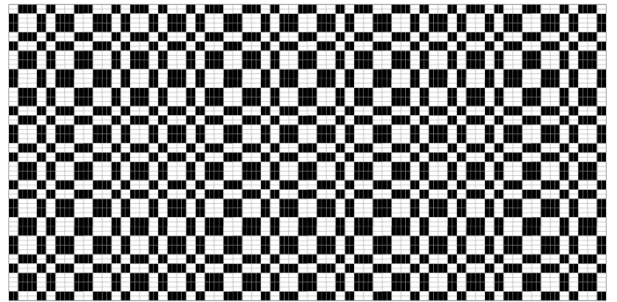
0002



0003



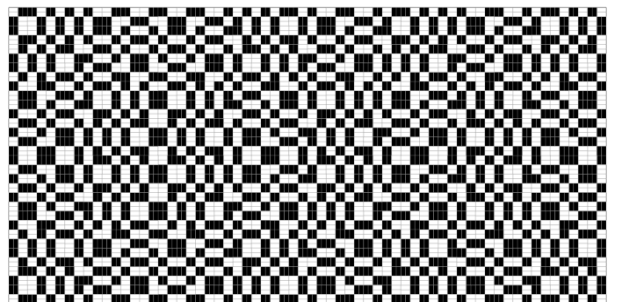
0010



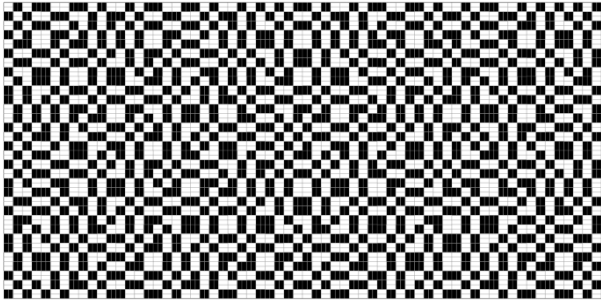
0011



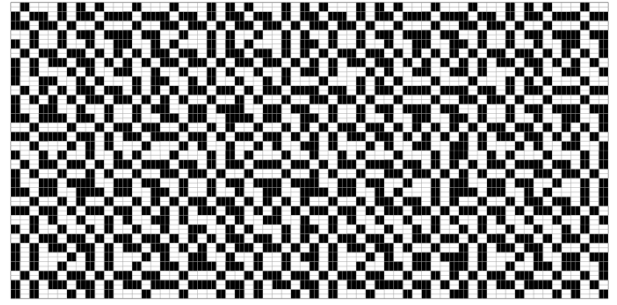
0012



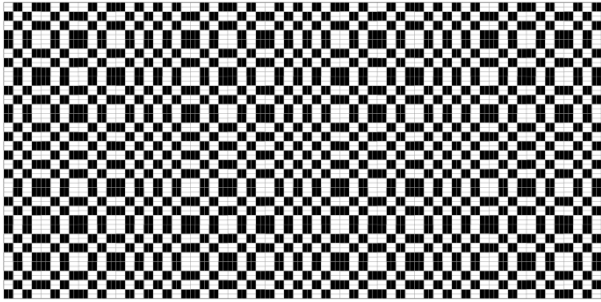
0013



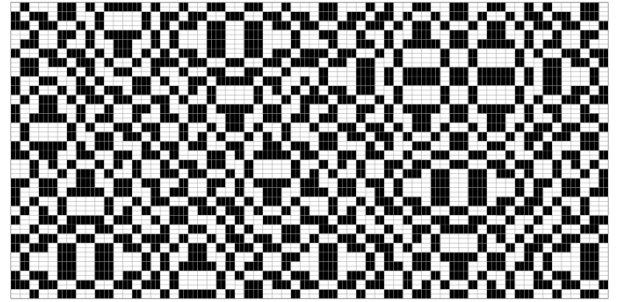
0020



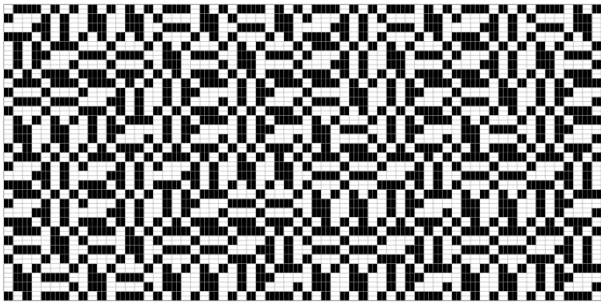
0021



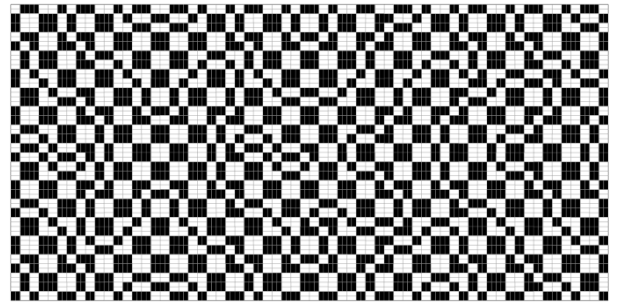
0022



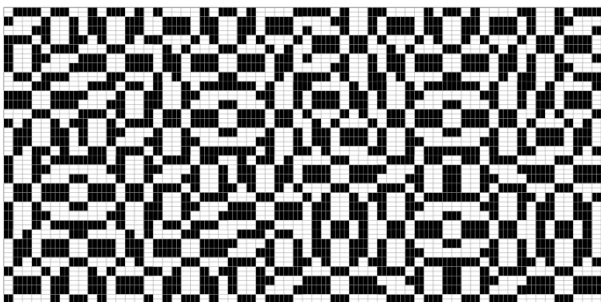
0023



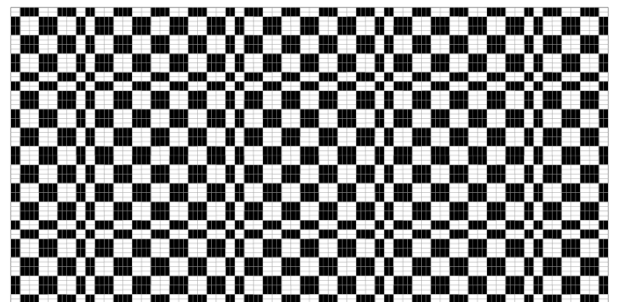
0030



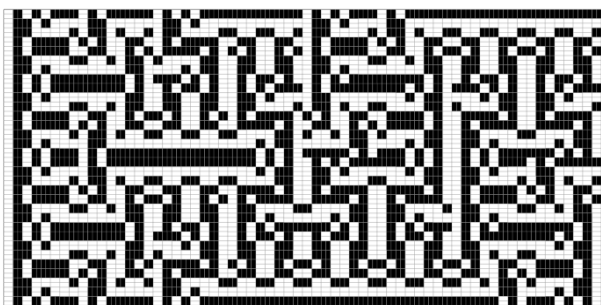
0031



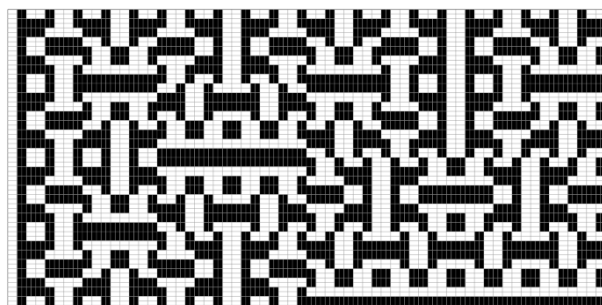
0032



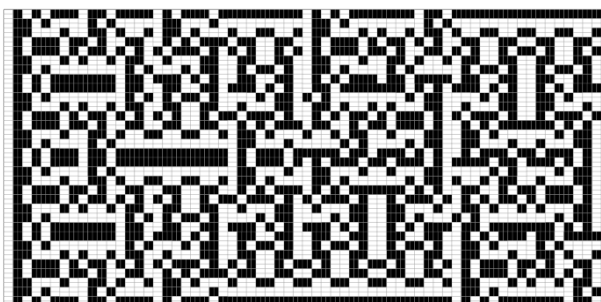
0033



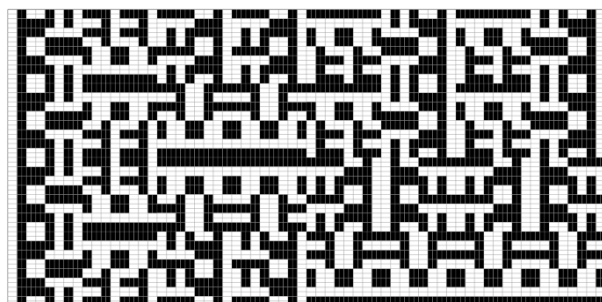
0100



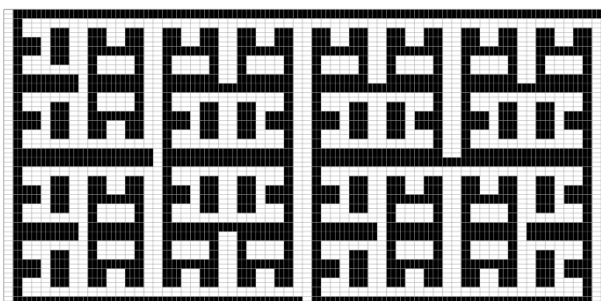
0101



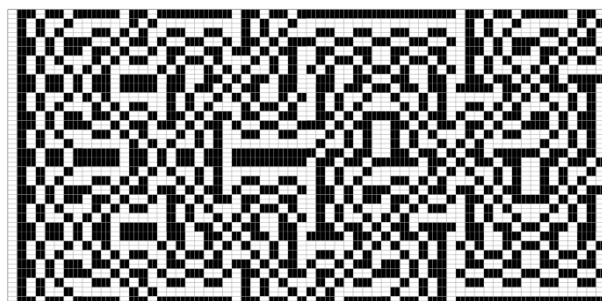
0102



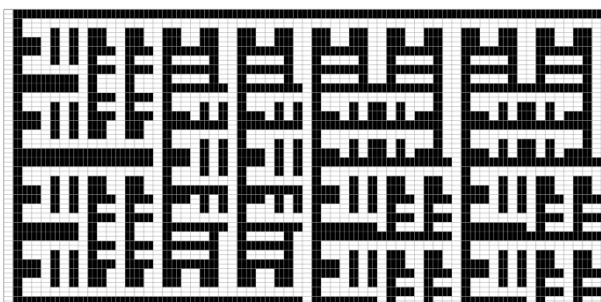
0103



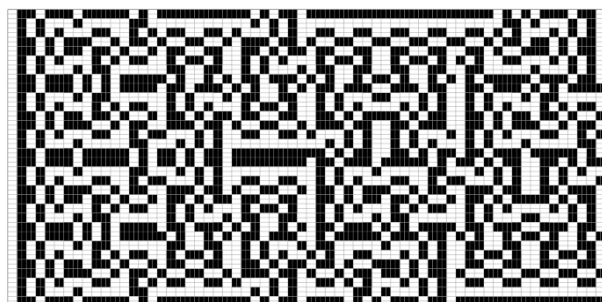
0110



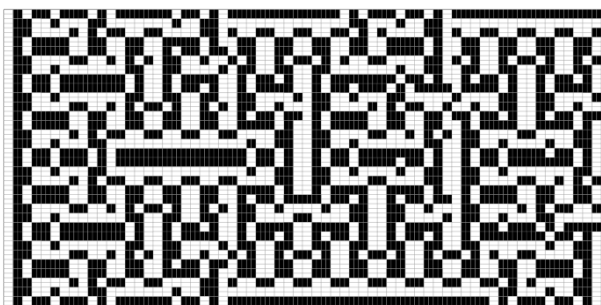
0111



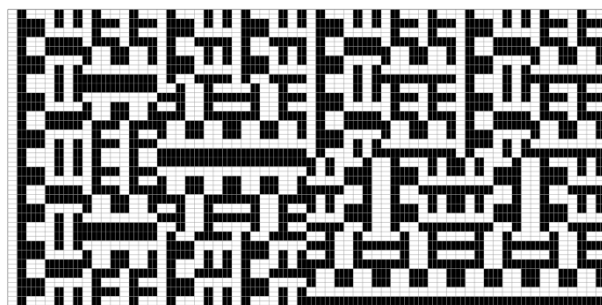
0112



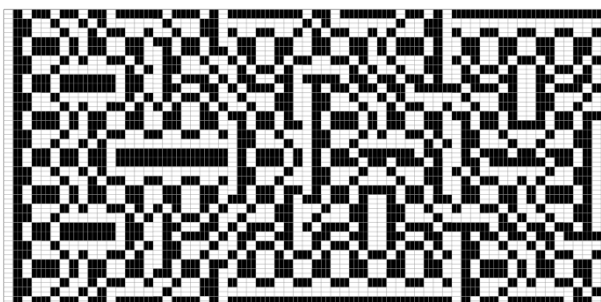
0113



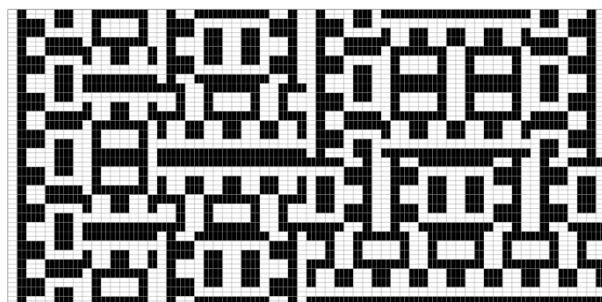
0120



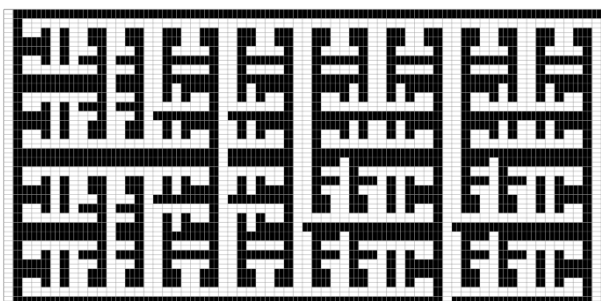
0121



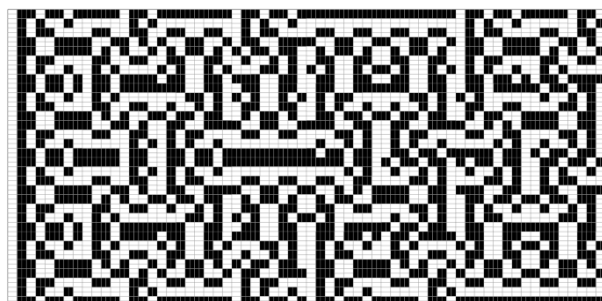
0122



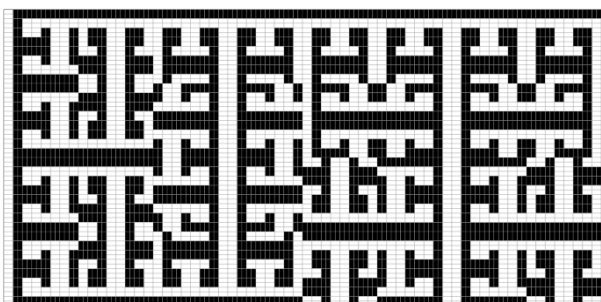
0123



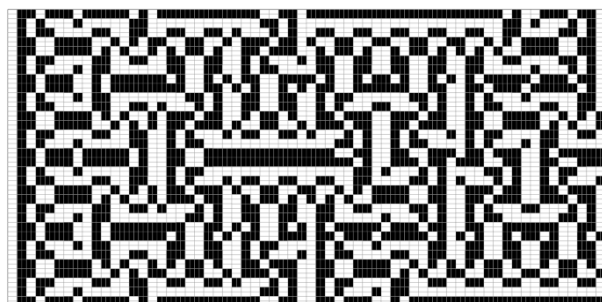
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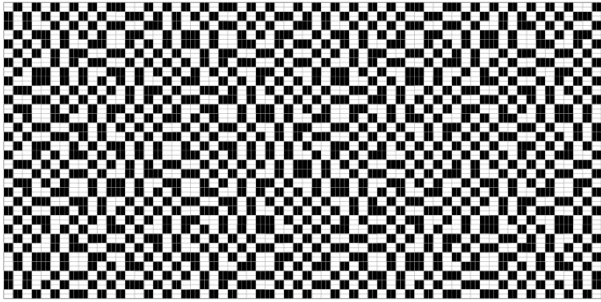
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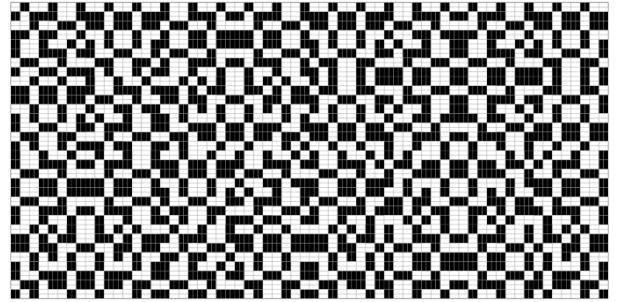
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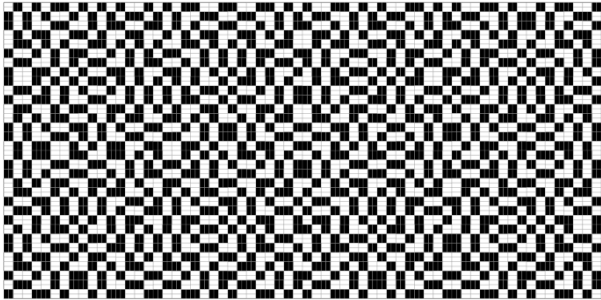
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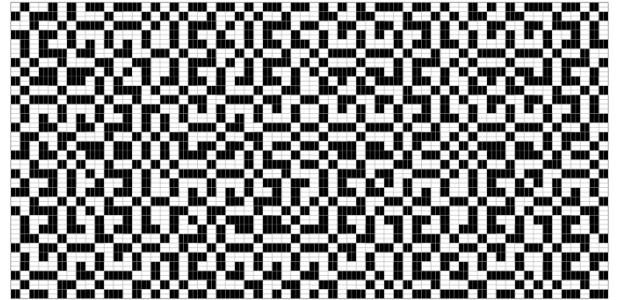
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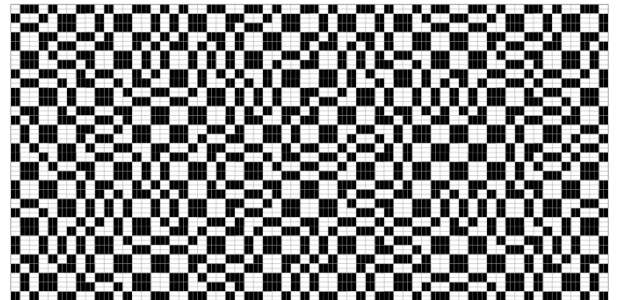
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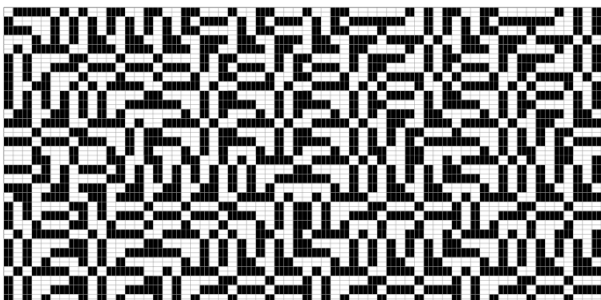
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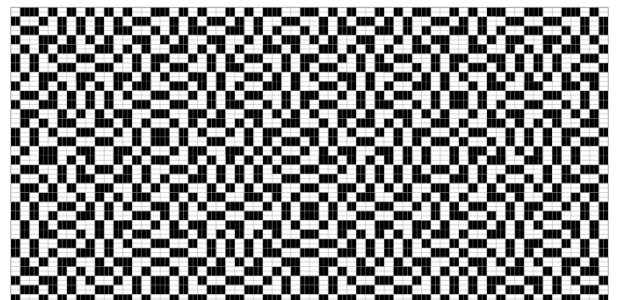
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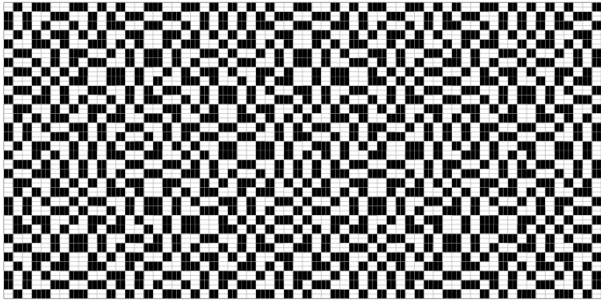
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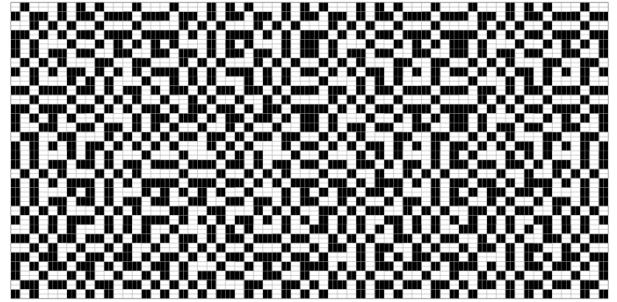
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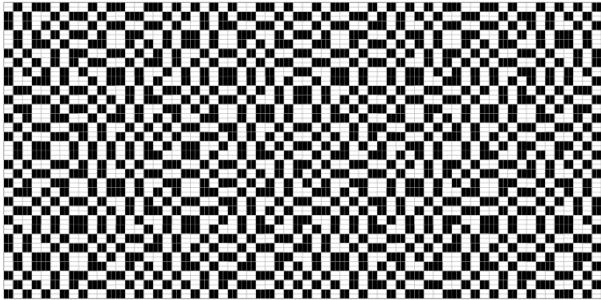
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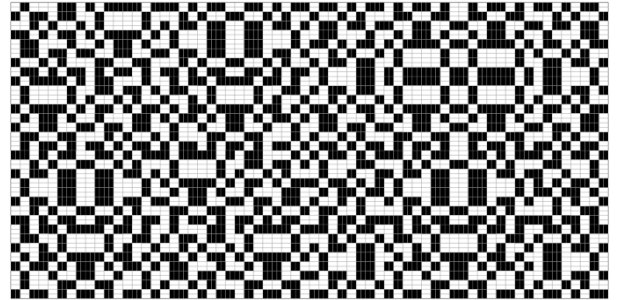
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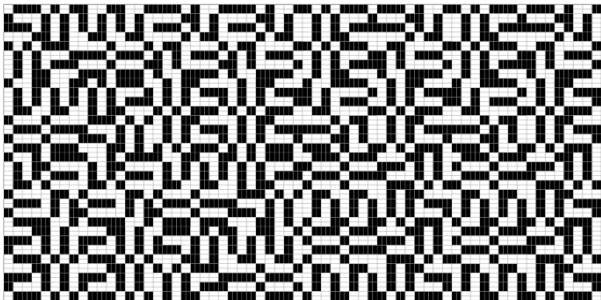
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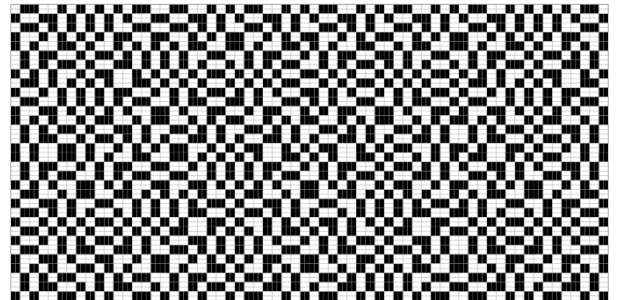
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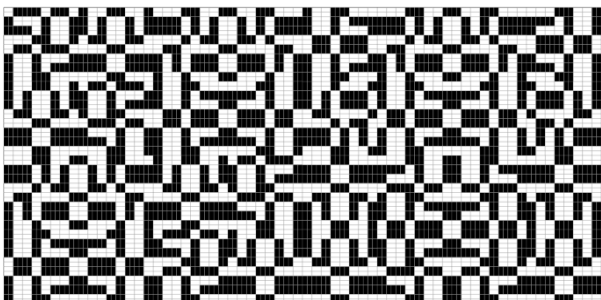
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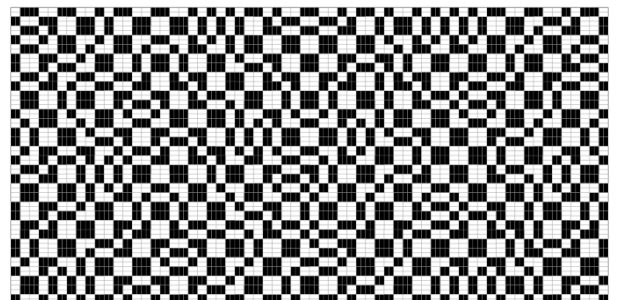
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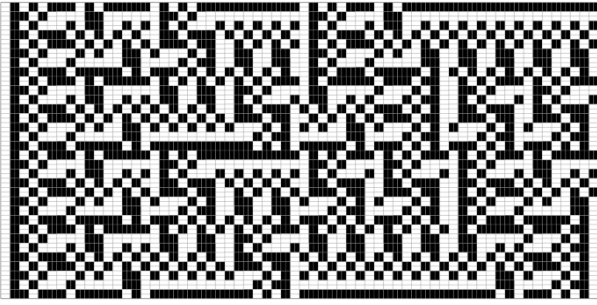
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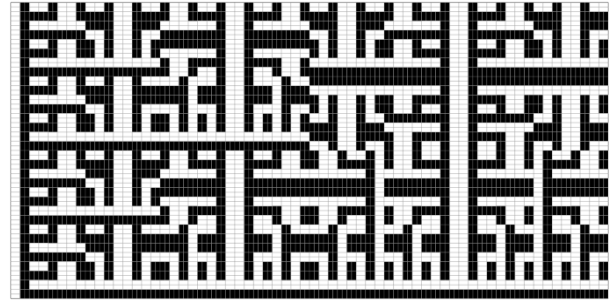
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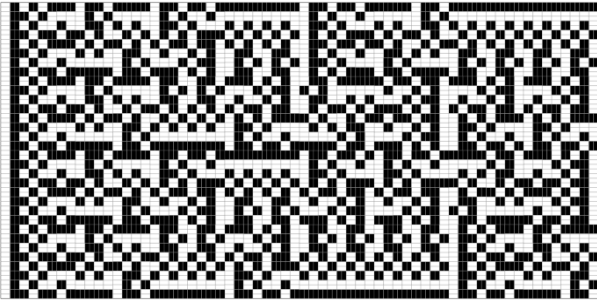
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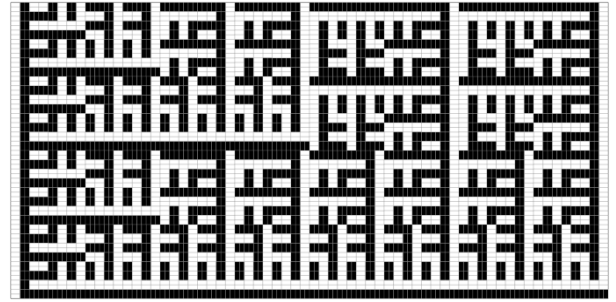
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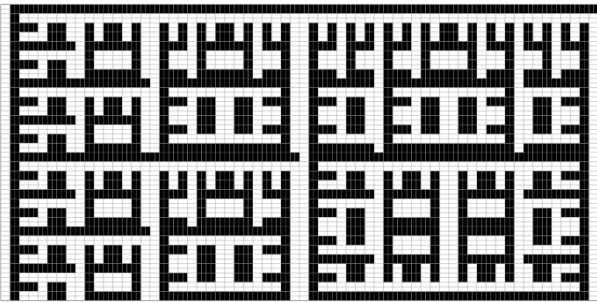
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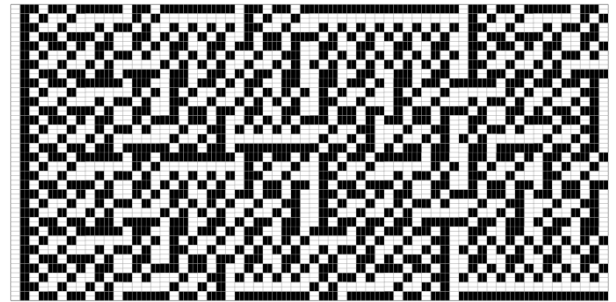
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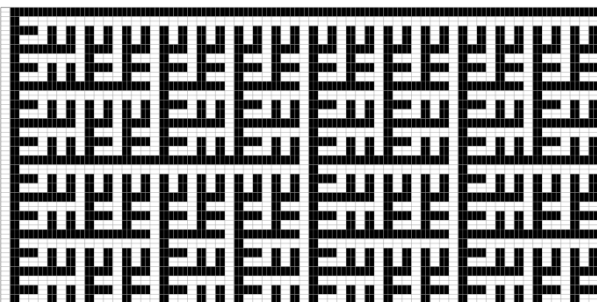
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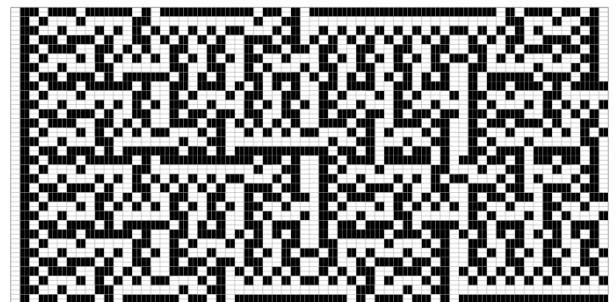
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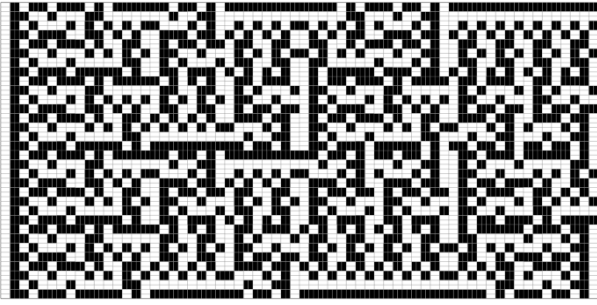
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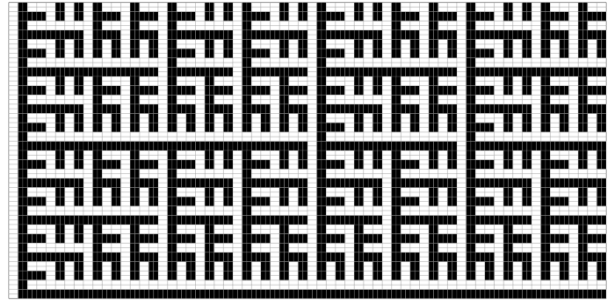
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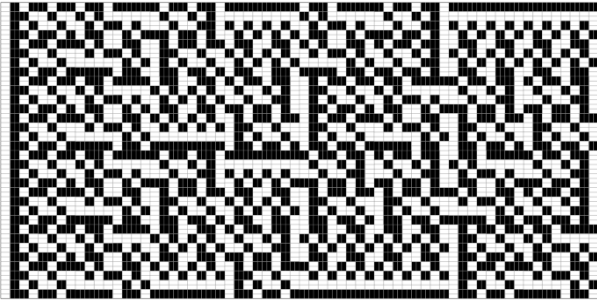
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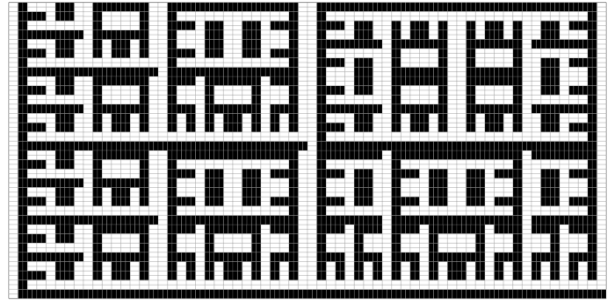
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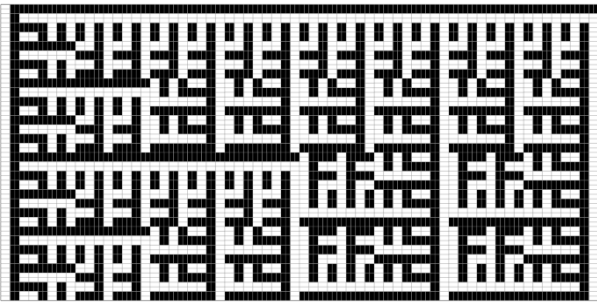
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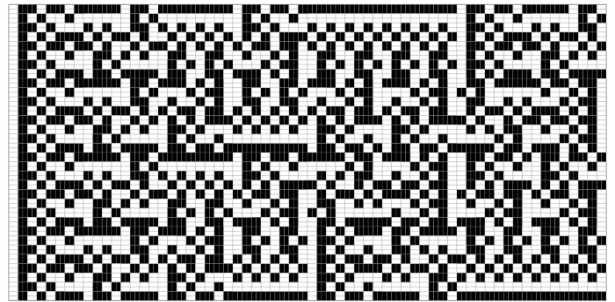
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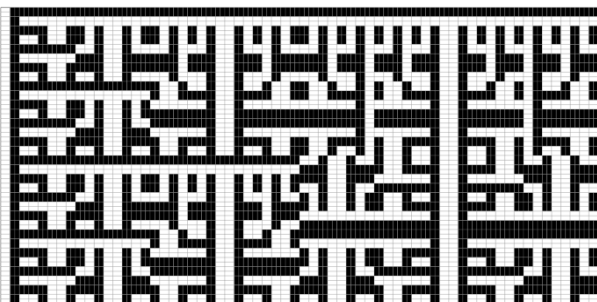
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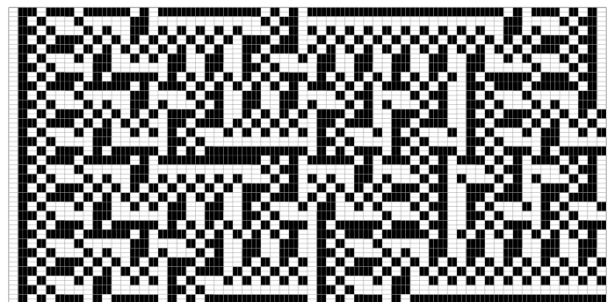
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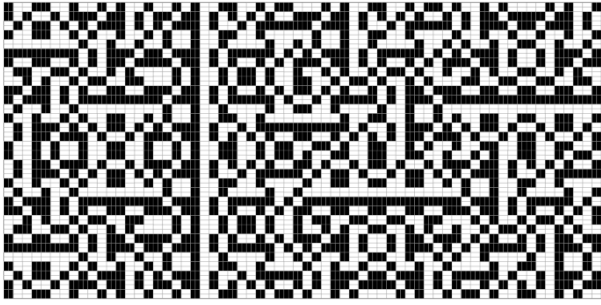
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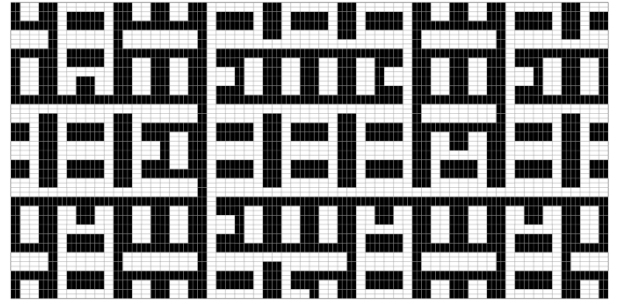
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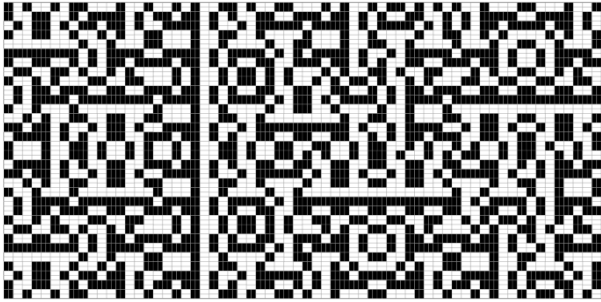
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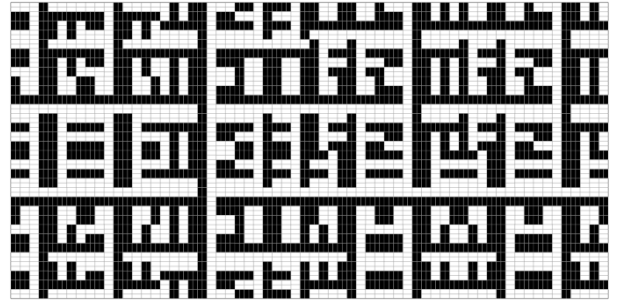
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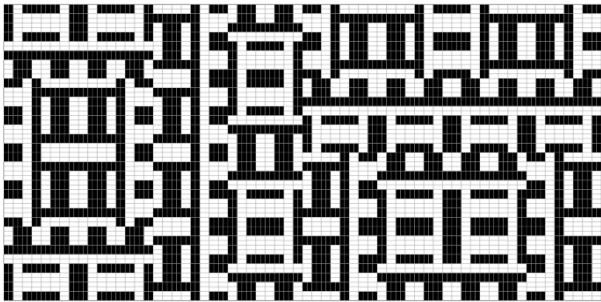
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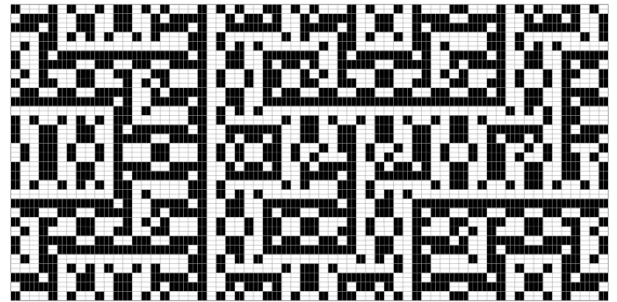
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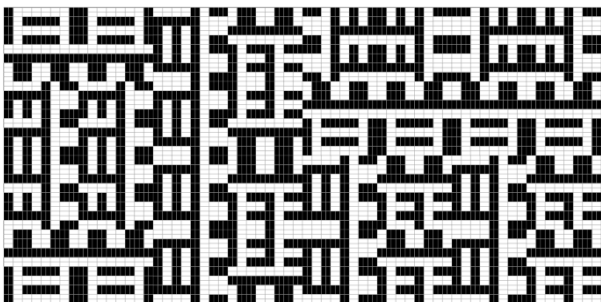
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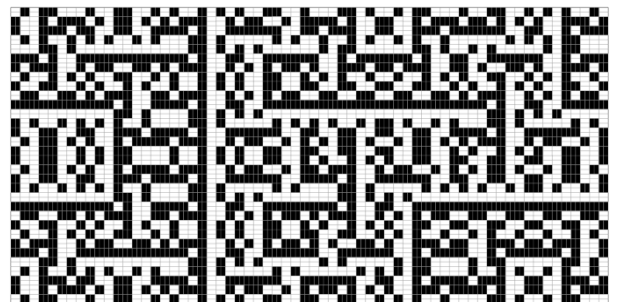
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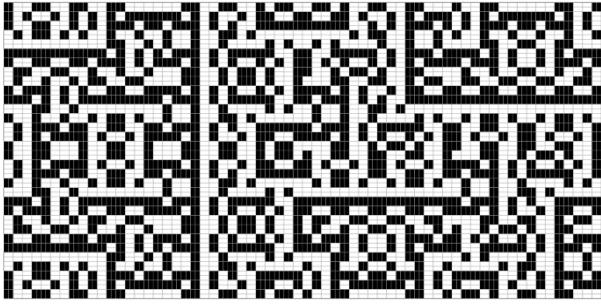
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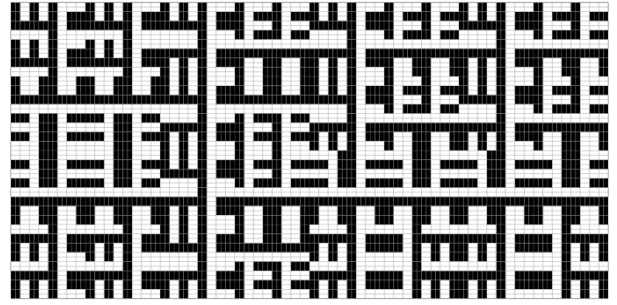
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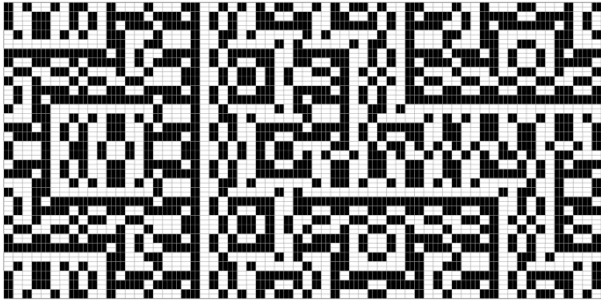
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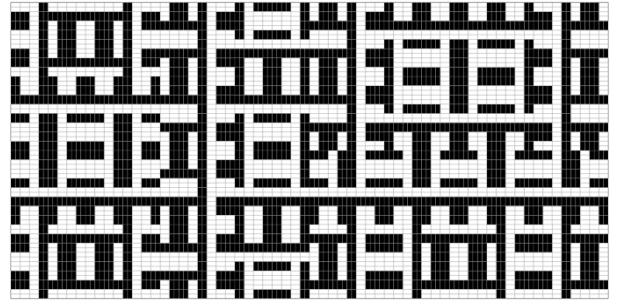
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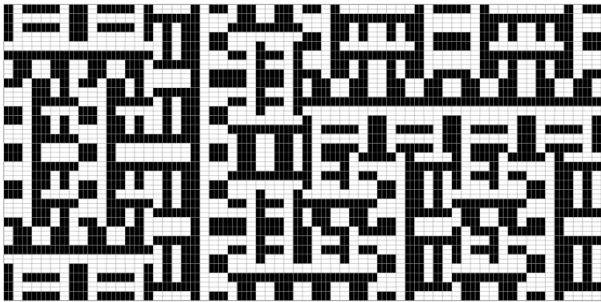
1021



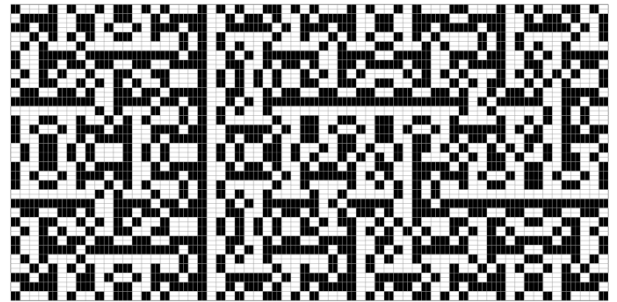
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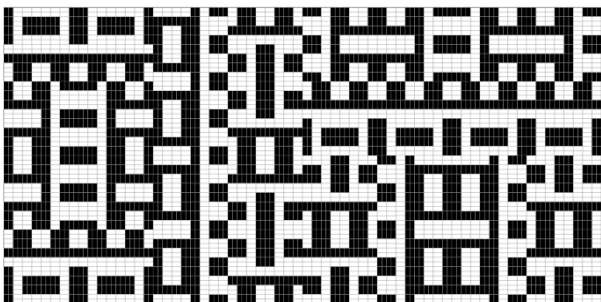
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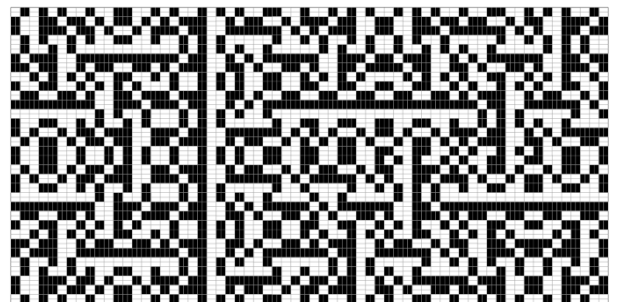
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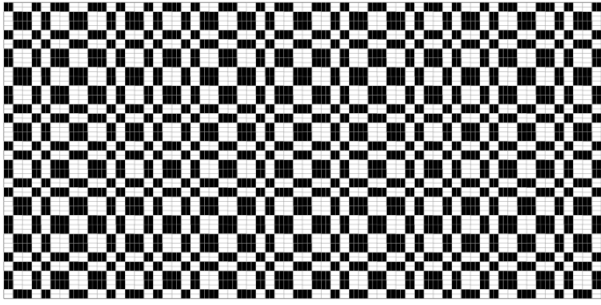
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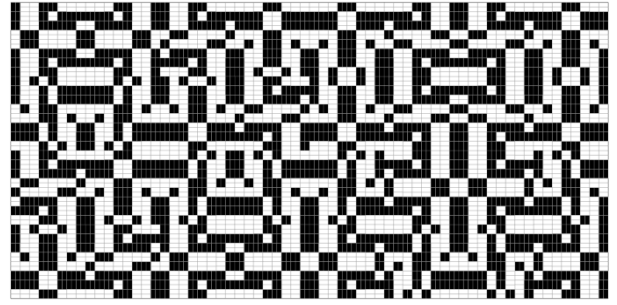
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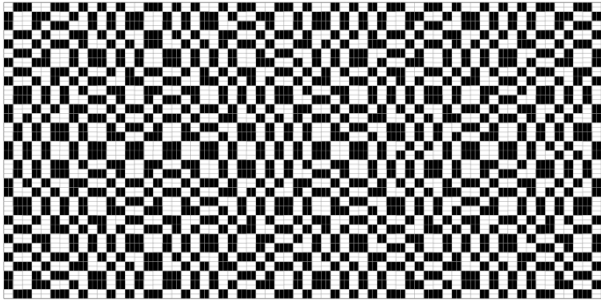
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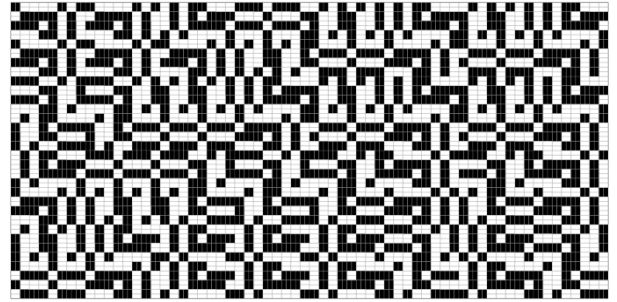
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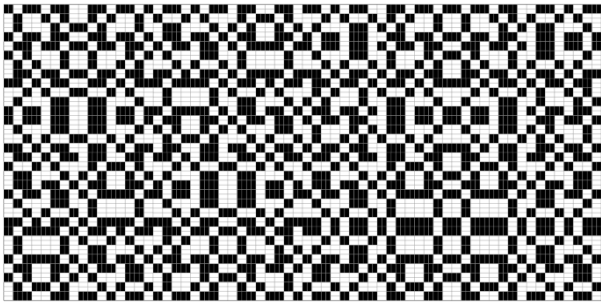
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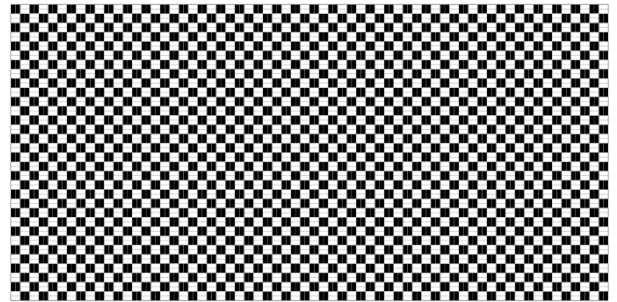
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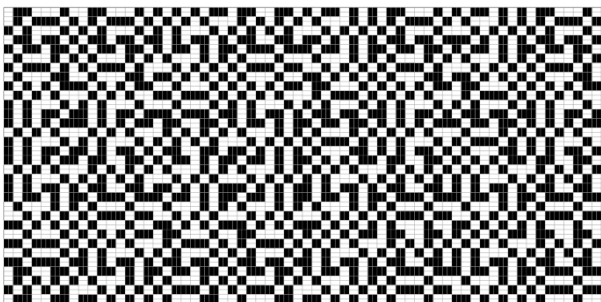
1103



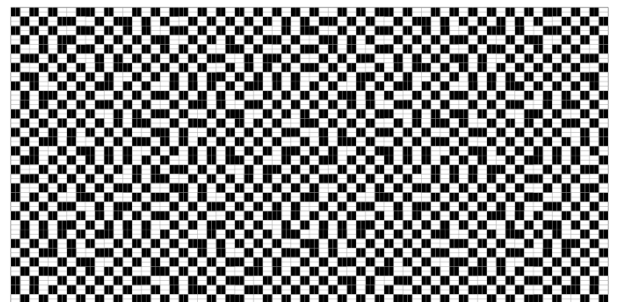
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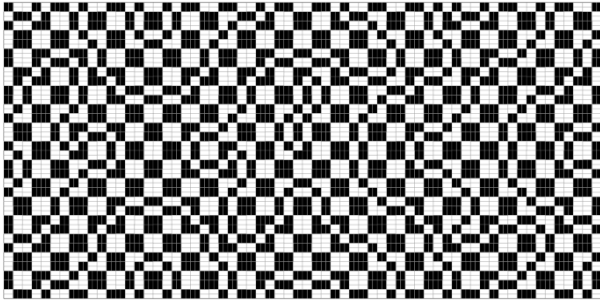
1111



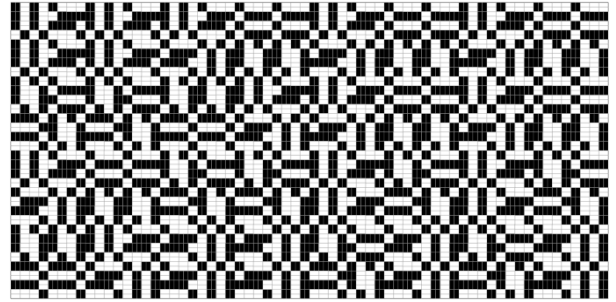
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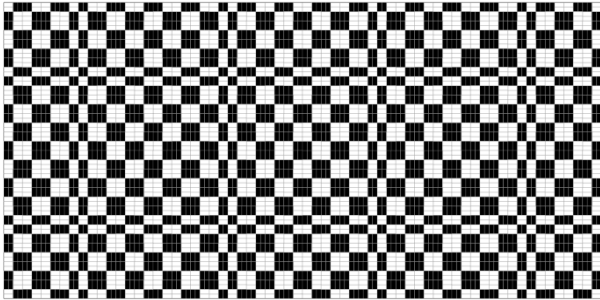
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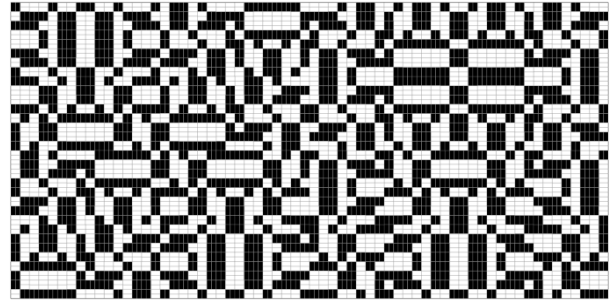
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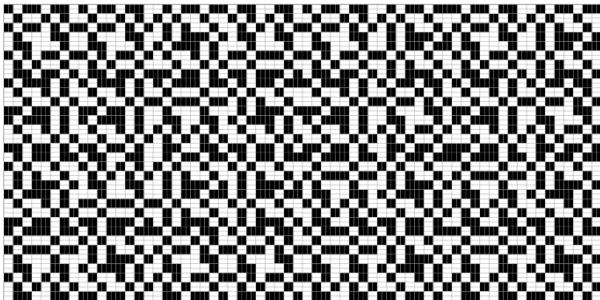
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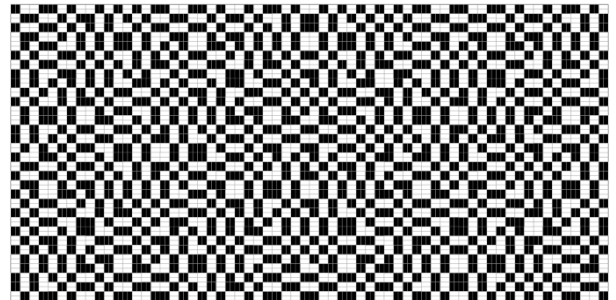
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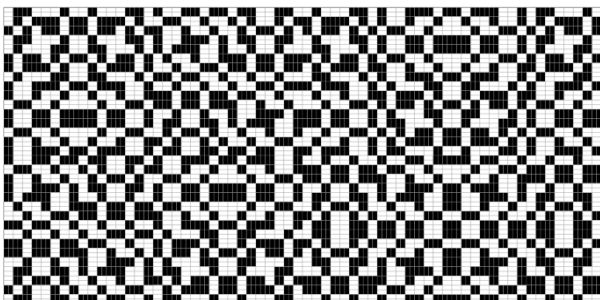
1123



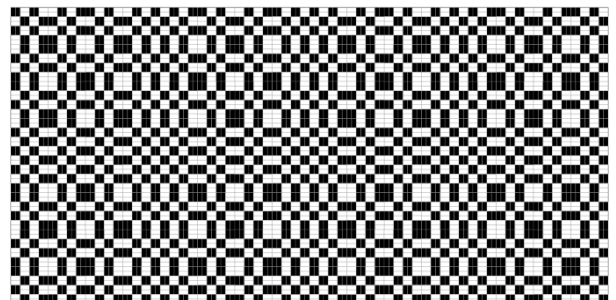
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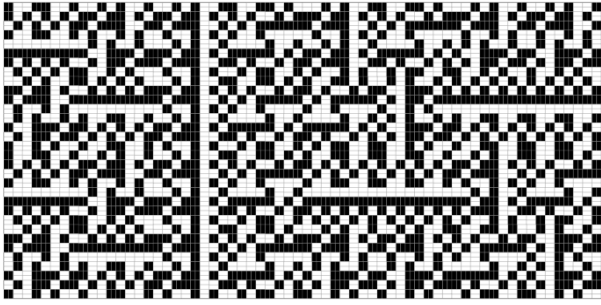
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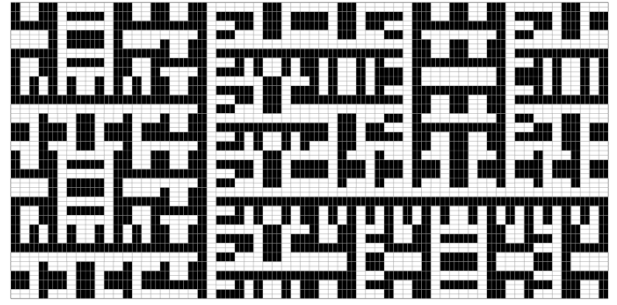
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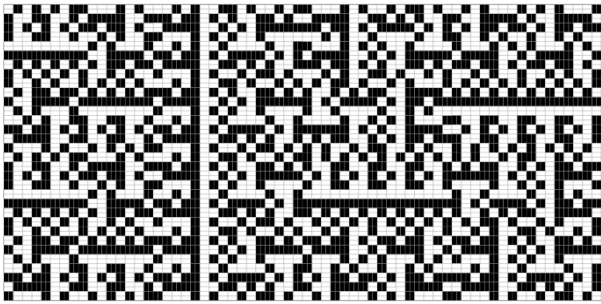
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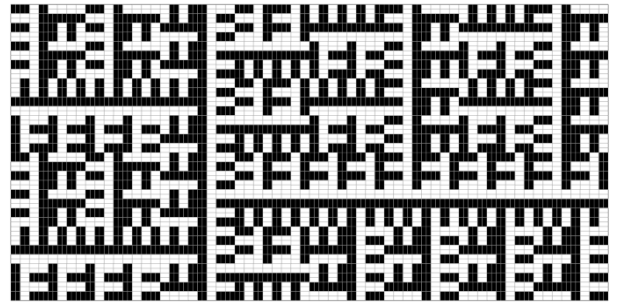
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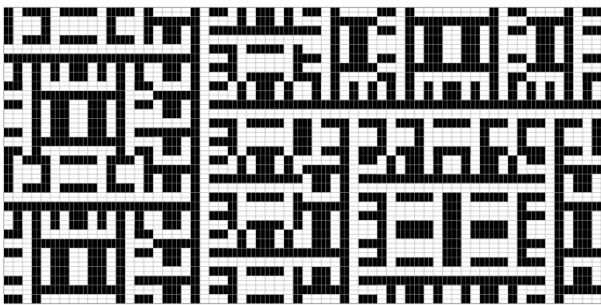
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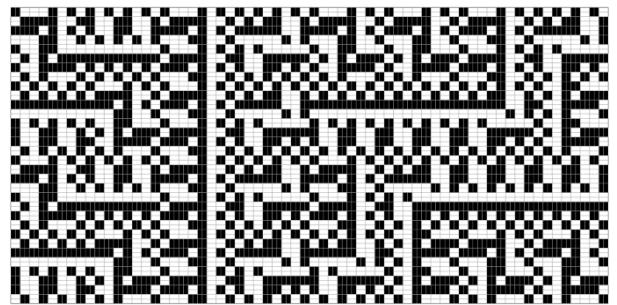
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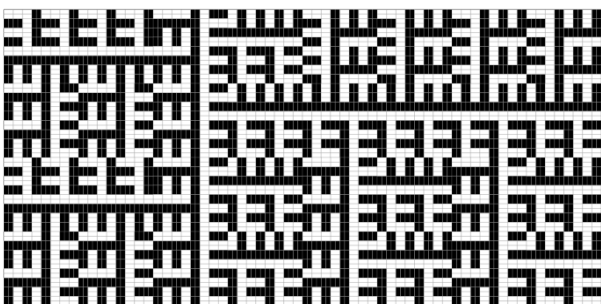
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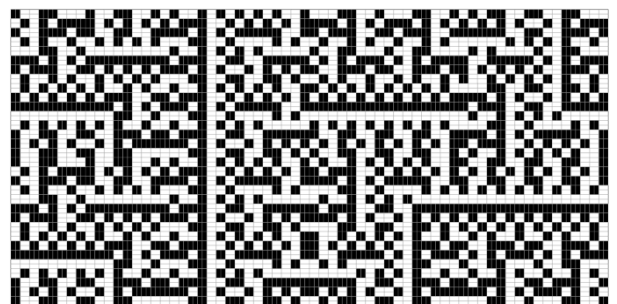
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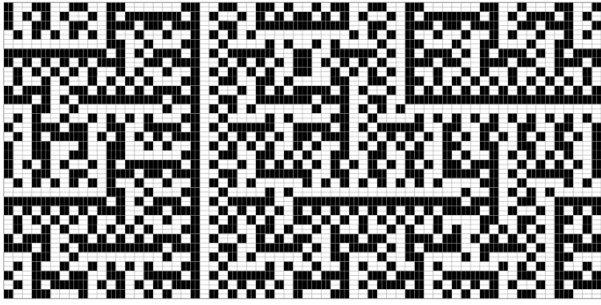
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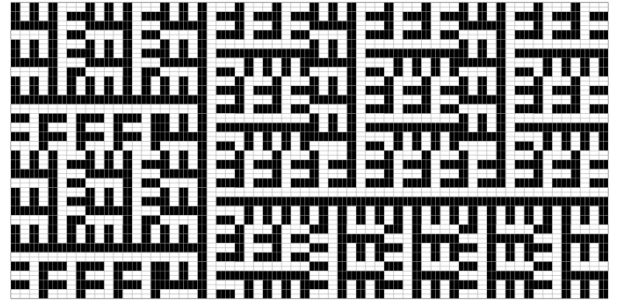
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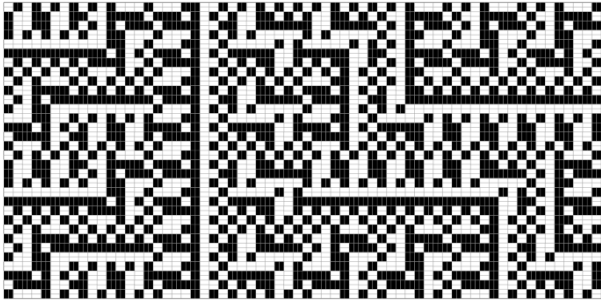
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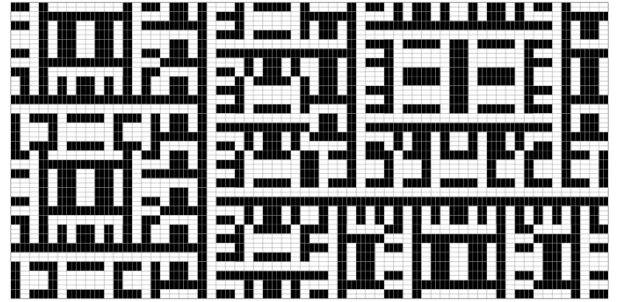
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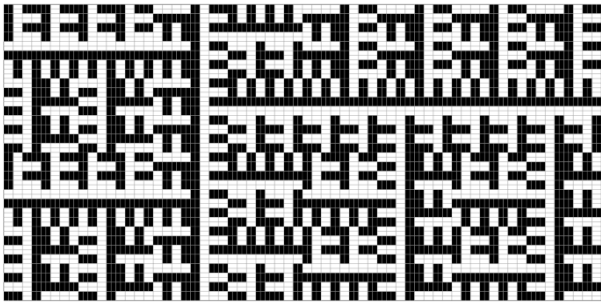
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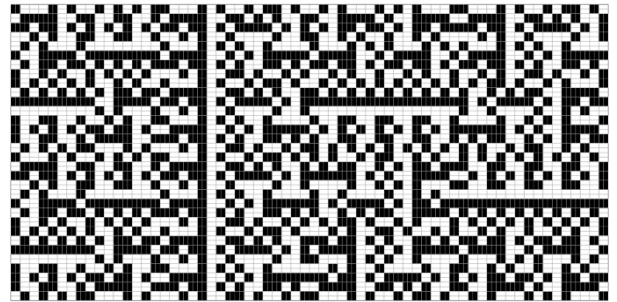
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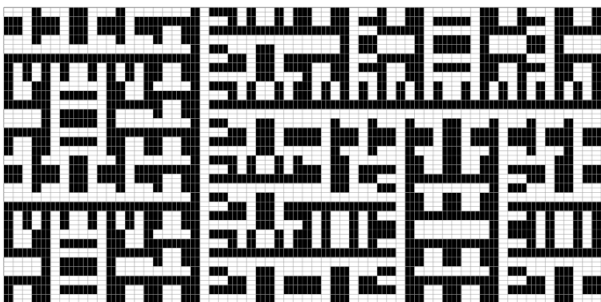
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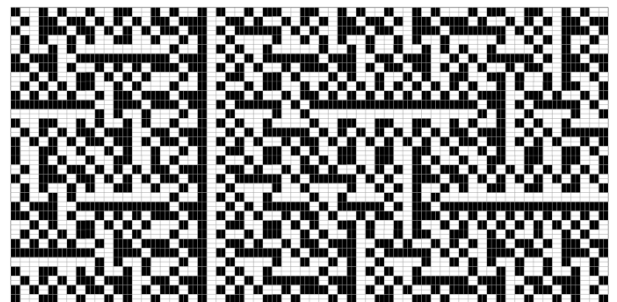
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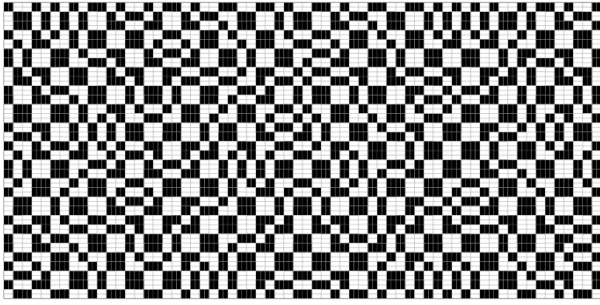
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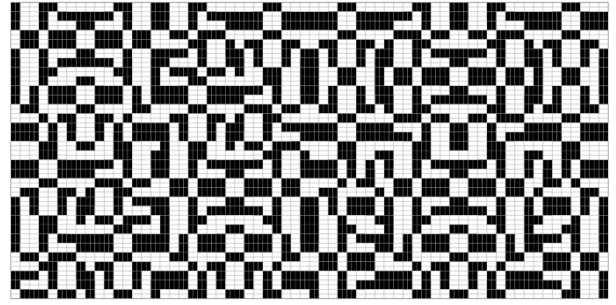
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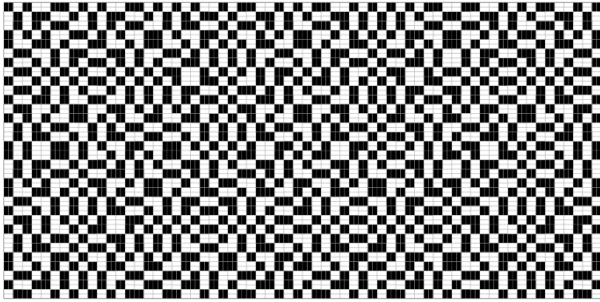
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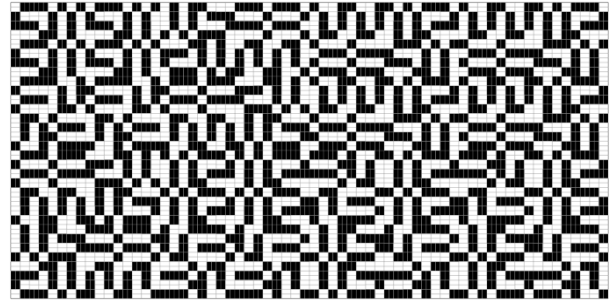
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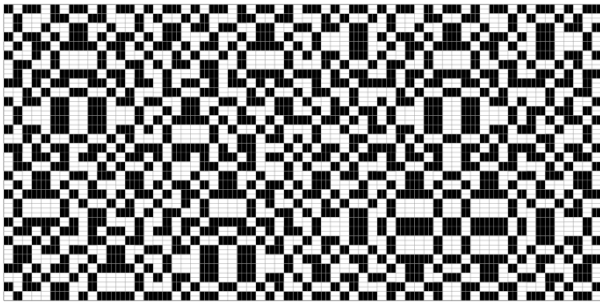
1301



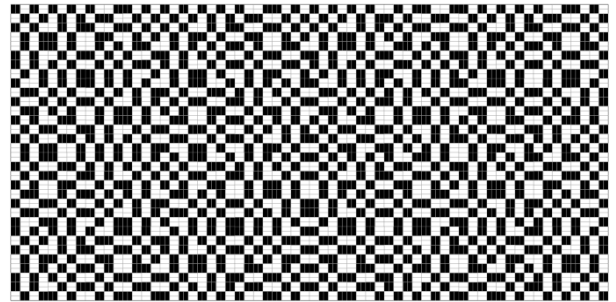
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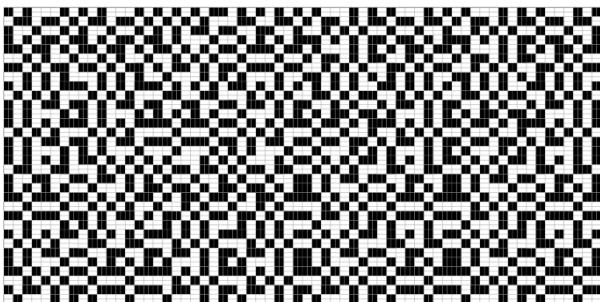
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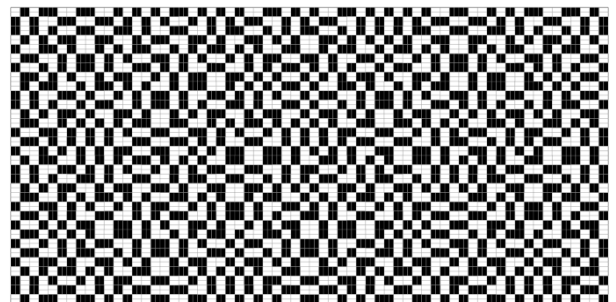
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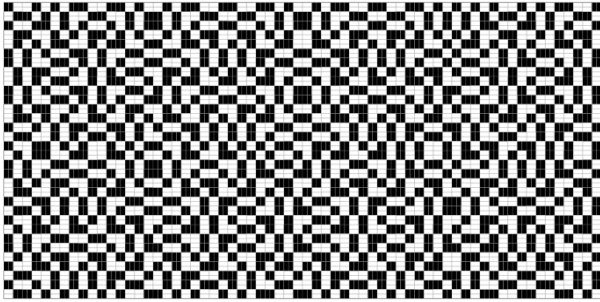
1311



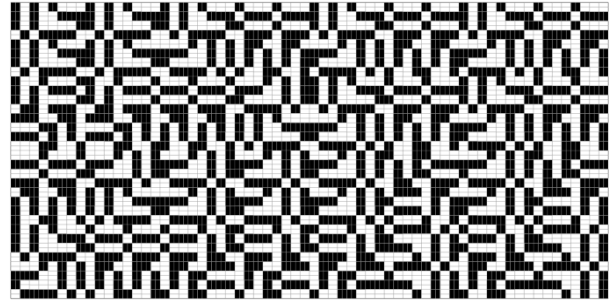
1312



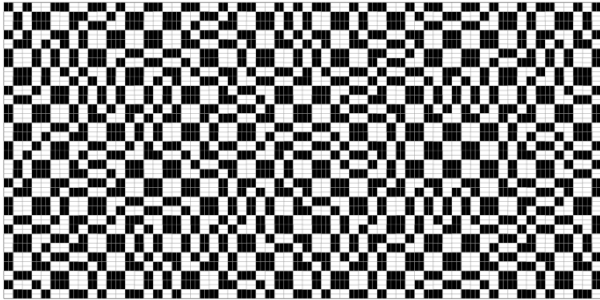
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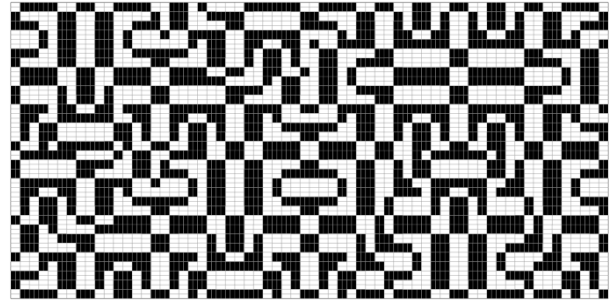
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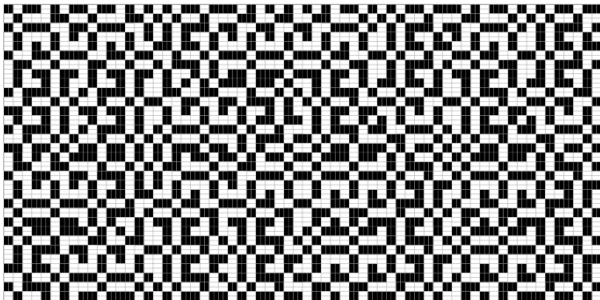
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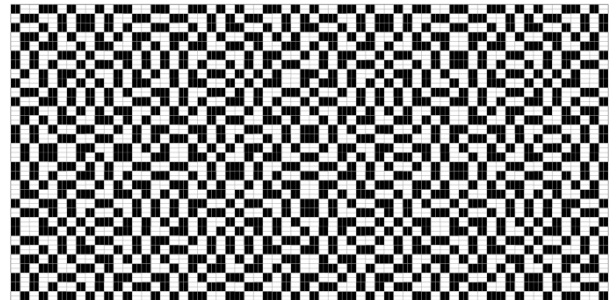
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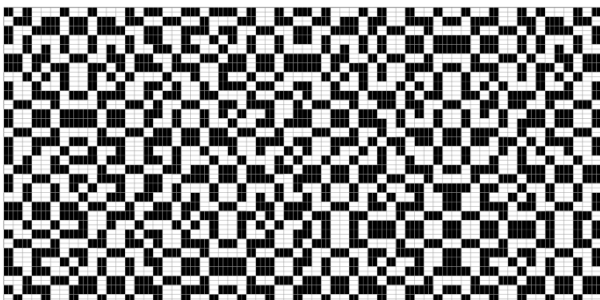
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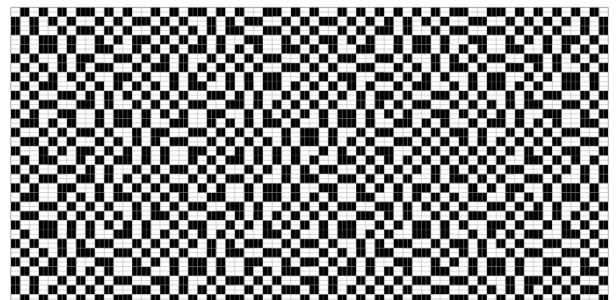
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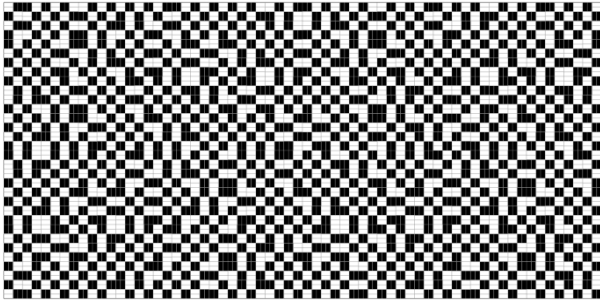
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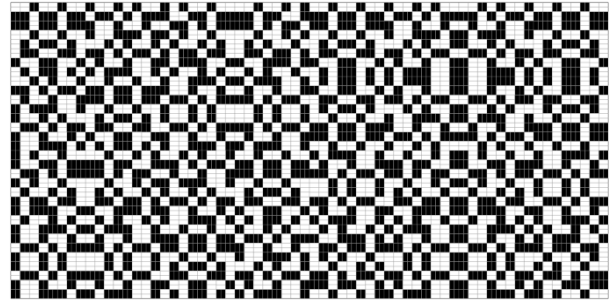
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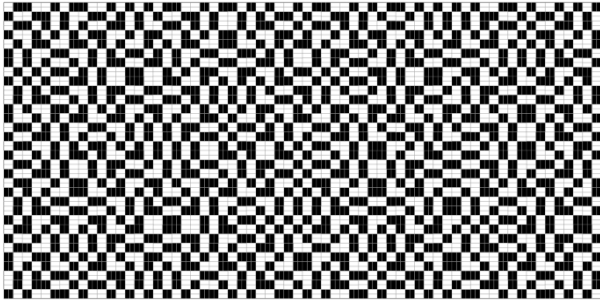
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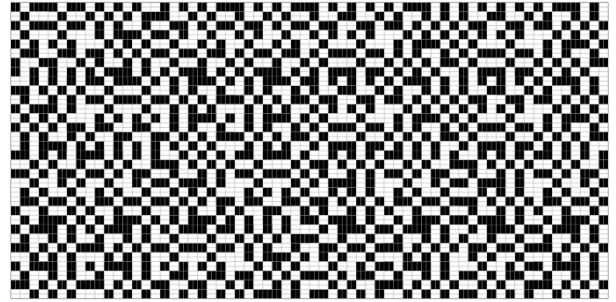
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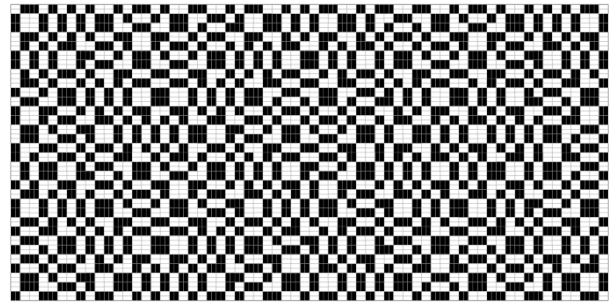
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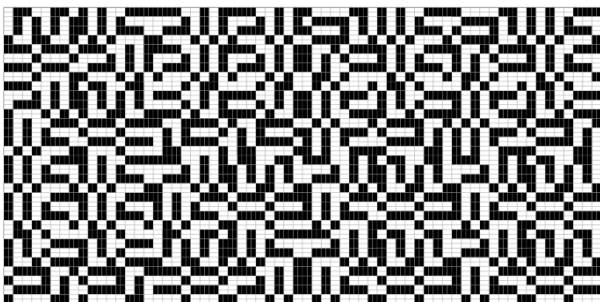
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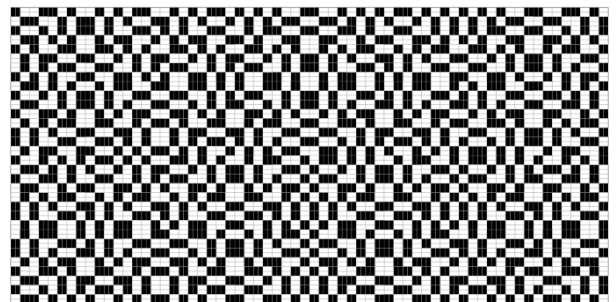
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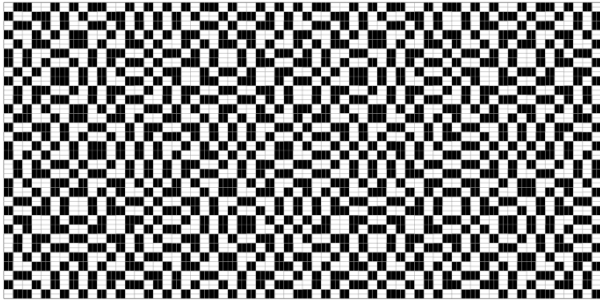
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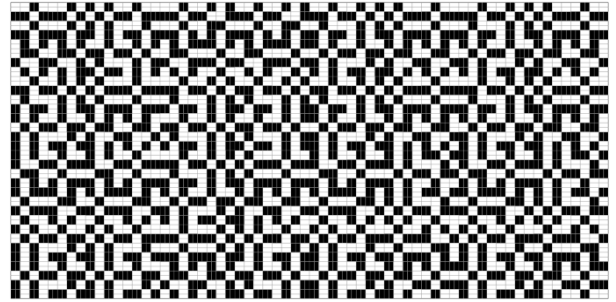
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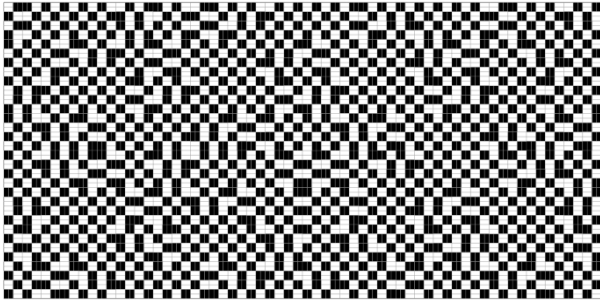
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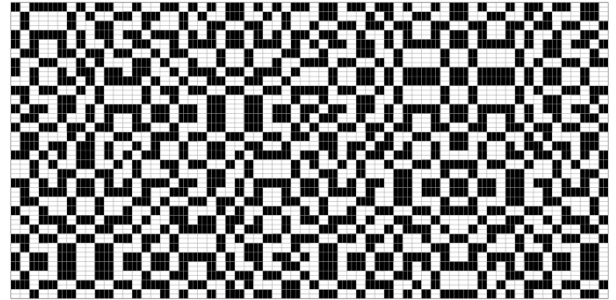
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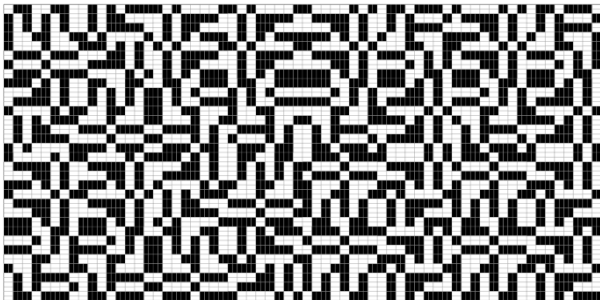
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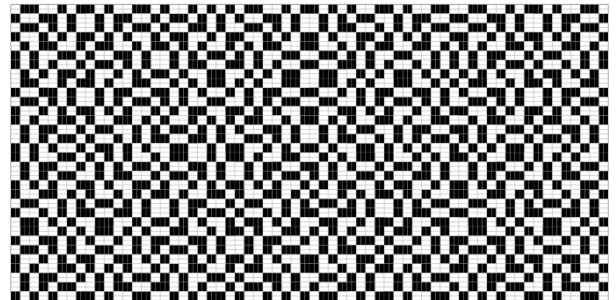
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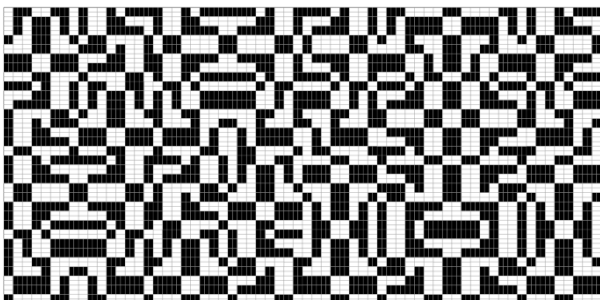
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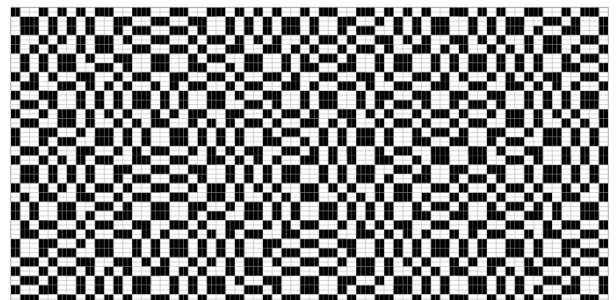
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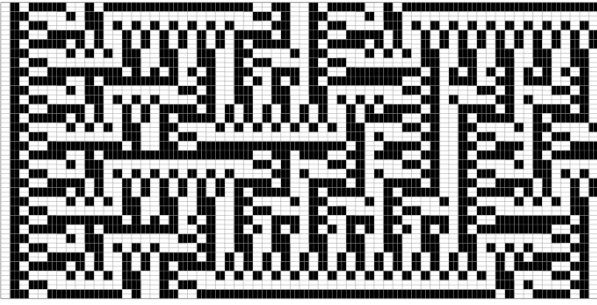
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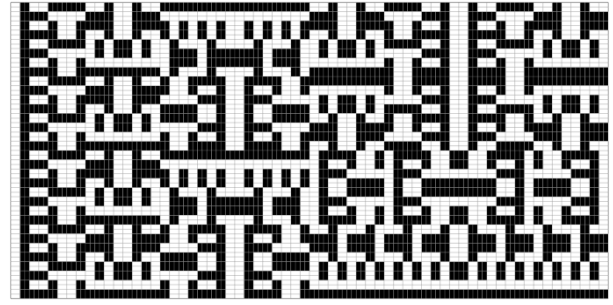
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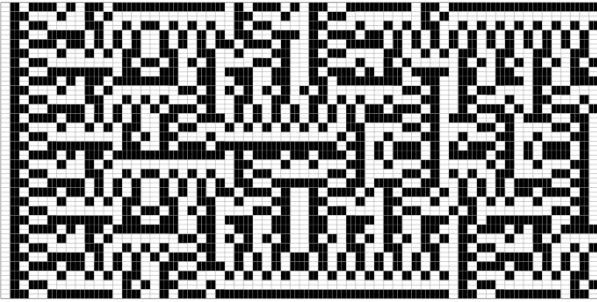
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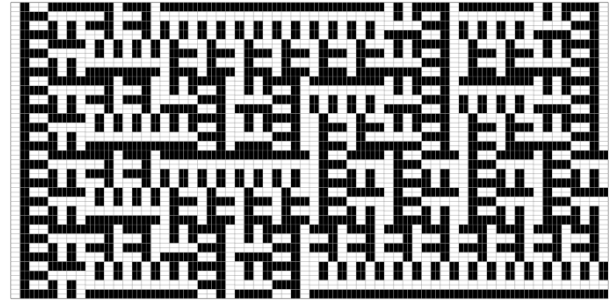
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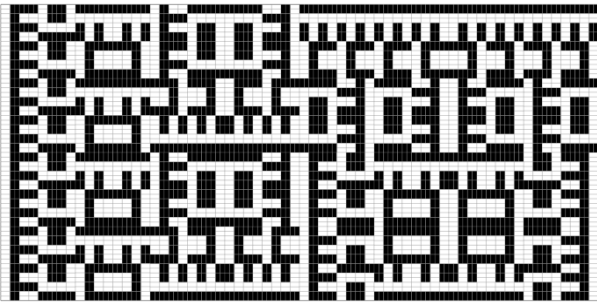
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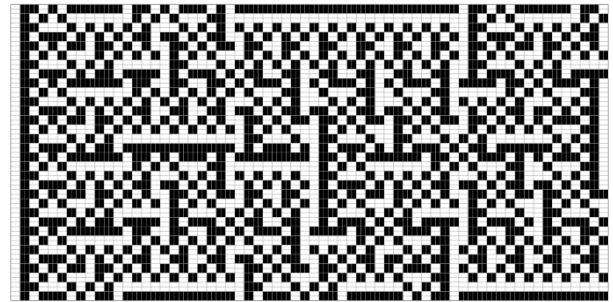
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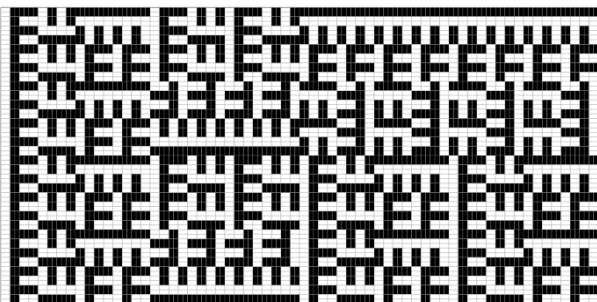
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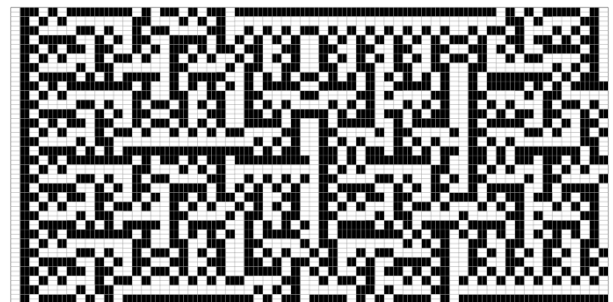
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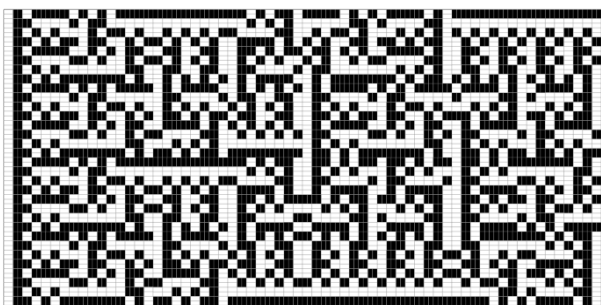
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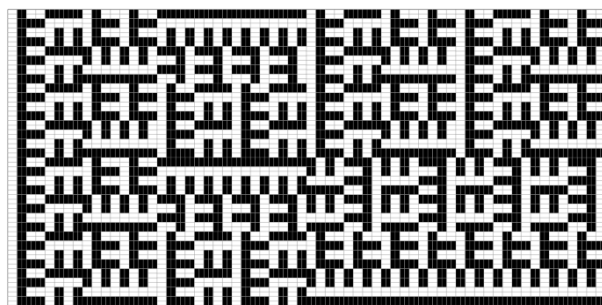
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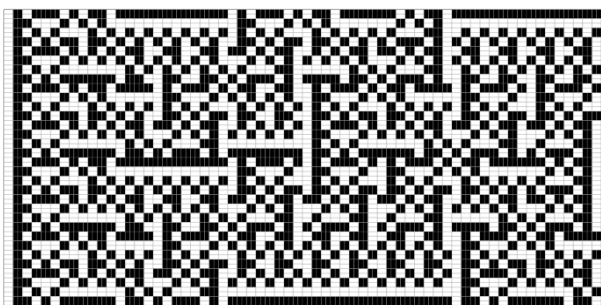
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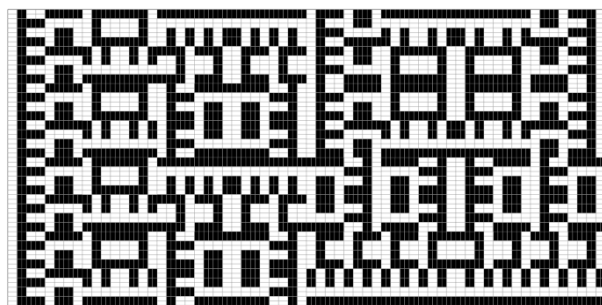
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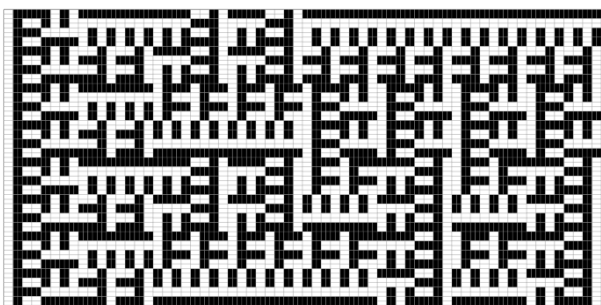
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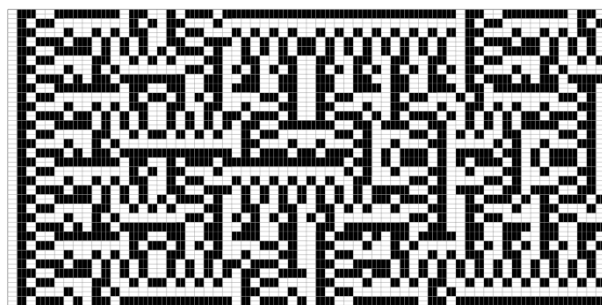
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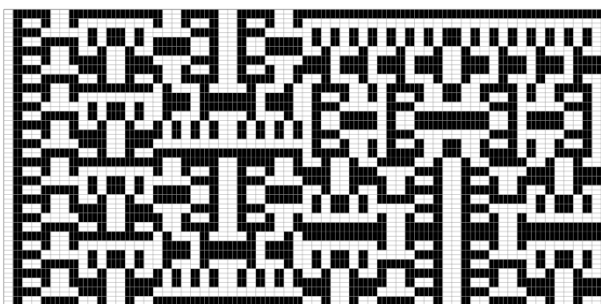
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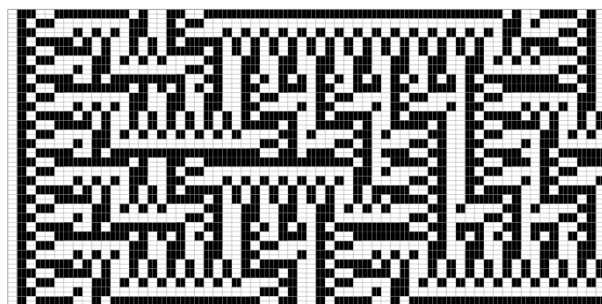
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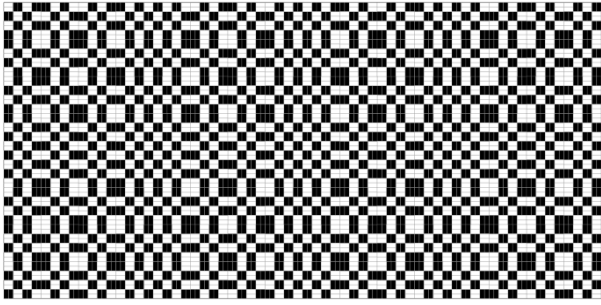
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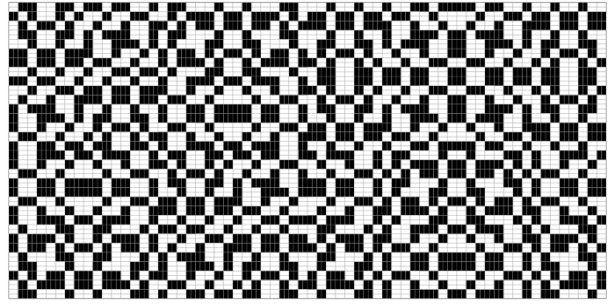
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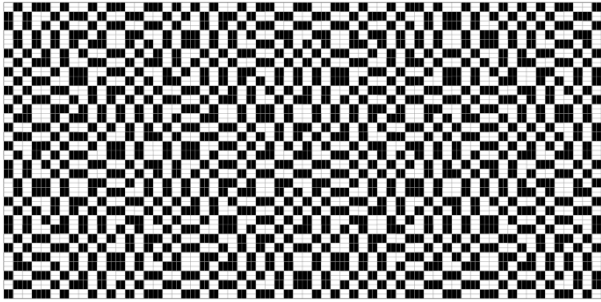
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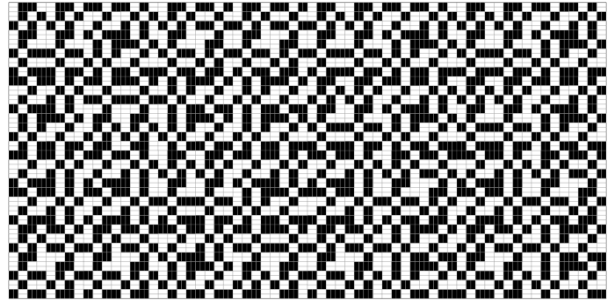
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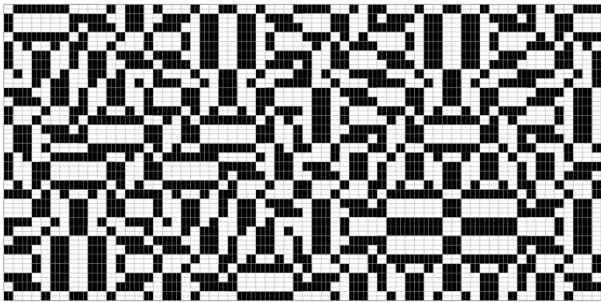
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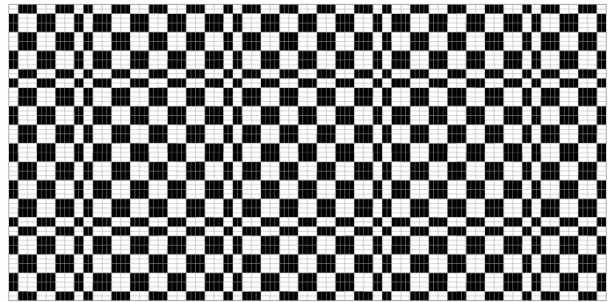
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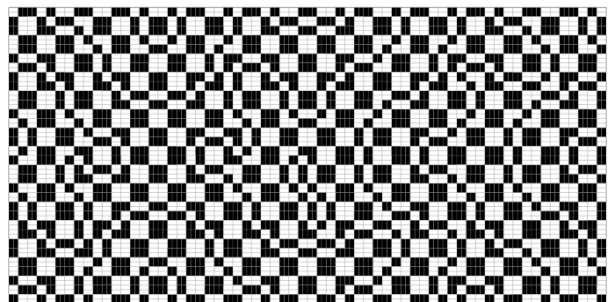
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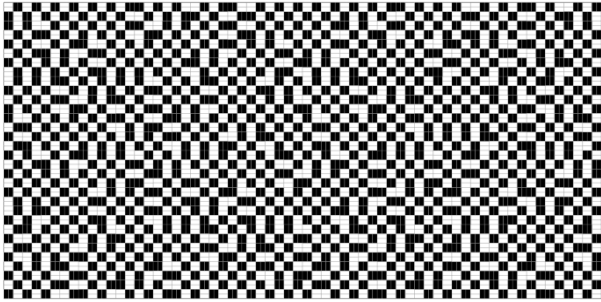
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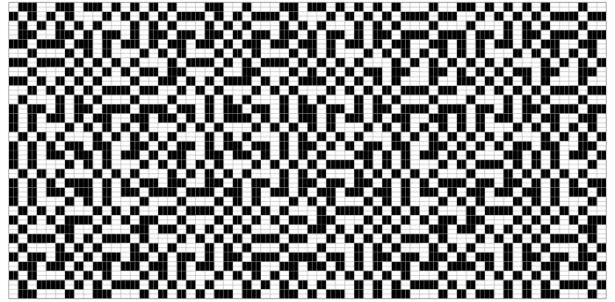
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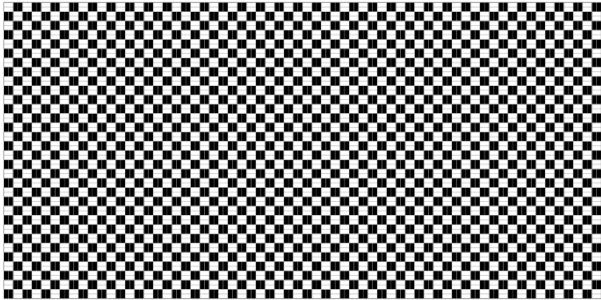
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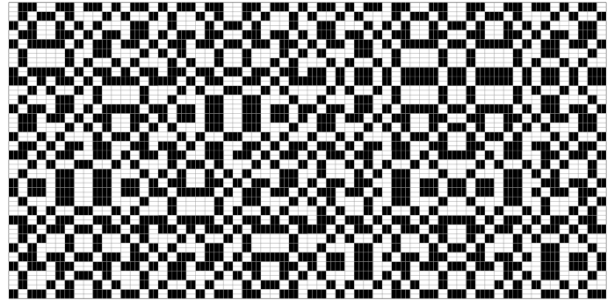
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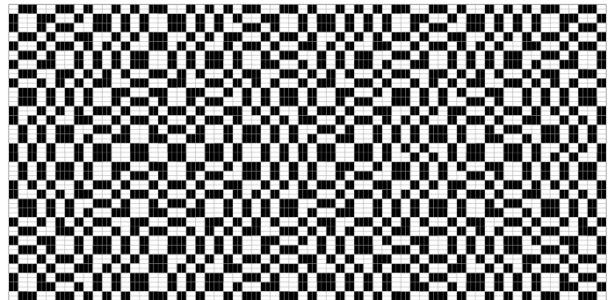
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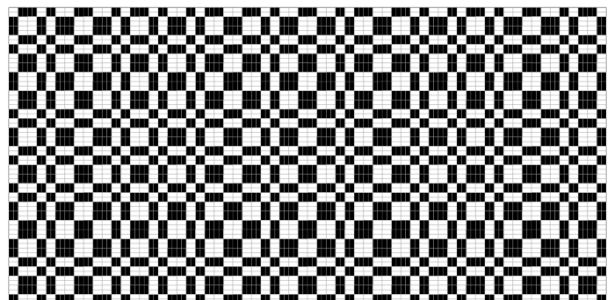
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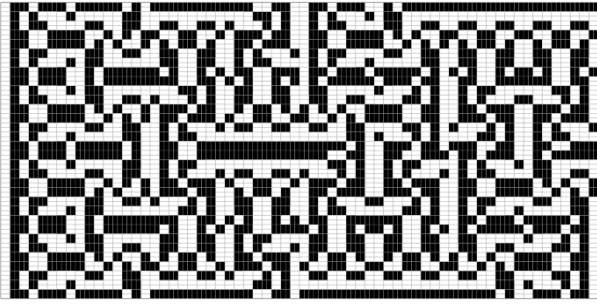
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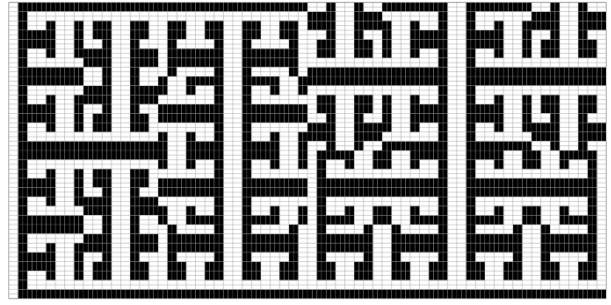
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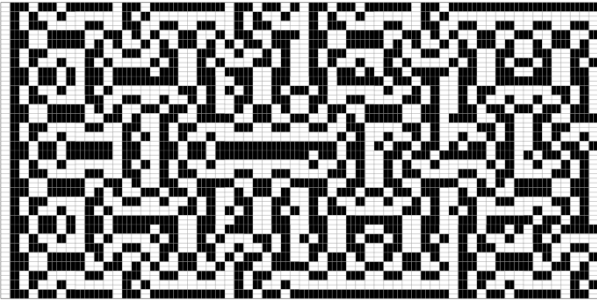
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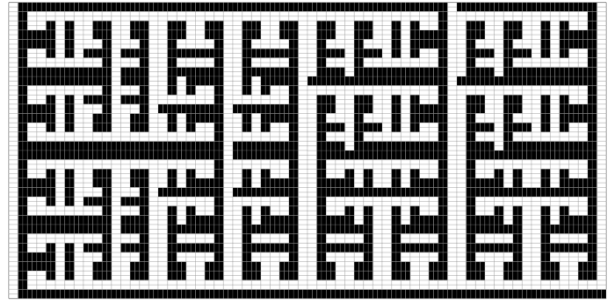
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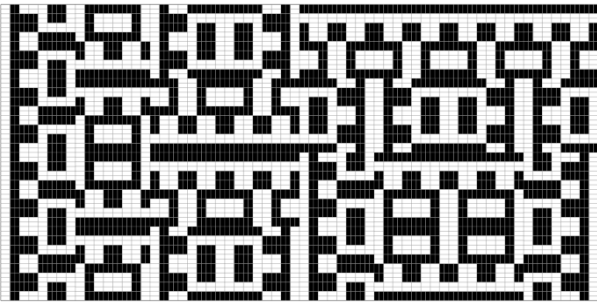
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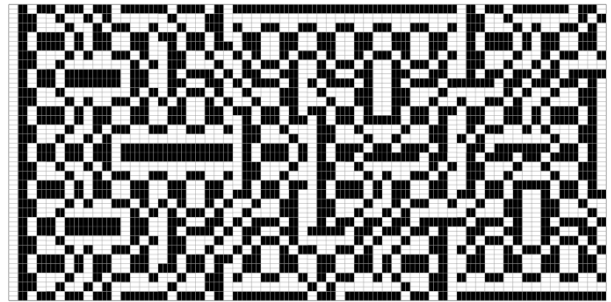
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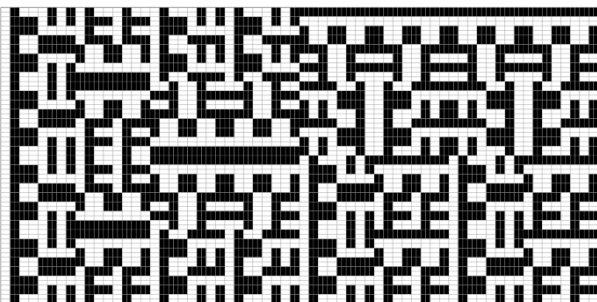
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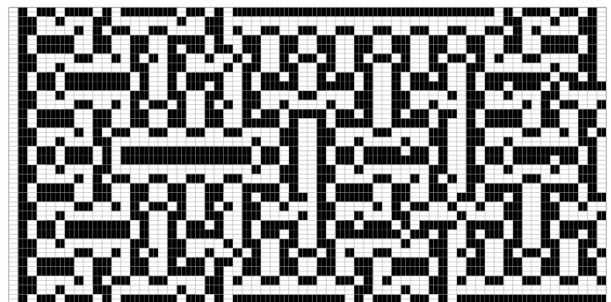
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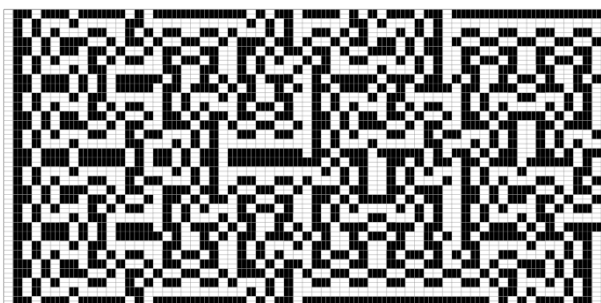
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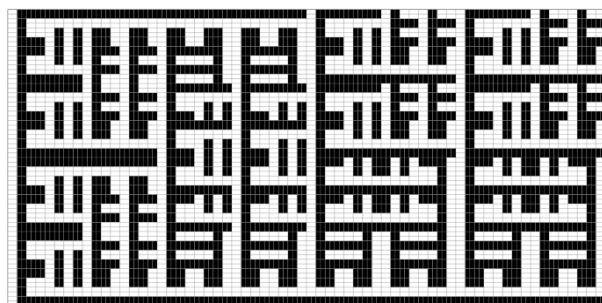
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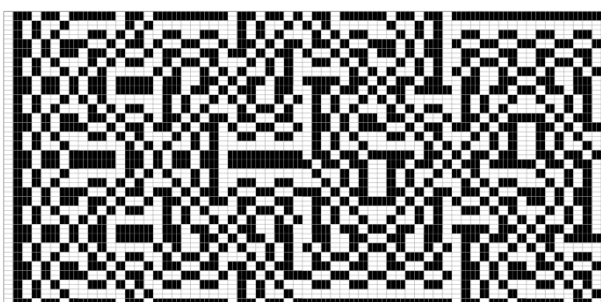
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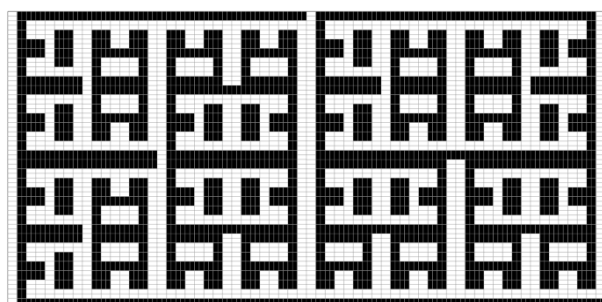
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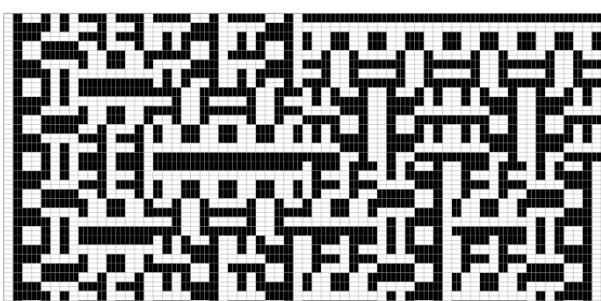
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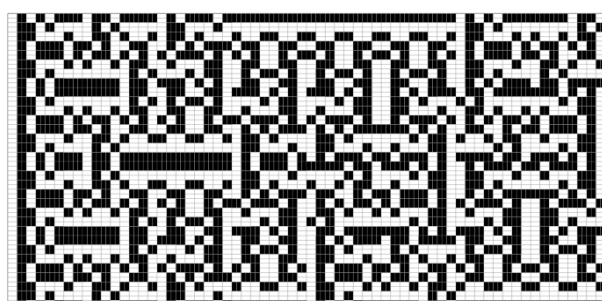
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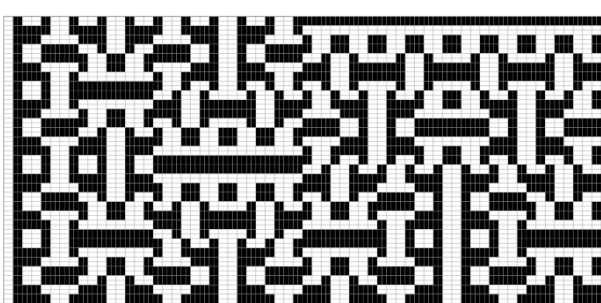
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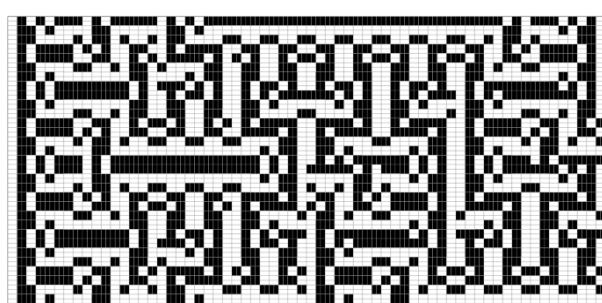
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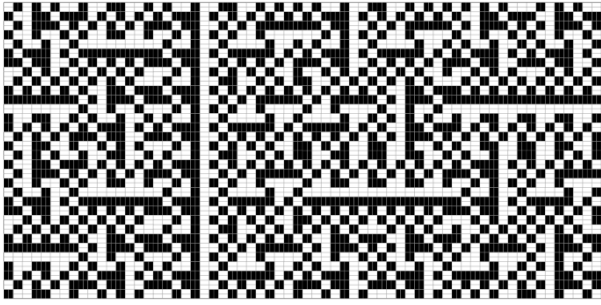
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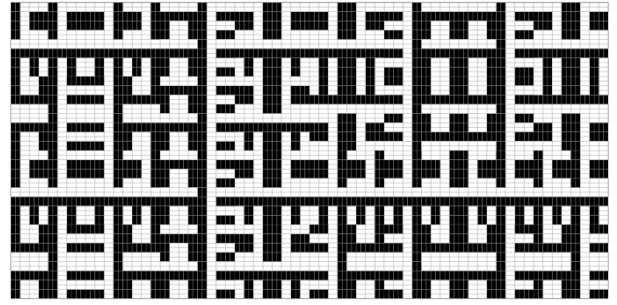
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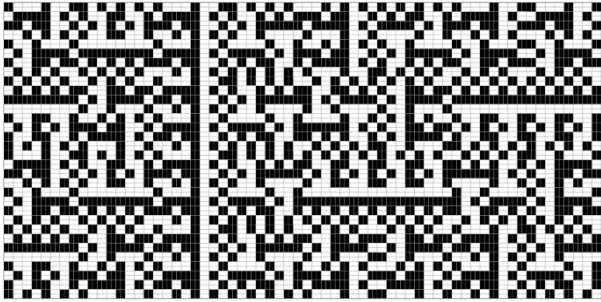
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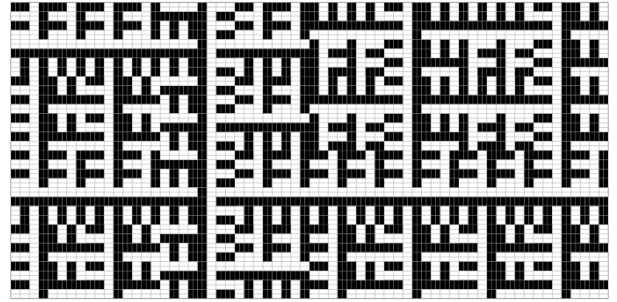
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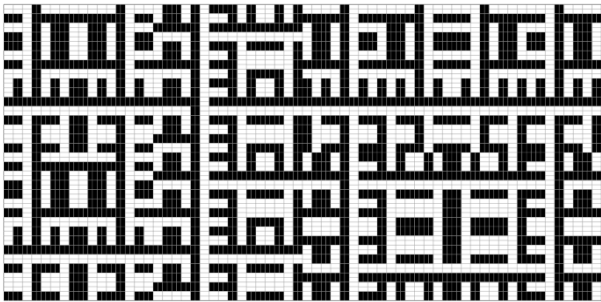
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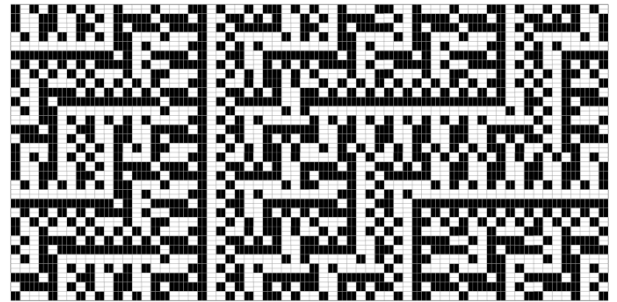
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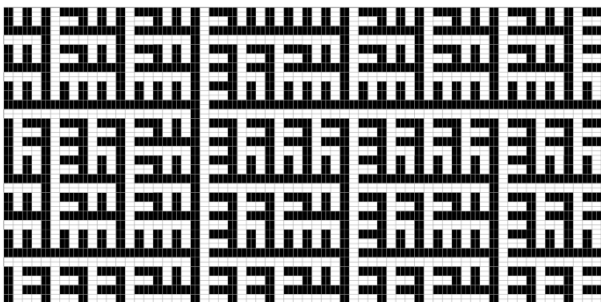
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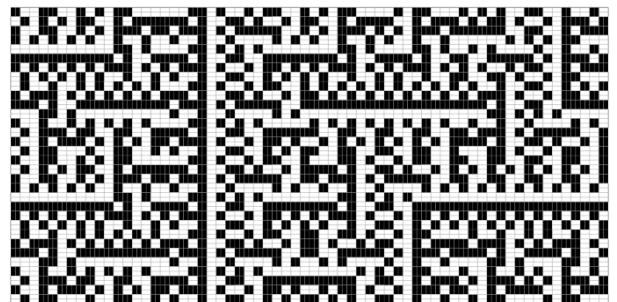
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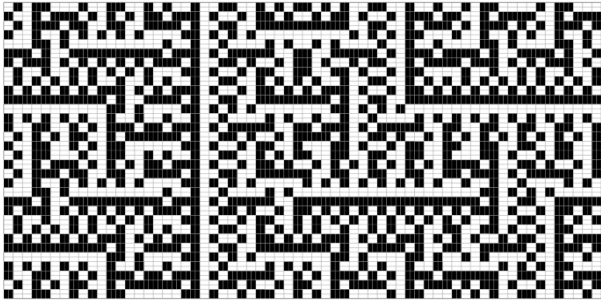
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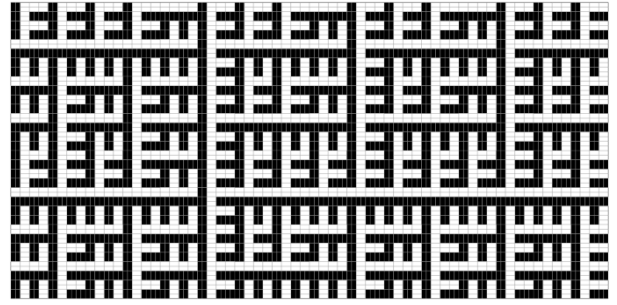
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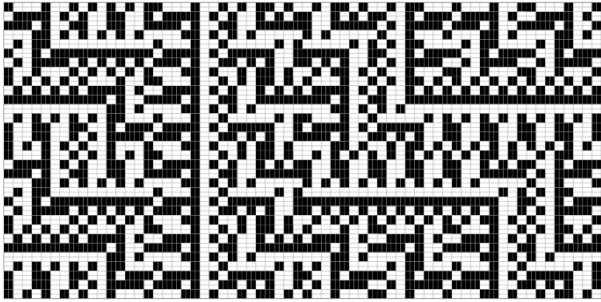
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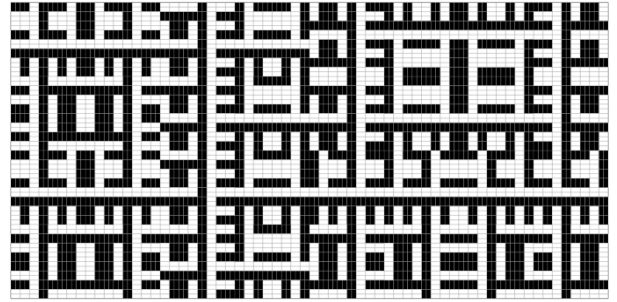
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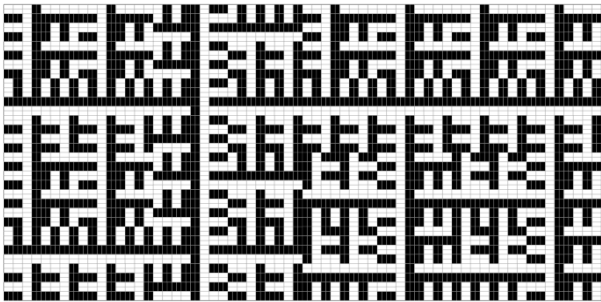
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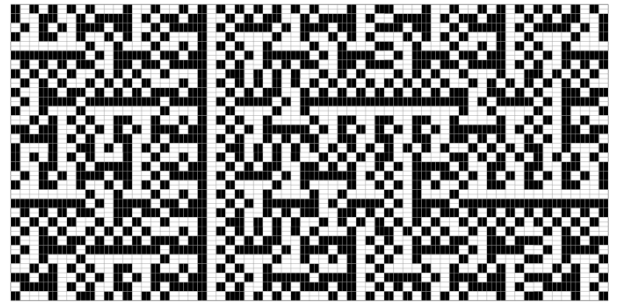
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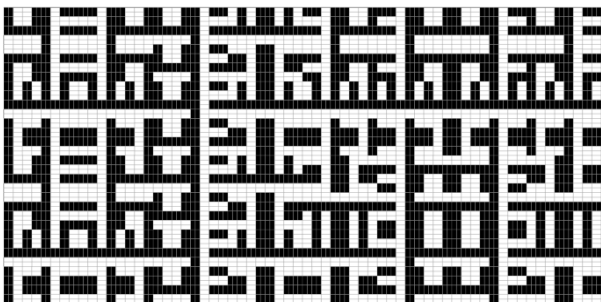
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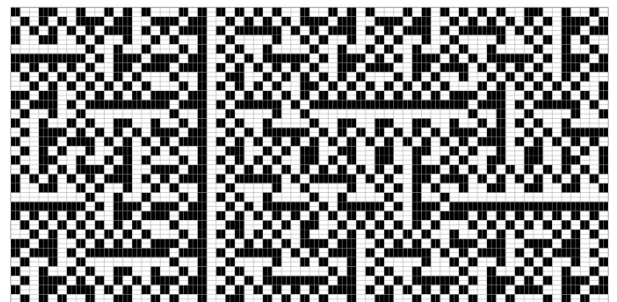
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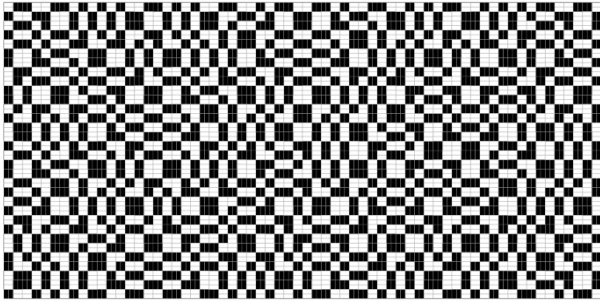
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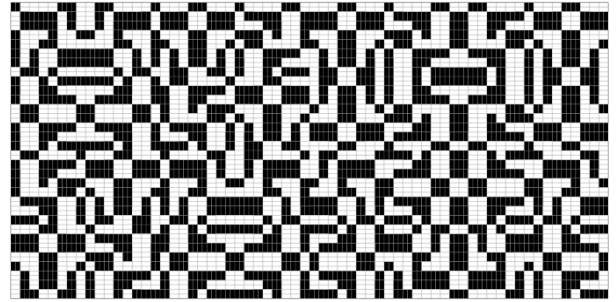
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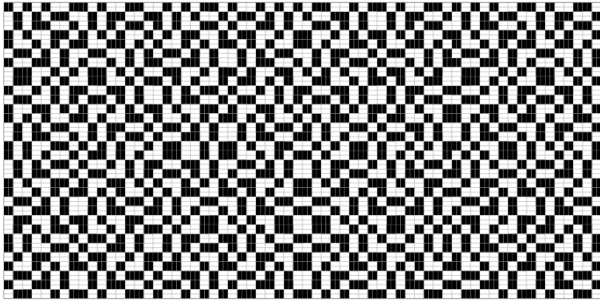
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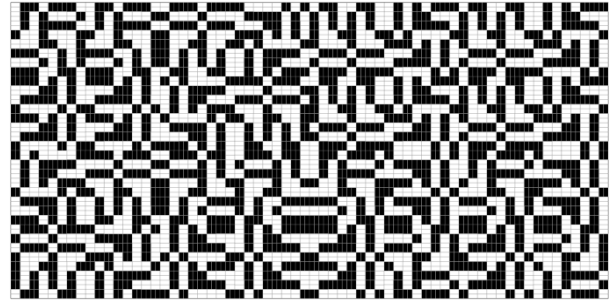
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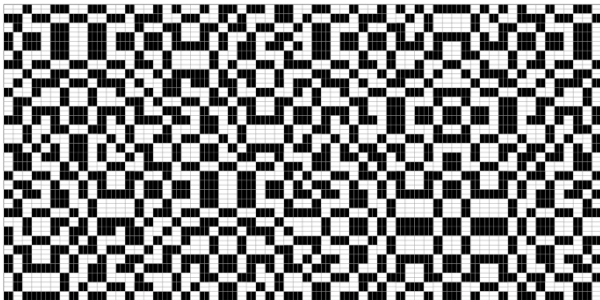
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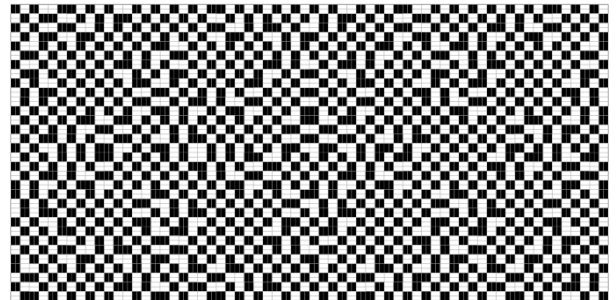
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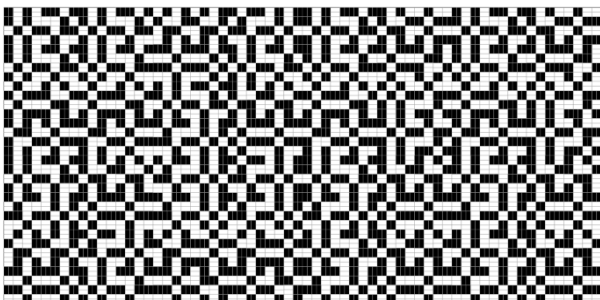
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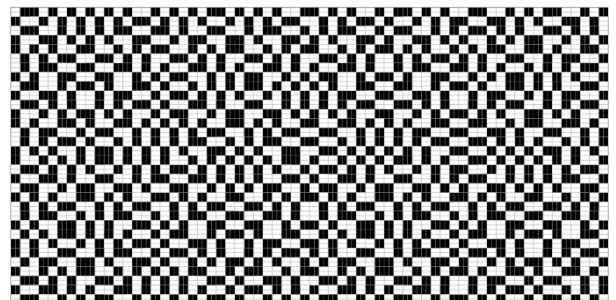
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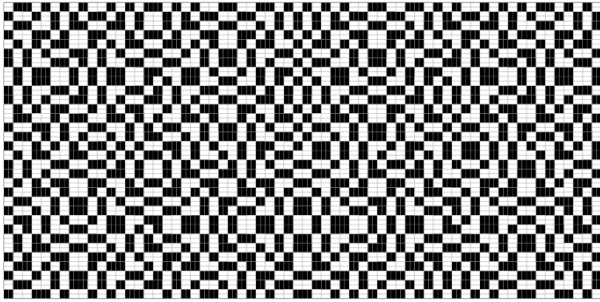
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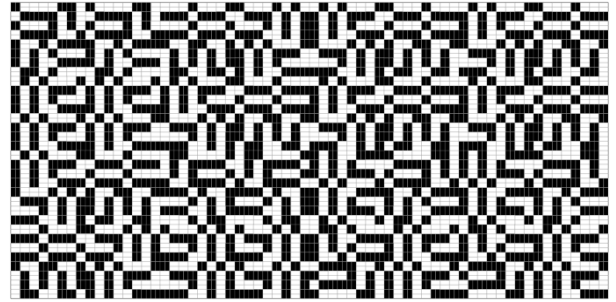
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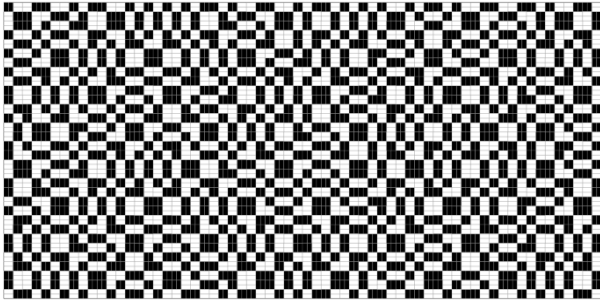
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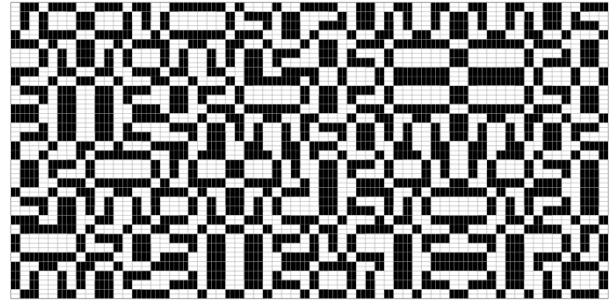
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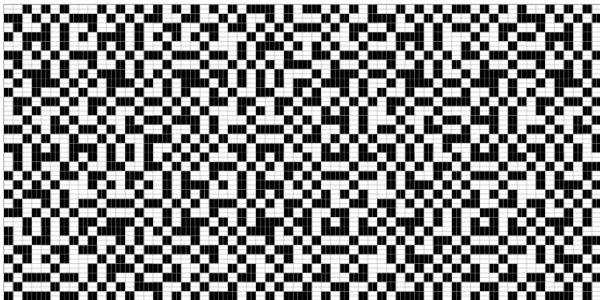
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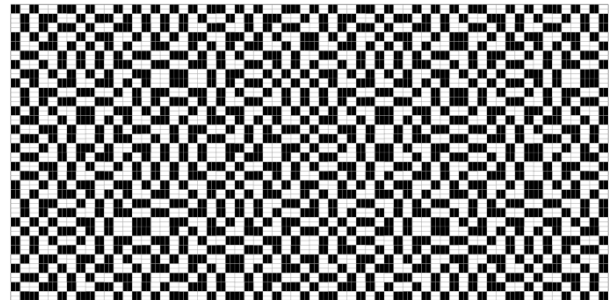
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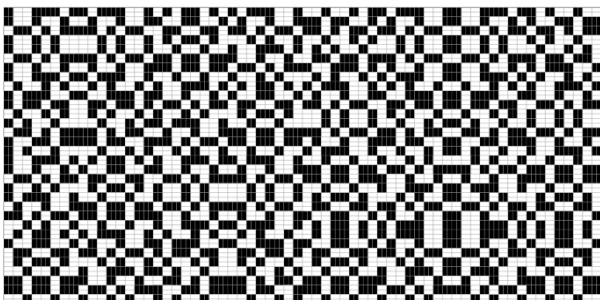
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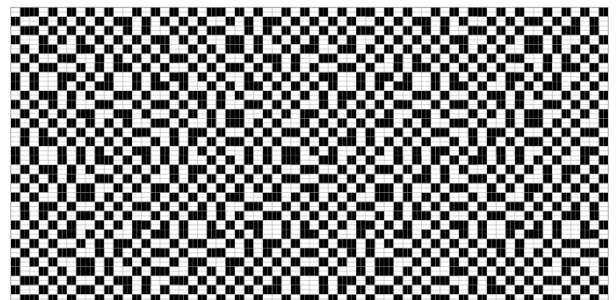
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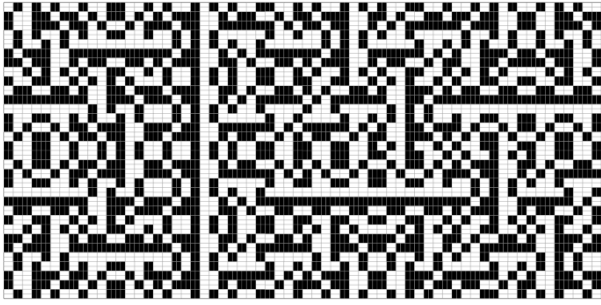
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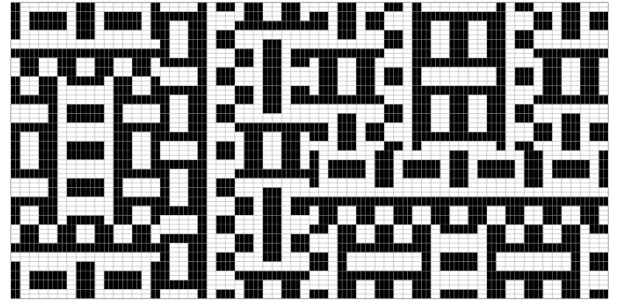
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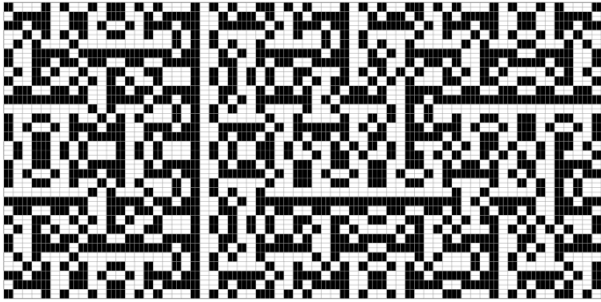
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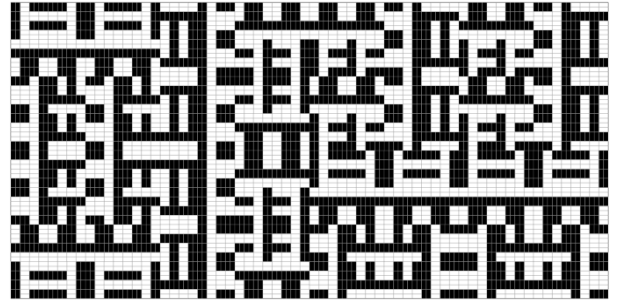
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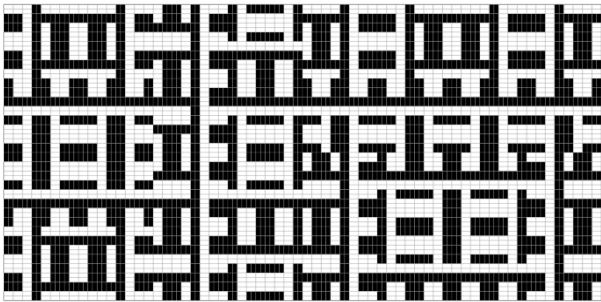
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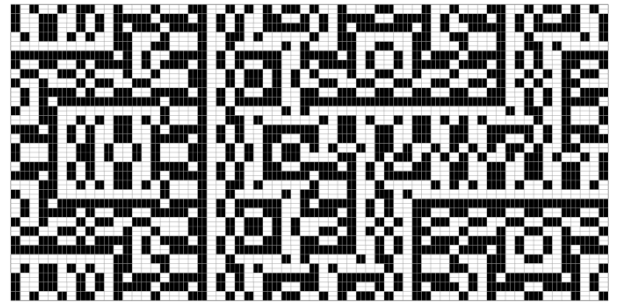
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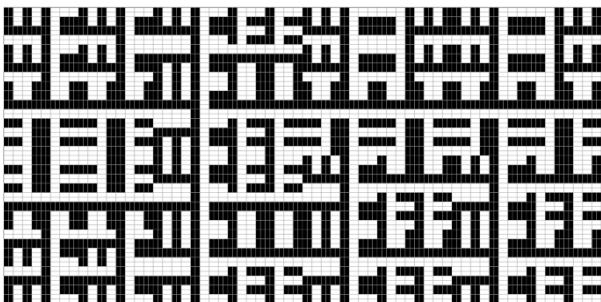
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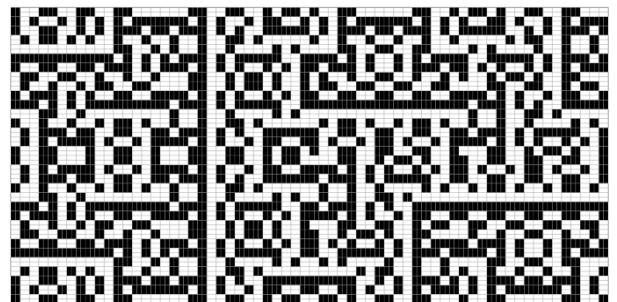
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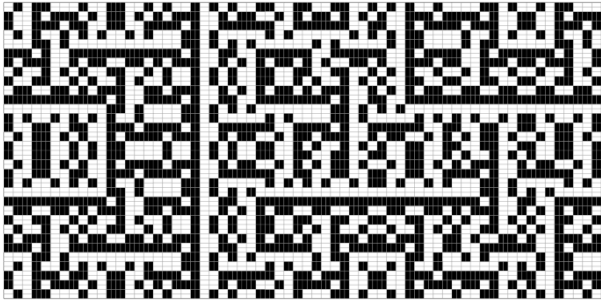
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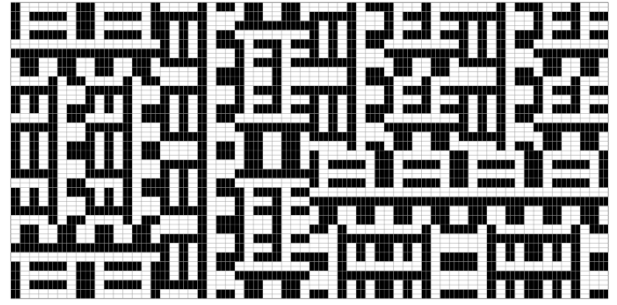
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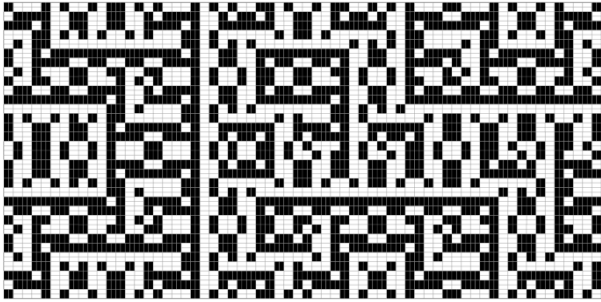
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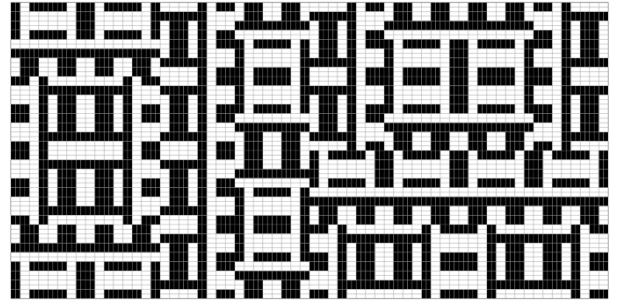
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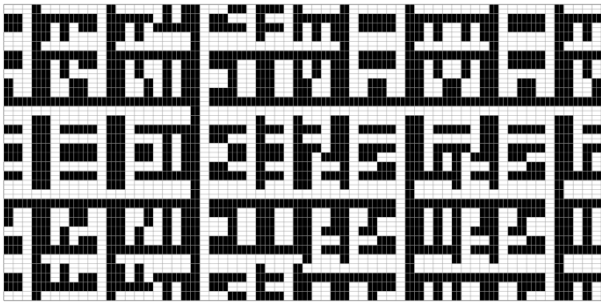
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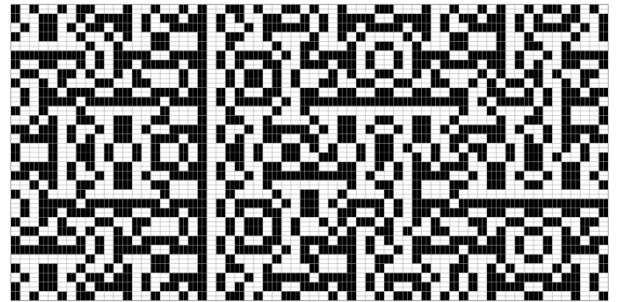
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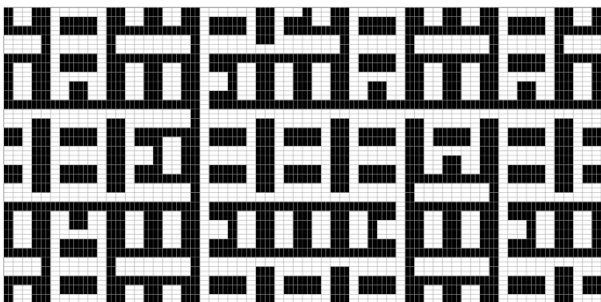
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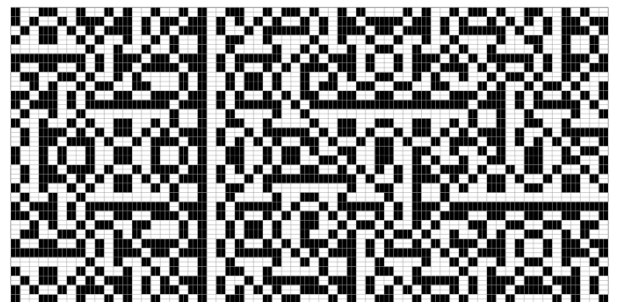
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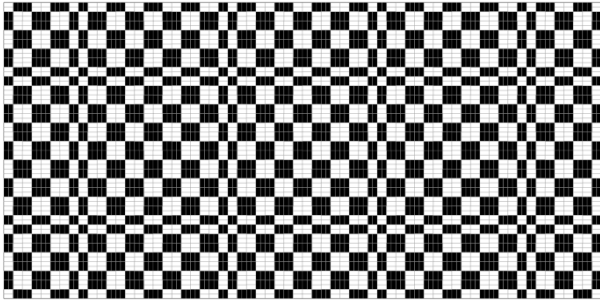
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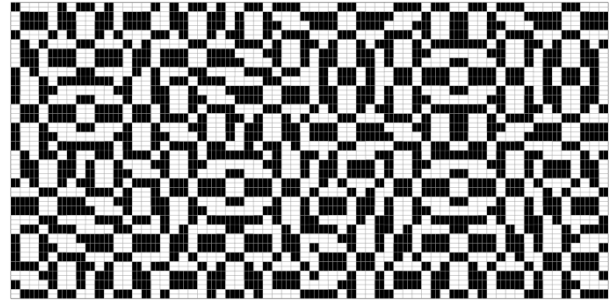
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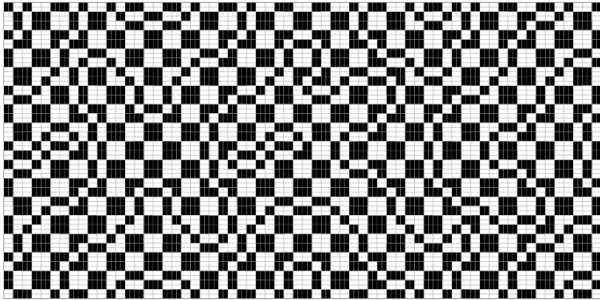
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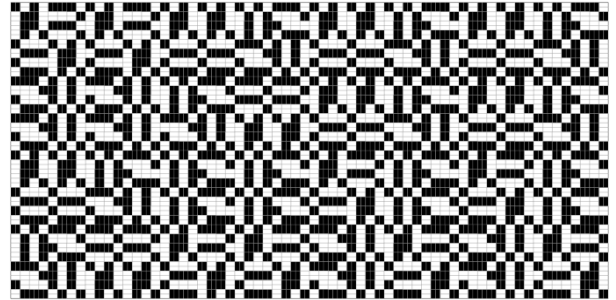
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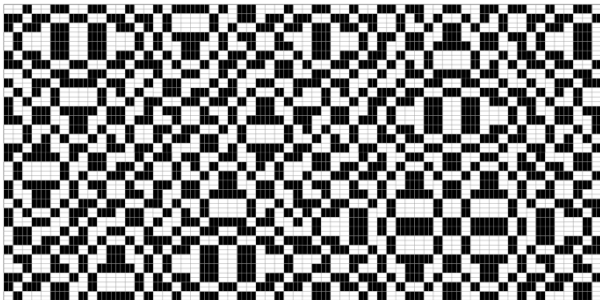
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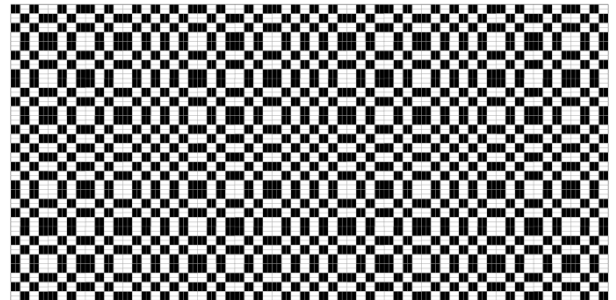
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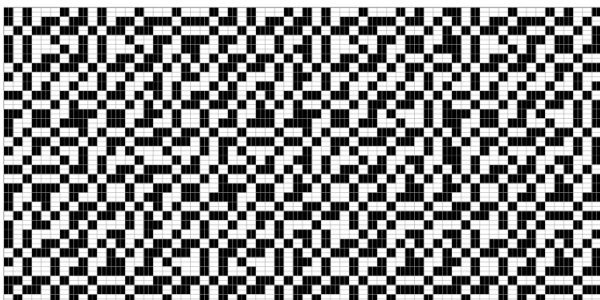
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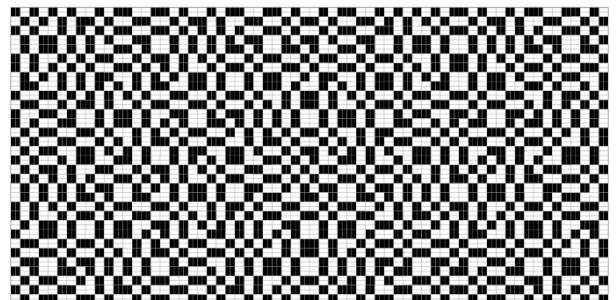
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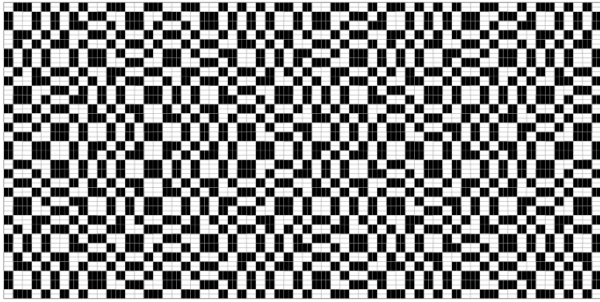
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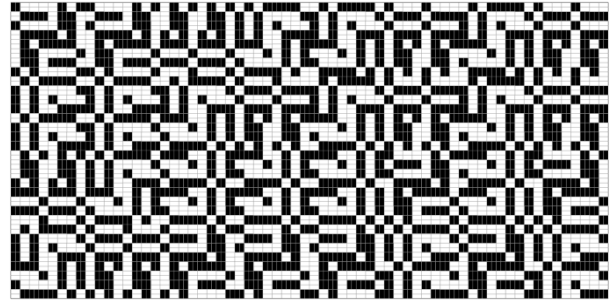
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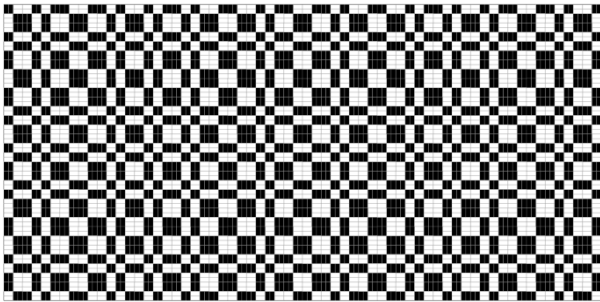
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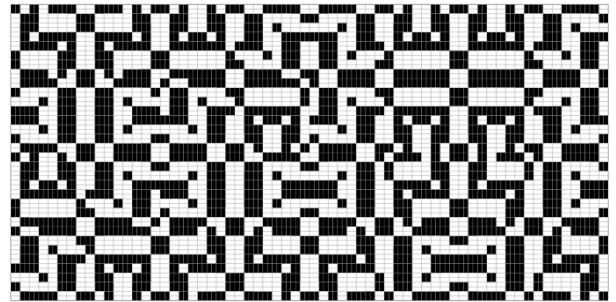
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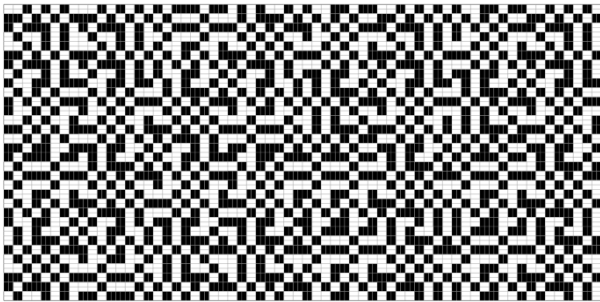
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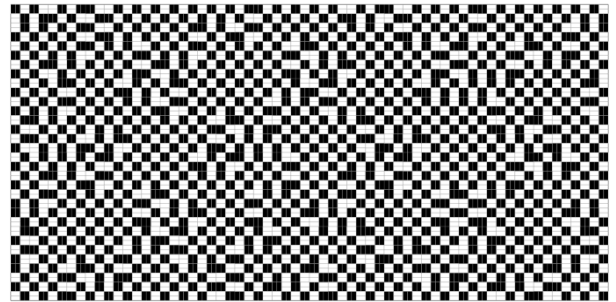
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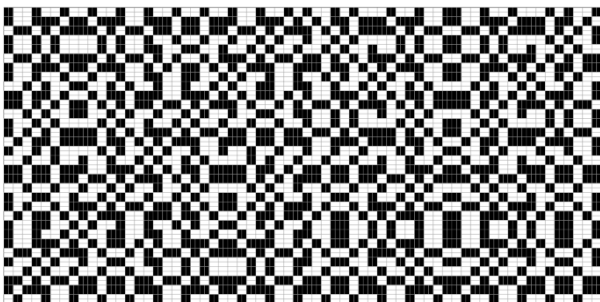
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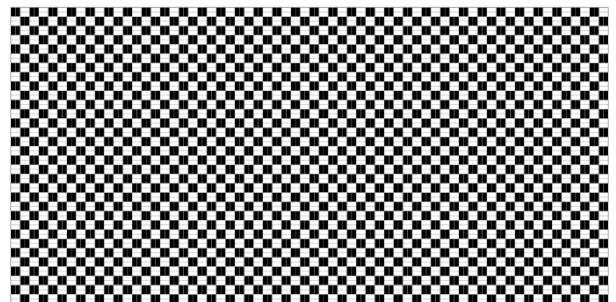
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3331



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