

Sesión 10.1 – CS3102 EDA

Prof. Victor Flores

2 de Junio de 2022

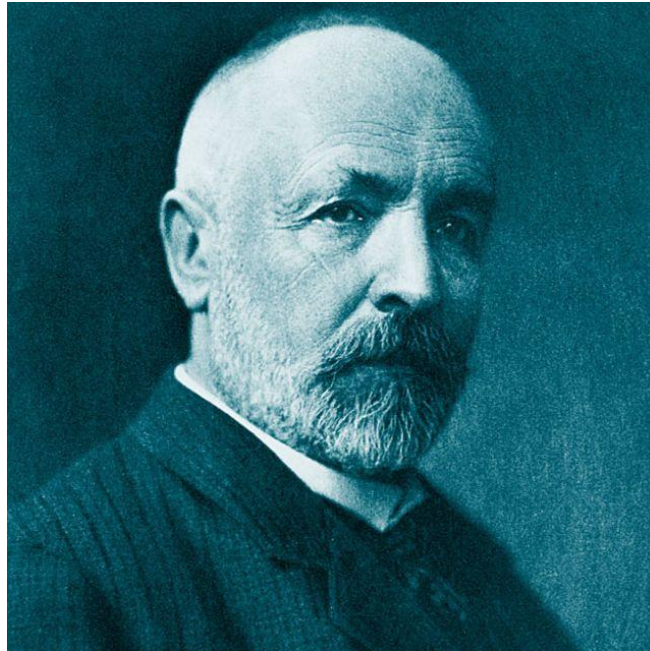


Contenido

- Space-filling curves
- Hilbert R-Tree

Space-filling curves

Los infinitos



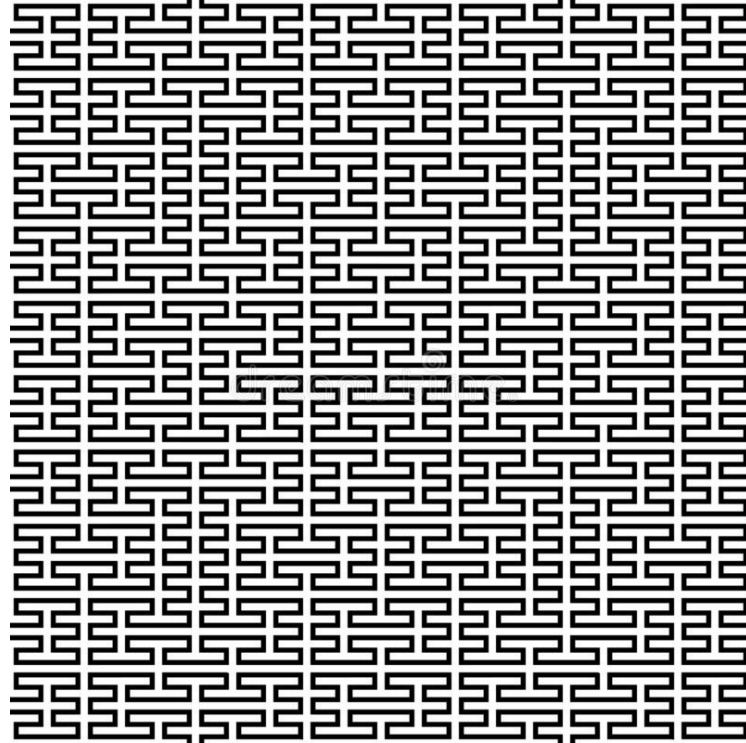
Georg Ferdinand Ludwig Philipp Cantor

Llenar un infinito con otro infinito

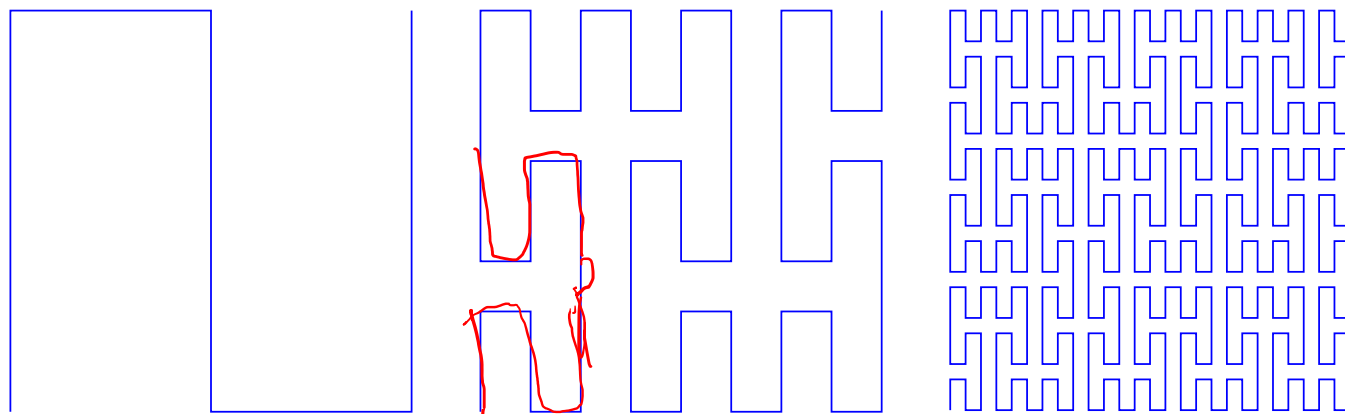


Giuseppe Peano

Llenar un infinito con otro infinito



Curva de Peano

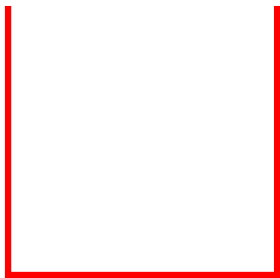


Llenar un infinito con... ondas?



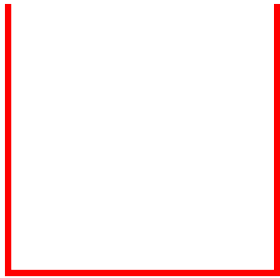
David Hilbert

Curva de Hilbert

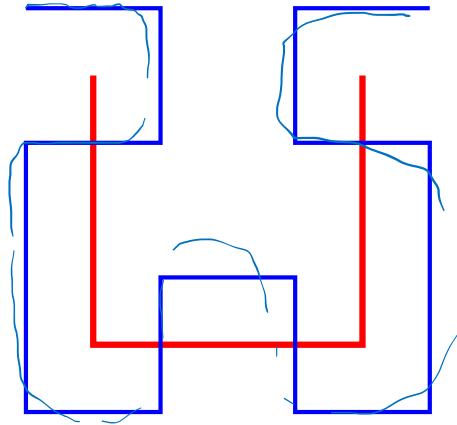


Primer orden

Curva de Hilbert

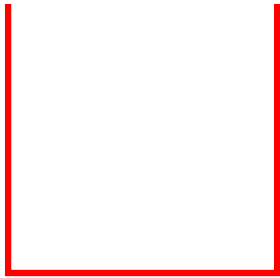


Primer orden

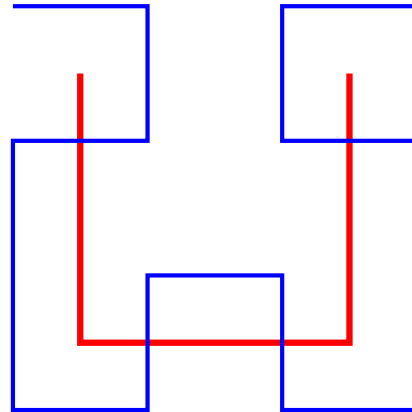


Segundo orden

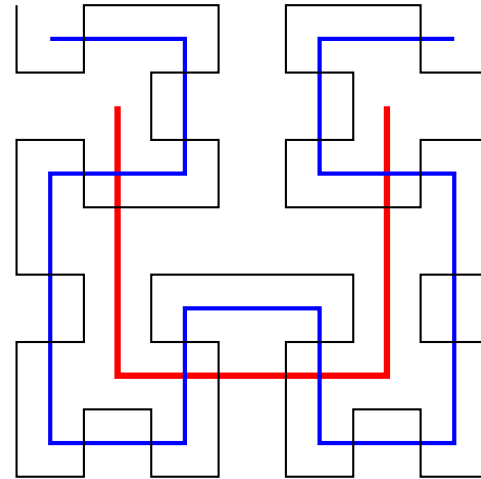
Curva de Hilbert



Primer orden

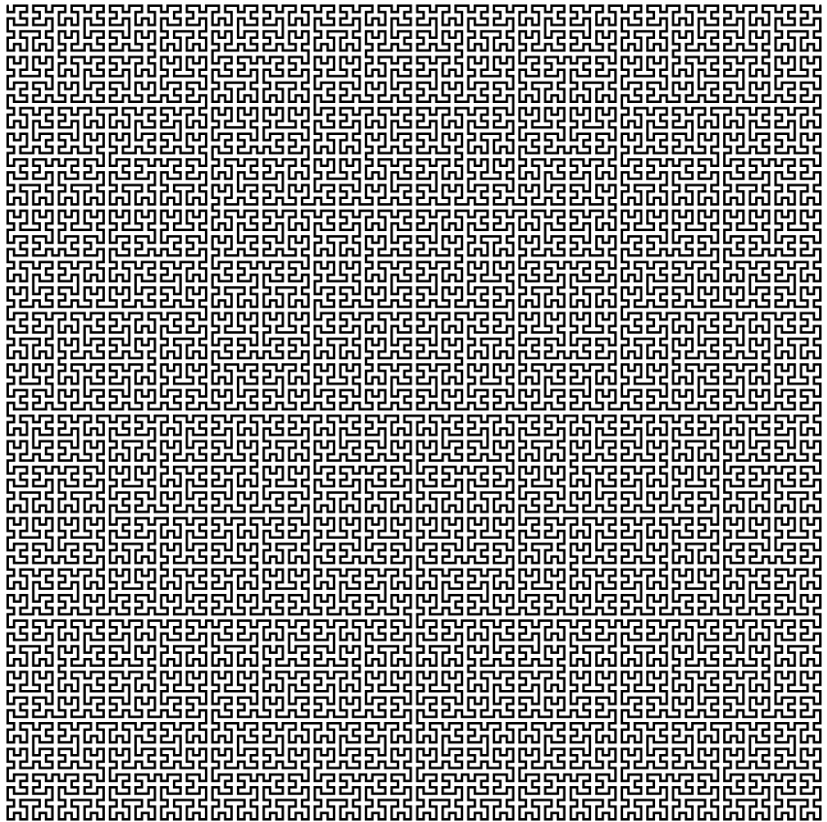


Segundo orden

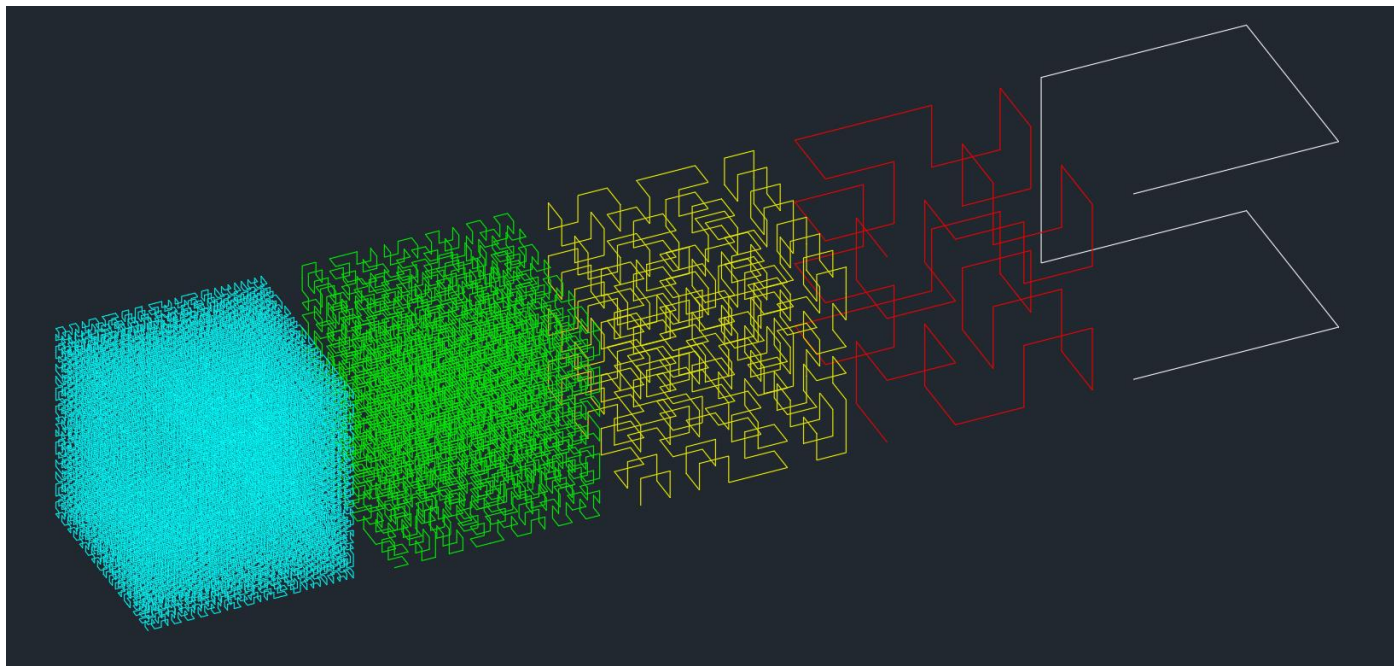


Tercer orden

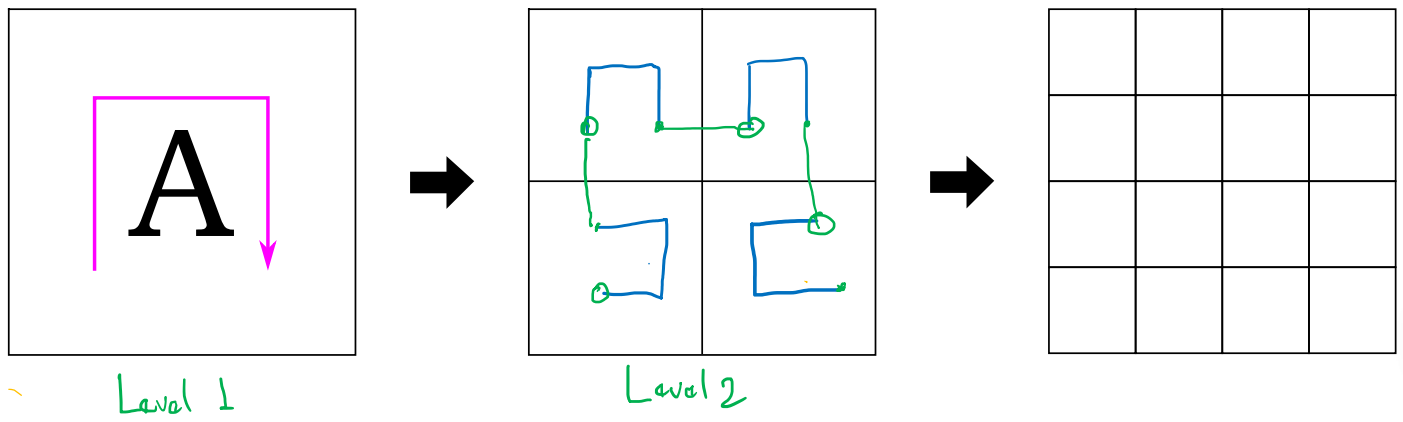
Curva de Hilbert



Curva de Hilbert

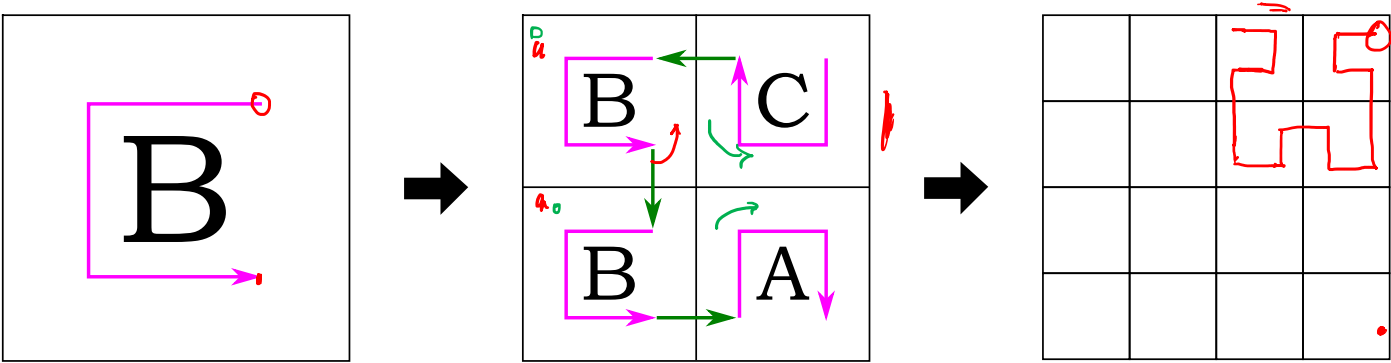


Curva de Hilbert

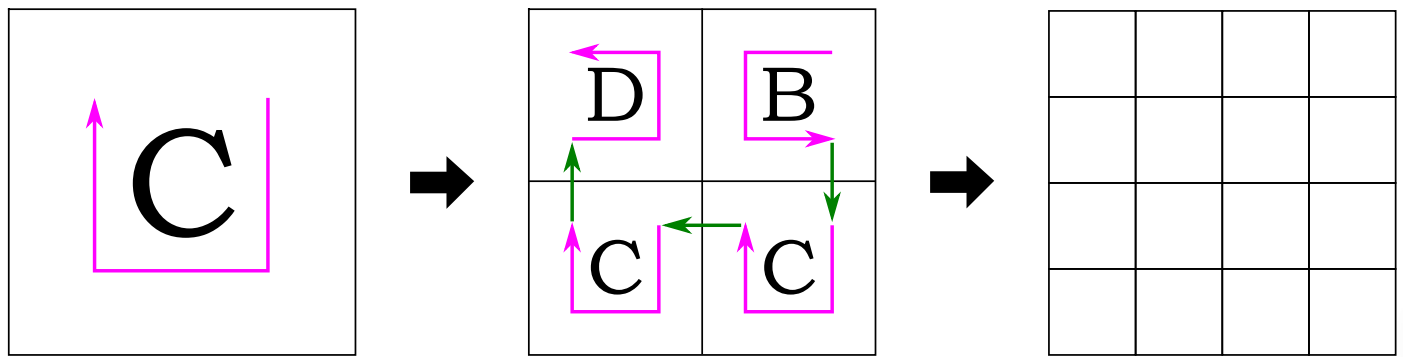


The diagram illustrates the hierarchical decomposition of a character 'A' into a 2x2 grid of sub-characters (A, A, D, B) and then into a 4x4 grid of Level 3 features. The first stage shows the character 'A' with a green arrow indicating the direction of the stroke. The second stage shows the character 'A' decomposed into four sub-characters (A, A, D, B) arranged in a 2x2 grid, with green arrows indicating the direction of the strokes. The third stage shows the 2x2 grid of sub-characters further decomposed into a 4x4 grid of Level 3 features, with green arrows indicating the direction of the strokes. The label 'Level 3' is written below the 4x4 grid.

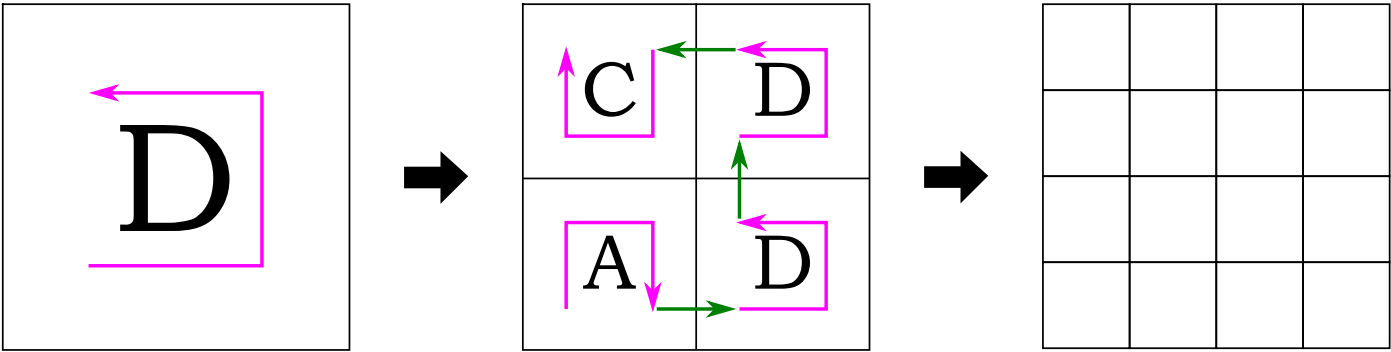
Curva de Hilbert



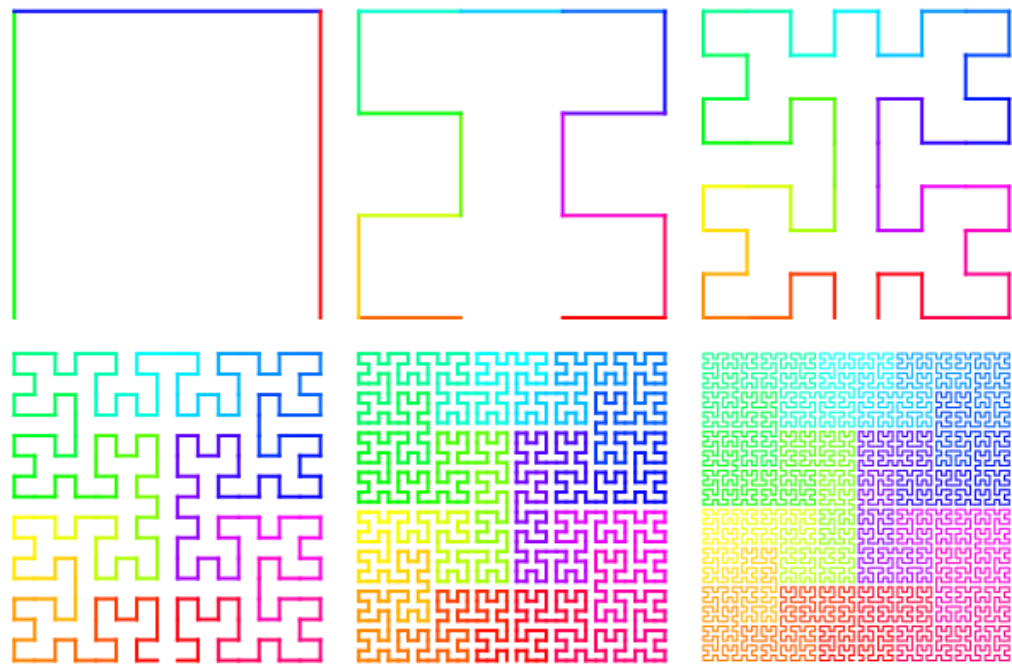
Curva de Hilbert



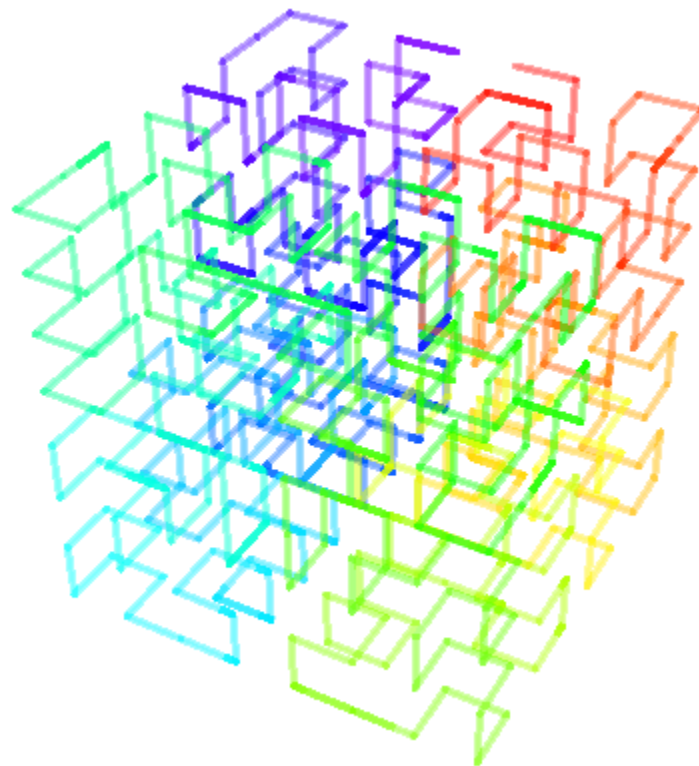
Curva de Hilbert



Curva de Moore

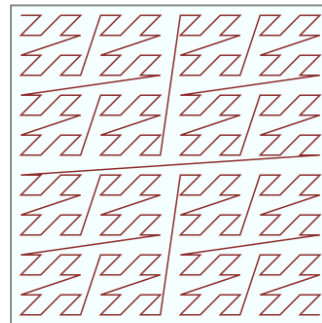
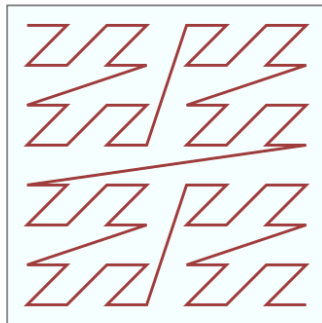
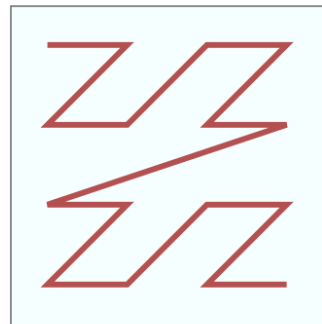
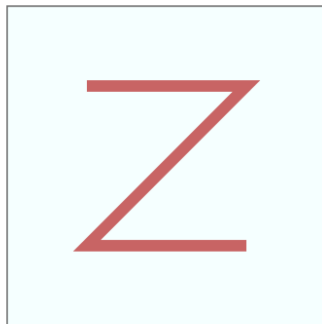


Curva de Moore



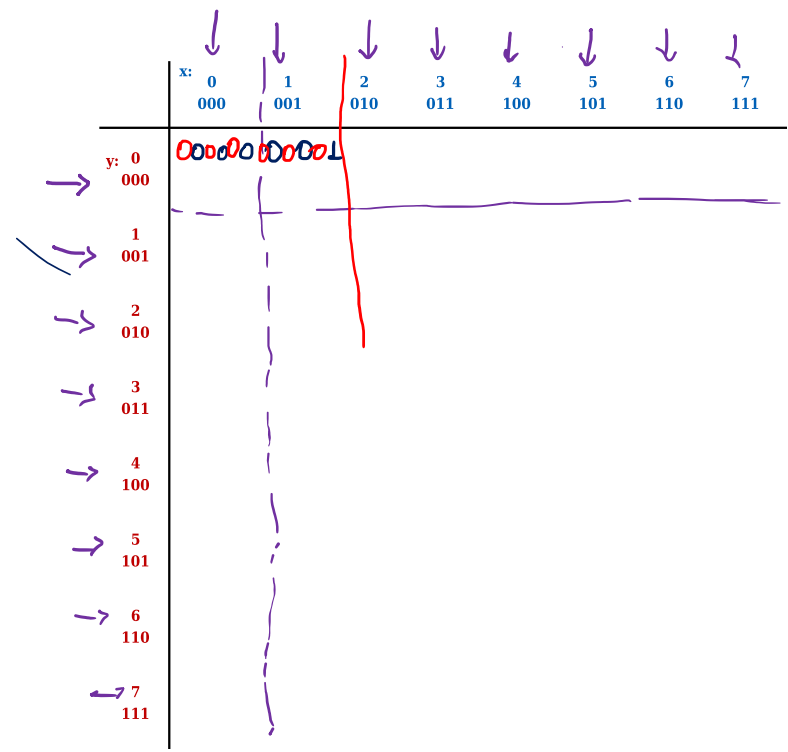
Morton order

(Z-order, Lebesgue curve)



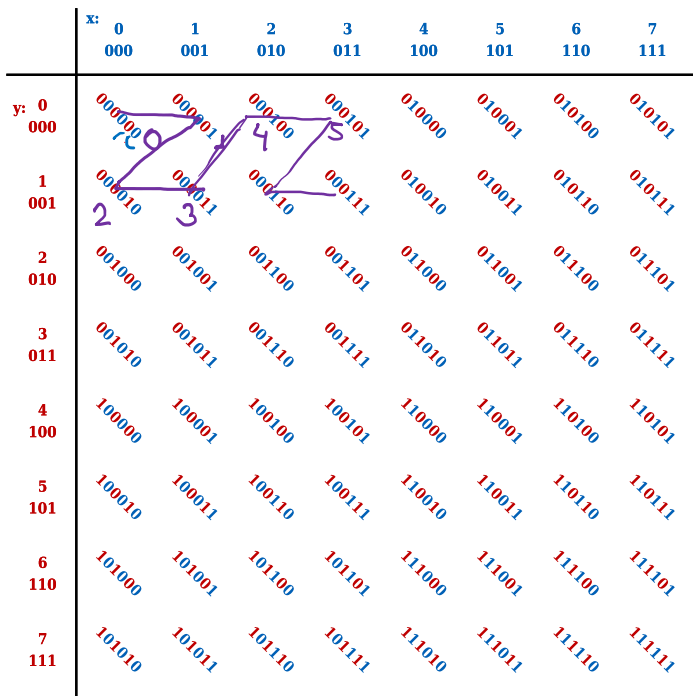
Morton order

(Z-order, Lebesgue curve)



Morton order

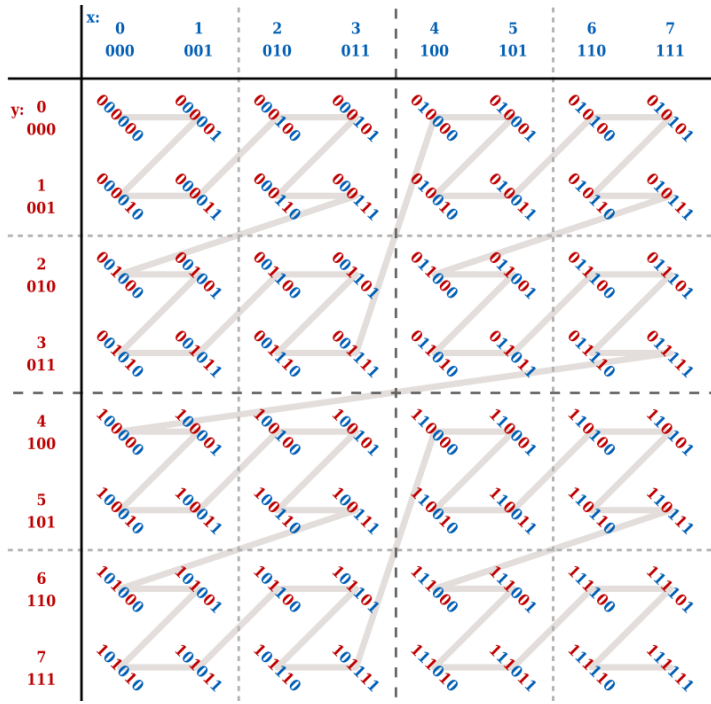
(Z-order, Lebesgue curve)



Morton order

(Z-order, Lebesgue curve)

$\{4^0, 4^1, 4^2, 4^3, 4^4, \dots\}$
 $SM = 1, 4, 5, 1$



Gray order

	x: 0	1	2	3	4	5	6	7
	000	001	010	011	100	101	110	111
y: 0								
000								
1								
001								
2								
010								
3								
011								
4								
100								
5								
101								
6								
110								
7								
111								

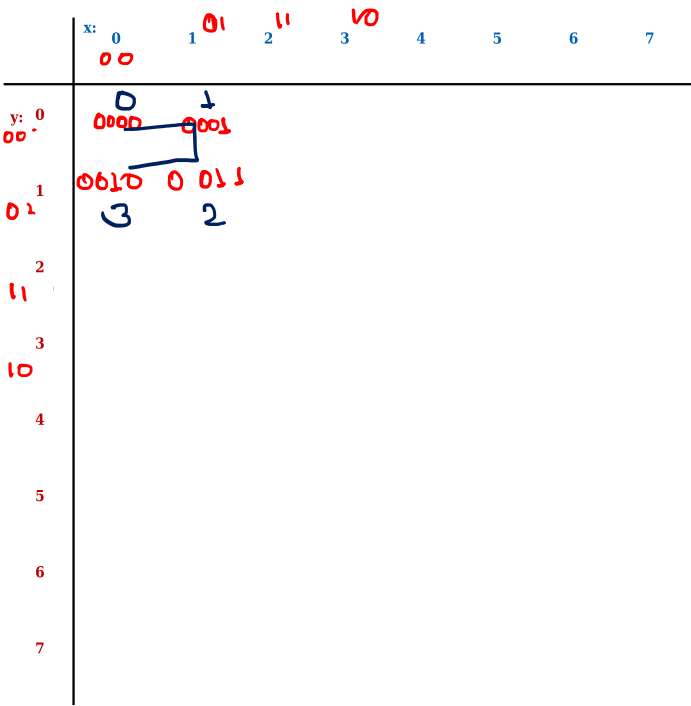
Gray order

	x:	0	1	2	3	4	5	6	7
		000	001	010	011	100	101	110	111
y: 0	000	000000	000001	000010	000011	000100	000101	000110	000111
1	001	000010	000011	000100	000101	000110	000111	001000	001001
2	010	000100	000101	000110	000111	001000	001001	001010	001011
3	011	000110	000111	001000	001001	001010	001011	001100	001101
4	100	001000	001001	001010	001011	001100	001101	001110	001111
5	101	001010	001011	001100	001101	001110	001111	010000	010001
6	110	010000	010001	010010	010011	010100	010101	010110	010111
7	111	010010	010011	010100	010101	010110	010111	011000	011001

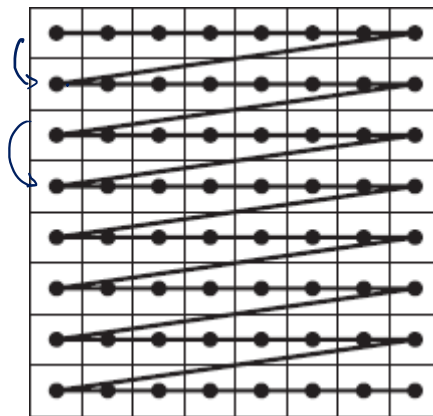
Decimal	Binary	Gray	Decimal of Gray
0	0000	0000	0
1	0001	0001	1
2	0010	0011	3
3	0011	0010	2
4	0100	0110	6
5	0101	0111	7
6	0110	0101	5
7	0111	0100	4
8	1000	1100	12
9	1001	1101	13
10	1010	1111	15
11	1011	1110	14
12	1100	1010	10
13	1101	1011	11
14	1110	1001	9
15	1111	1000	8

Double Gray order

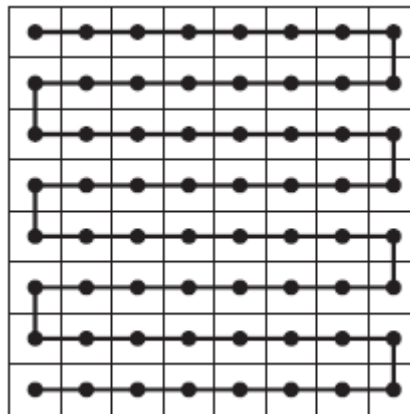
Decimal	Binary	Gray	Decimal of Gray
0	0000	0000	0
1	0001	0001	1
2	0010	0011	3
3	0011	0010	2
4	0100	0110	6
5	0101	0111	7
6	0110	0101	5
7	0111	0100	4
8	1000	1100	12
9	1001	1101	13
10	1010	1111	15
11	1011	1110	14
12	1100	1010	10
13	1101	1011	11
14	1110	1001	9
15	1111	1000	8



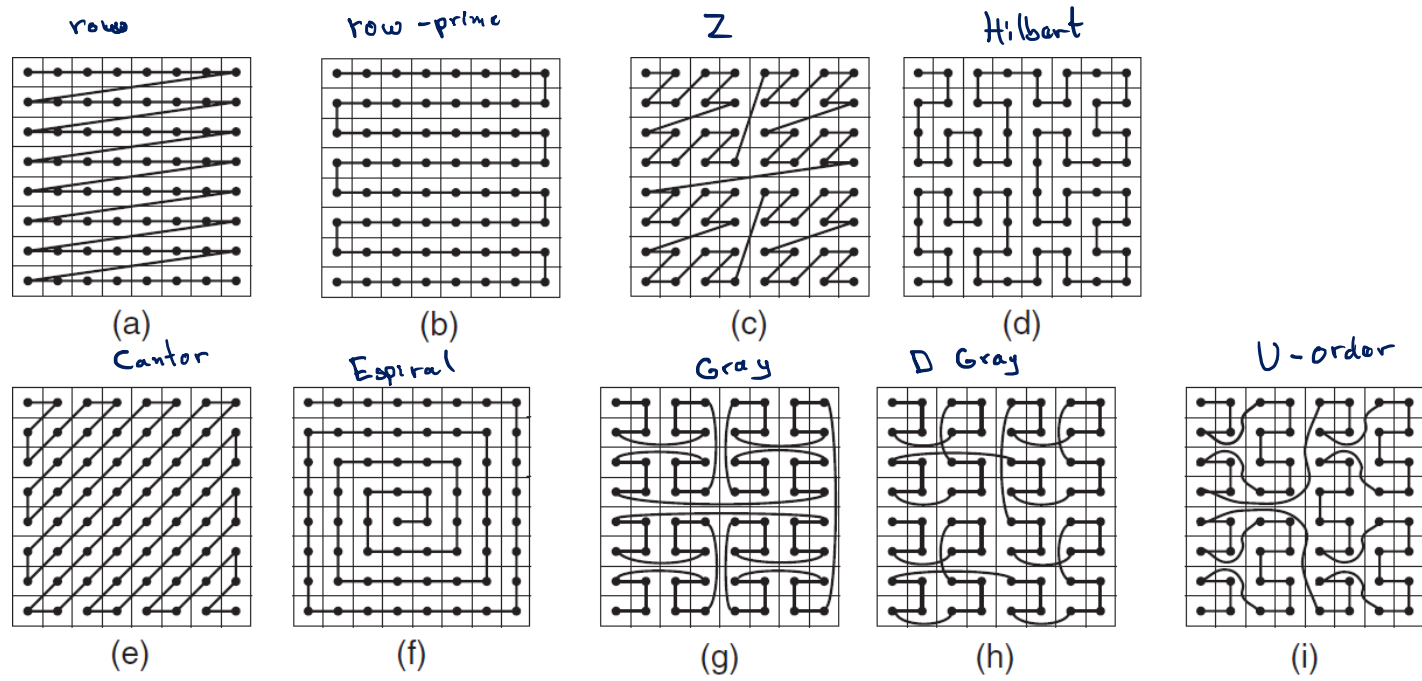
Row order



Row-prime order



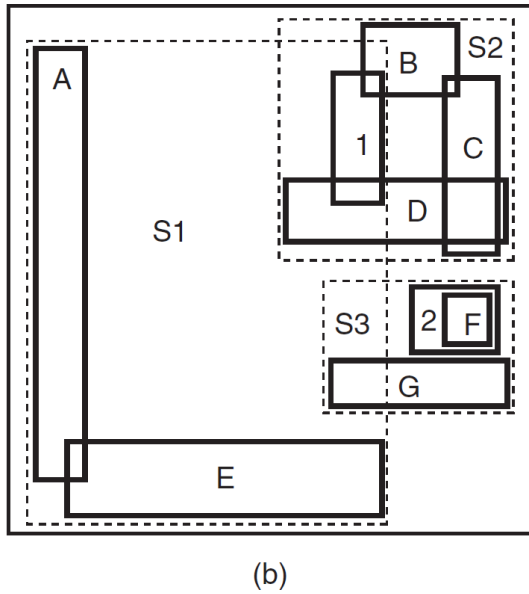
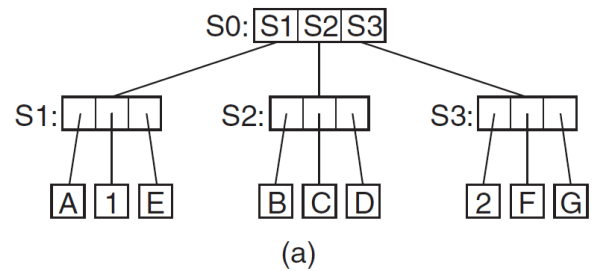
Resumen



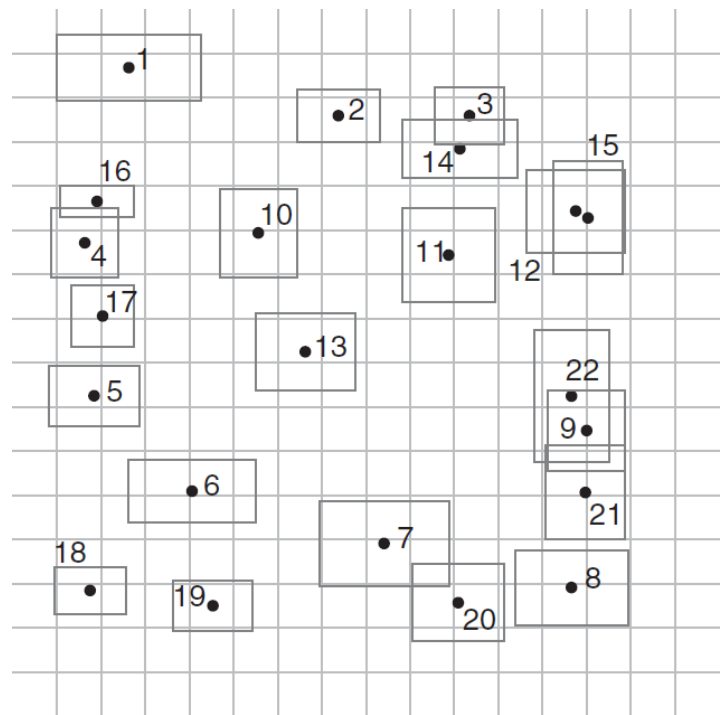
Hilbert R-Tree

Hilbert R-Tree

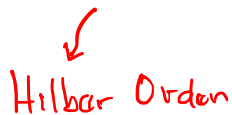
Objet-based → *Busqueda a Regiones*



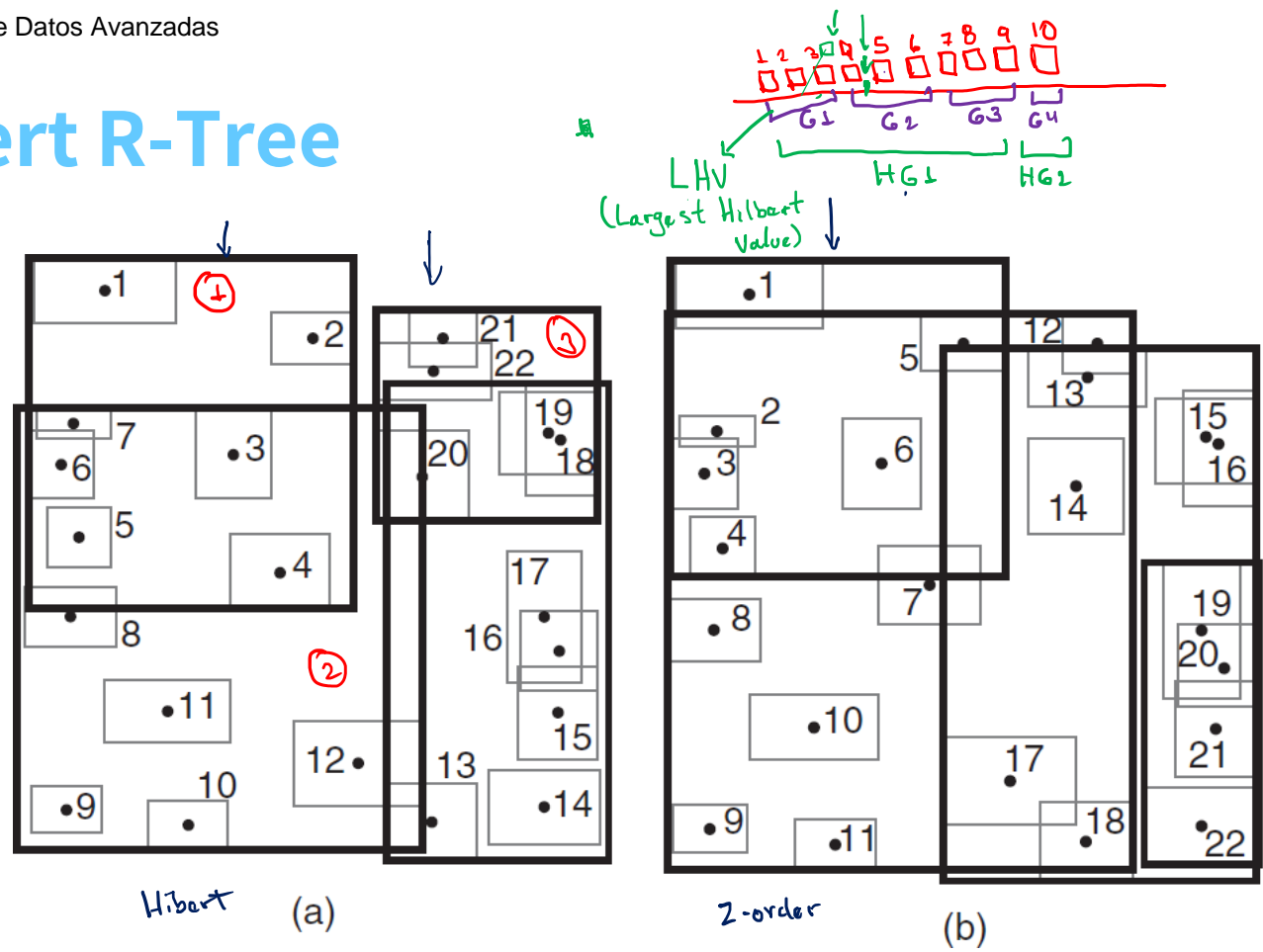
Hilbert R-Tree



R-tree
Cap³



Hilbert R-Tree



¿Preguntas?

