Representation of spatial objects

Representation of spatial objects
1. Raster representation of spatial objects

How is raster data stored?

Individual information levels in the raster = **layers** = layers – here are :

cells

Individual information levels in the vector = **layers** = at ESRI called, for example, coverages , here they are:

Point = 1 pixel

Line = sequence of adjacent pixels

Area = contiguous group of adjacent pixels

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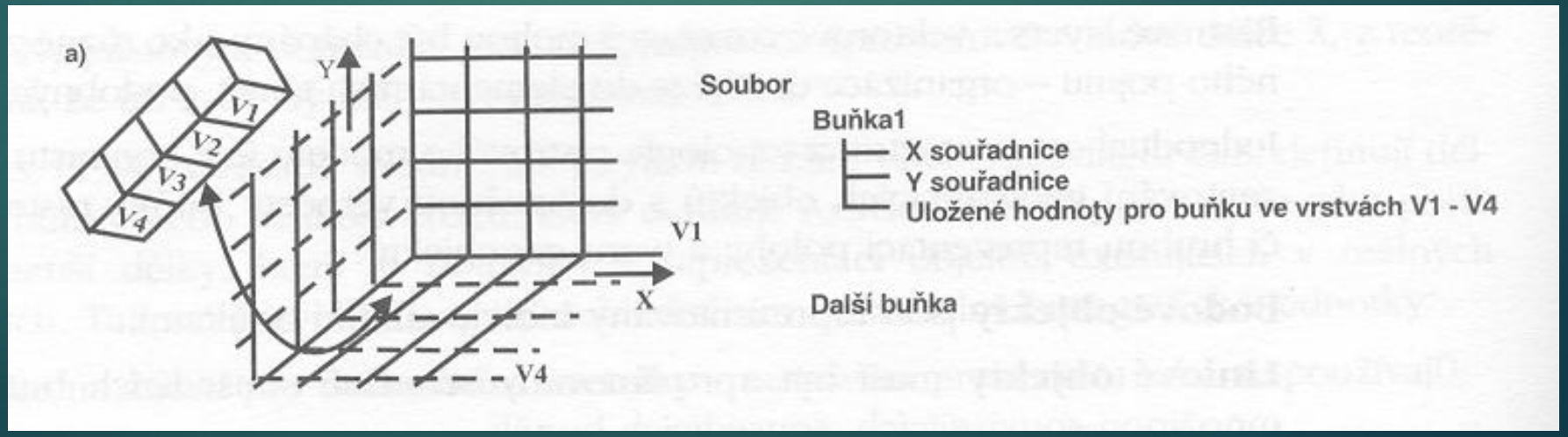
Ways of structuring data in raster representation :

that is, how data is stored for a raster GIS

1. Direct cell dating

= by cells - cell def . help

- Coordinates X,Y
- or i,j (column and row position) – attribute column given for the layer/class v1, v2, … for the thus determined pixel



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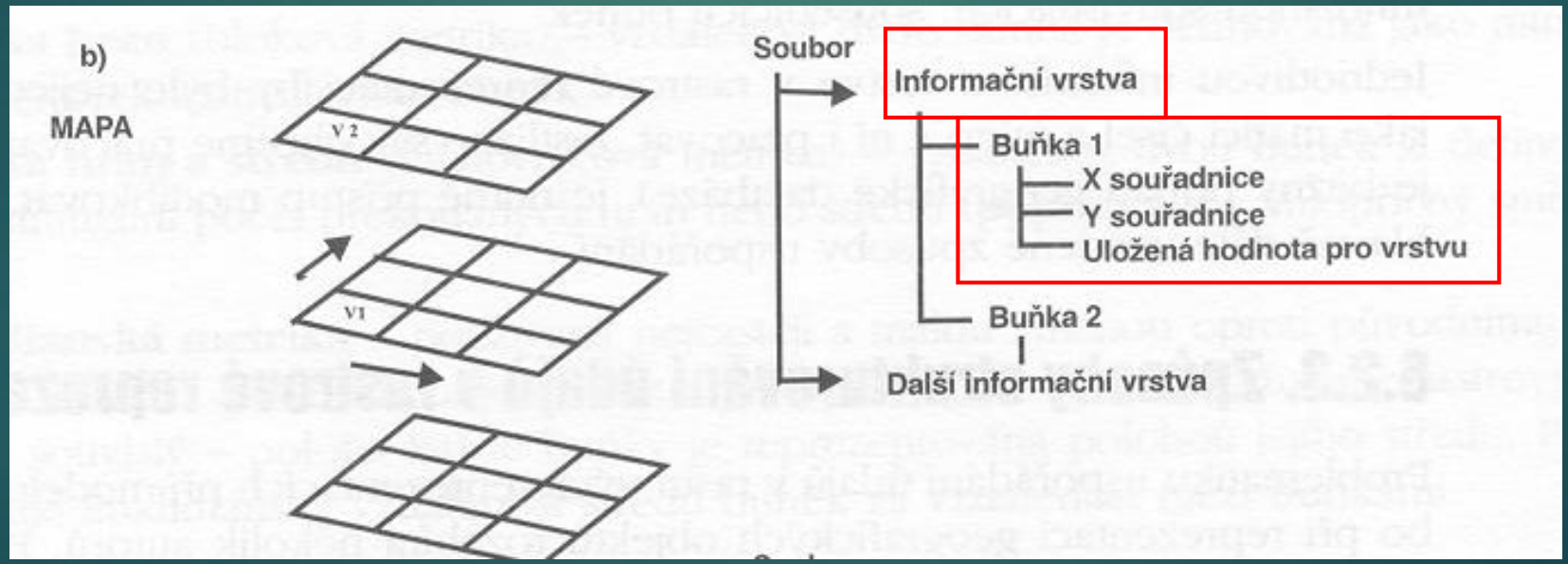
Ways of structuring data in a raster representation - continued :

2 . Direct dating of the information layer = by layers



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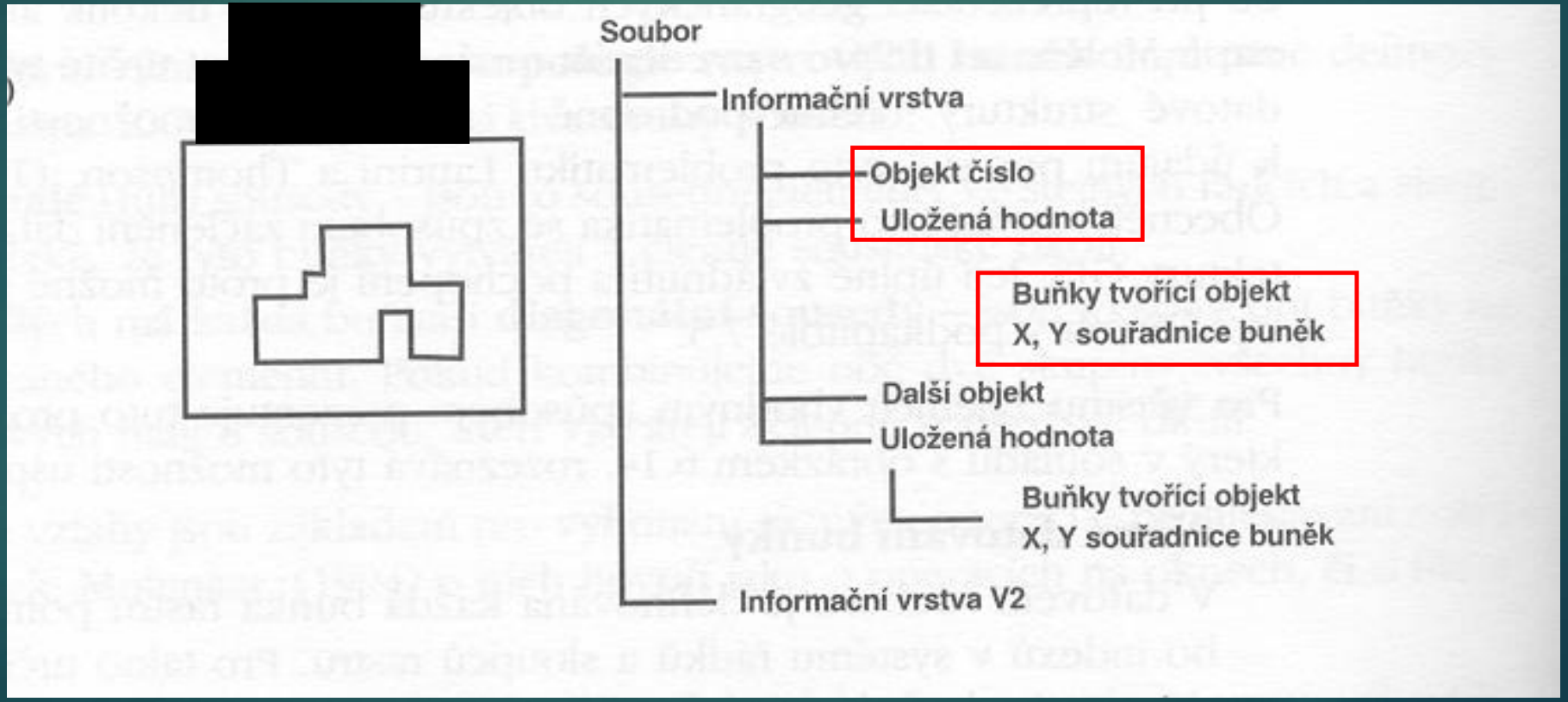
Ways of structuring data in a raster representation - continued:

3. direct dating of the object = by objects



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Raster data compression

uncompressed data volumes are large

A. RLE – run - length encoding :

Data, i.e. values in cells 1 1 1 1 3 3 2 2 2 2 2 2 3 3 3 3

Data after RLE compression : (1 4)(3 2)(2 6)(3 4)

(the value in pixels and the number of repetitions are given, i.e. we have 2 of the first 4 values)

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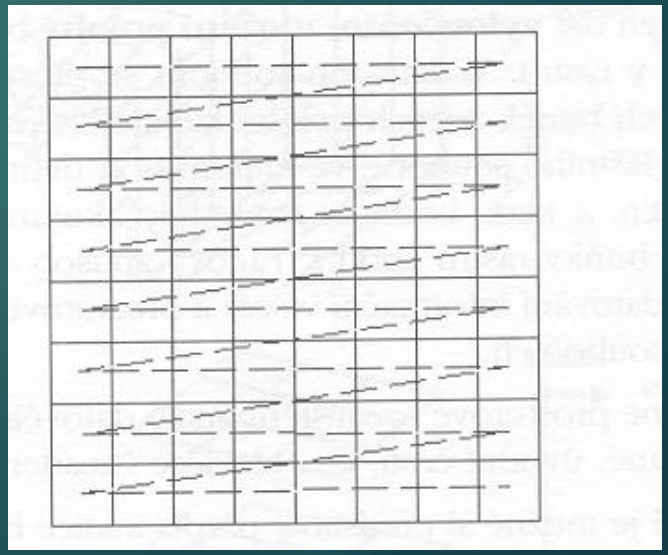
A. RLE - different options for determining the order of values for compression:

A1. Following the lines for RLE – row-ordering – (each row starts on the left) does not respect close values of neighboring pixels



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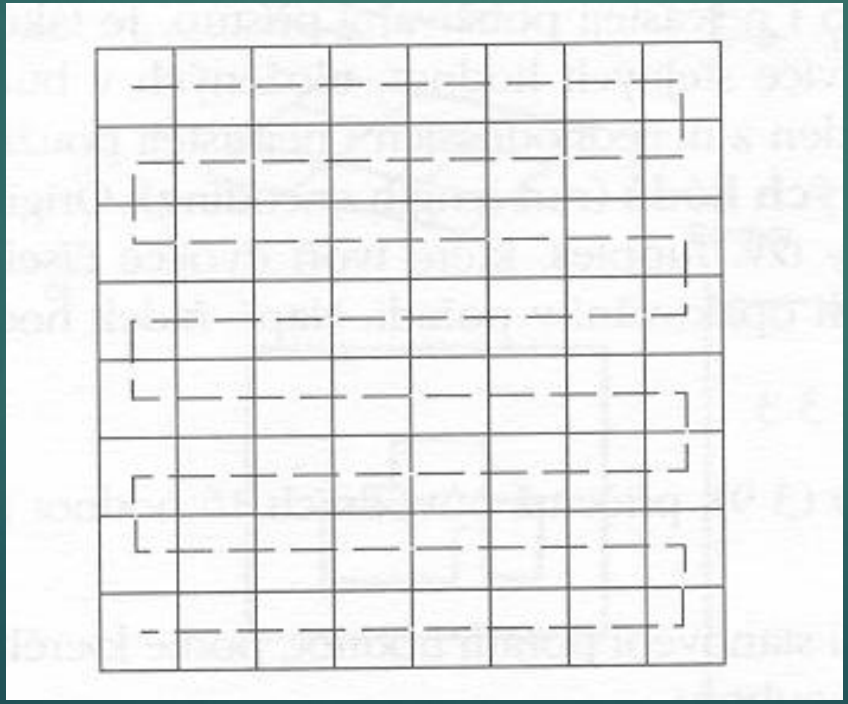
A2. Row-by-row progression for RLE – row prime/ horizontal ordering – respects close values of pixels close to the beginning and end of the line



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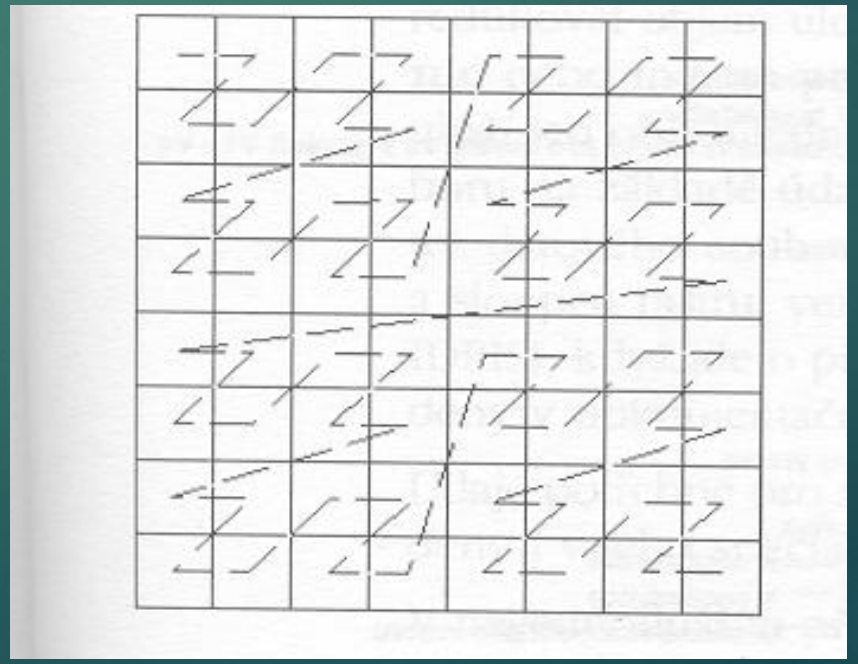
A3. Morton's order for RLE – Morton / Quadrant ordering

Changes of direction diagonally - more appropriate respect of values close to each other in the immediate vicinity over **4 lines**



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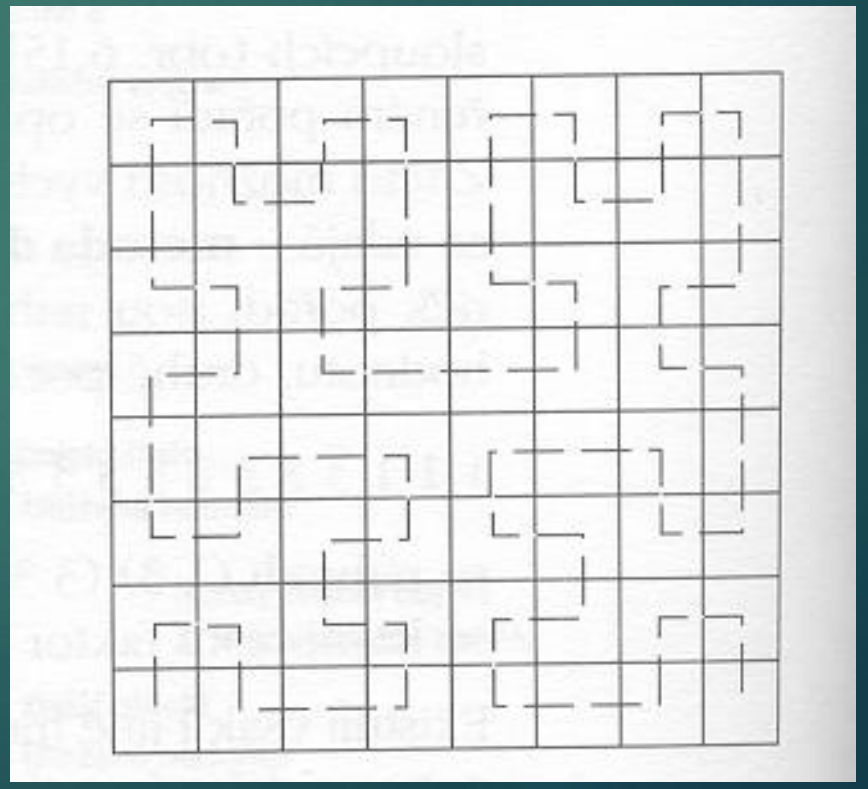
A4 . Peano order for RLE – Peano / Hilbert ordering

changes of direction in the perpendicular direction –

more appropriate respect for loved ones

values in the immediate vicinity



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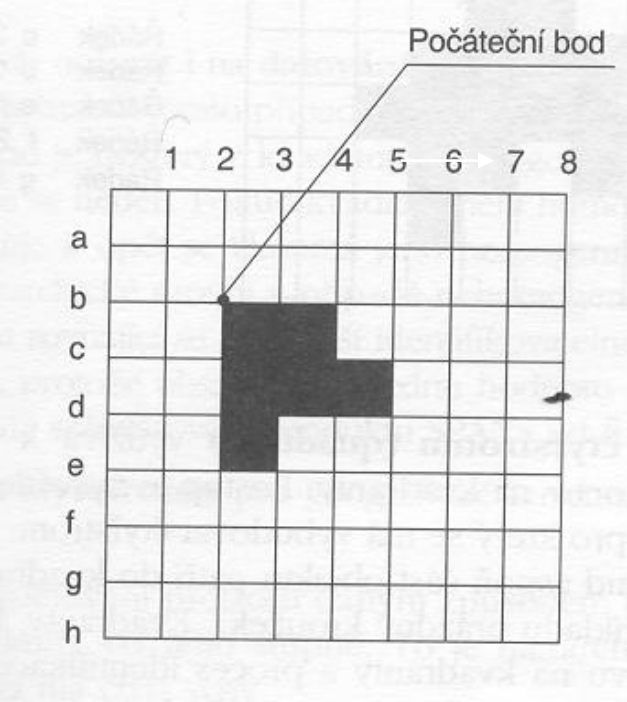
B. String Codes (chain codes)

define boundaries by encoding directions along object boundaries -

It is intended for starting cells (row i , column j) *and then the* direction for one pixel is always determined



Kódy směrů: V= 0

S = 1

Z = 2

J = 3

0, 0, 3, 0, 3, 2, 2, 3, 2, 1, 1, 1

0 x 2, 3, 0, 3, 2 x 2, 3, 2, 1, 1 x 3

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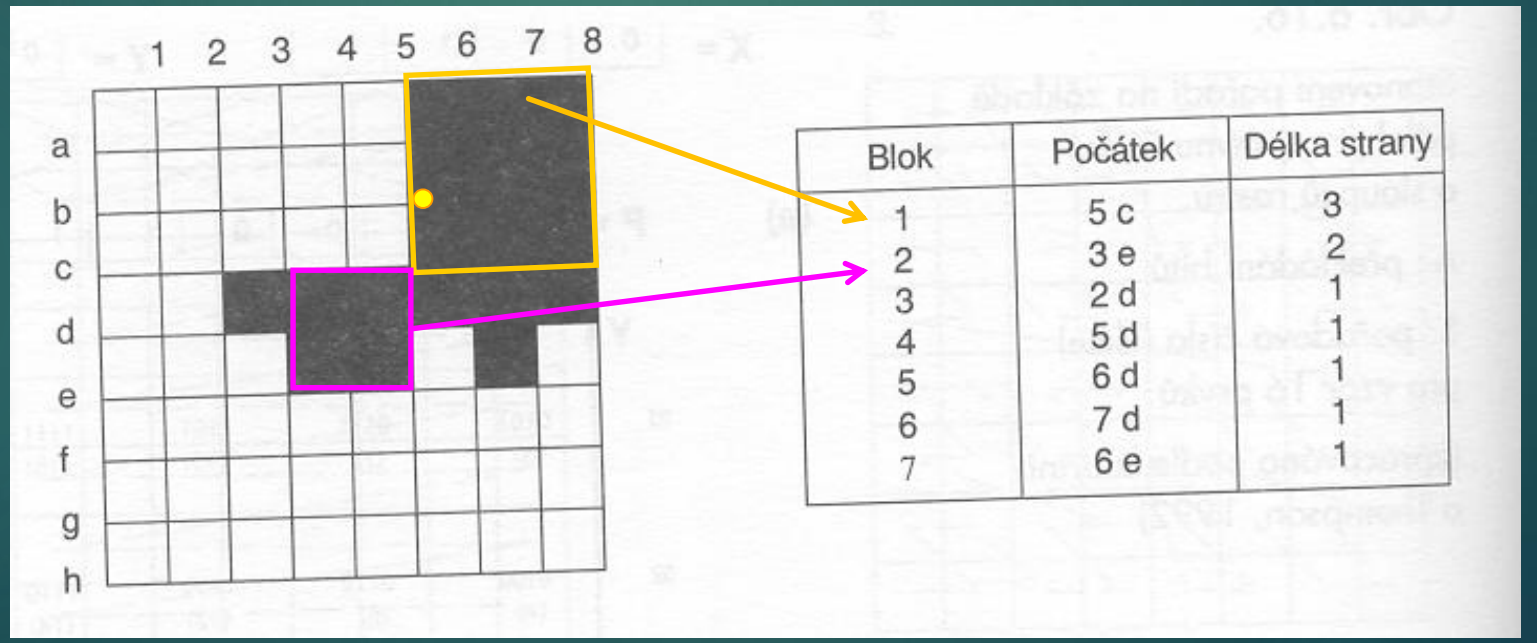
C. Block codes - square (block codes)

It is given

1. the position of the reference points at the bottom left and
2. size of square blocks



Blok	Počátek	Délka strany
1	5 c	3
2	3 e	2
3	2 d	1
4	5 d	1
5	6 d	1
6	7 d	1
7	6 e	1

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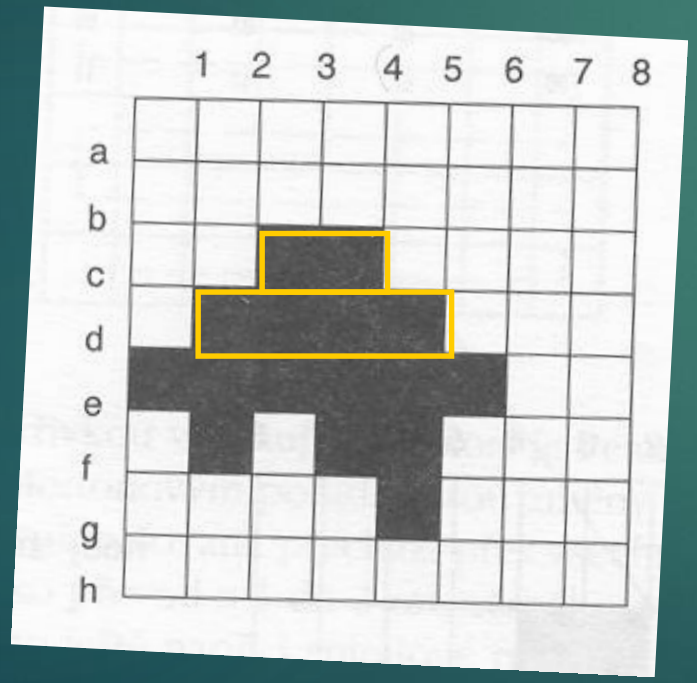
D. Coding of line sections (run length encodes)

indicates the start and end of a range of cells in rows



Řádek c 3,4
Řádek d 2,5
Řádek e 1,6
Řádek f 2,2 4,5
Řádek g 5,5

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E. Quadtree coding

Coding using repeated division into 4 quadrants by halving the sides

The goal is to get squares in which there is only a cell or more cells forming one object, i.e. the cells in it have the same value

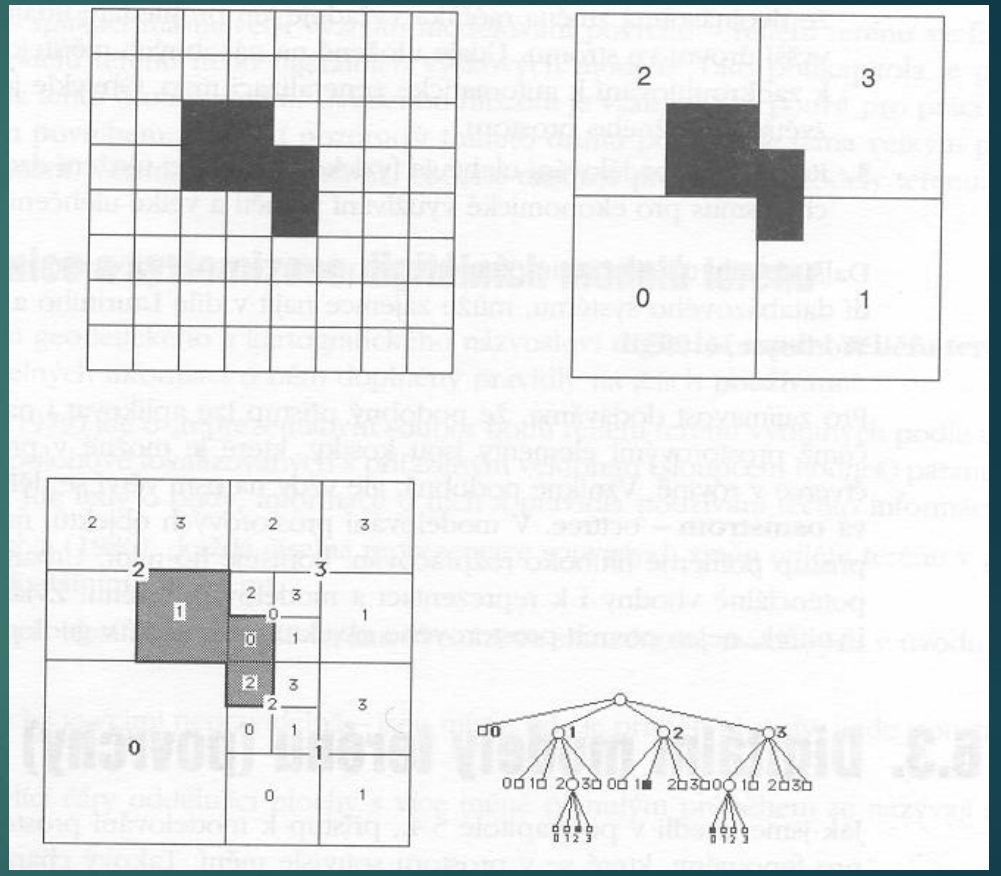

Figure shows the levels of partitioning by the quadtree method presented here

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The octtree method for three-dimensional models composed of voxels