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CARTOGRAPHIC MODELLING OF SPATIAL DATA - METHODOLOGICAL ASPECT

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Processing of spatial data in the process of cartographic visualisation requires that the, so-called, measuring scales are applied. Measuring scales are described in publications as such scales which allow for processing descriptive data to the form of a cartographic symbol. And the reference of objects in time, as well as the process of object geometrisation also have similar impacts.

Therefore it is proposed to assume two groups of measuring scales applied in cartography:

- scales referring data to temporal and spatial location of objects,
- scales referring to features and characteristics of objects.

The first group of measuring scales includes: the scale of time, referring data to selected moments and the geometrisation scale, which connects the process of object geometrisation with its visualisation and location on a map. Geometrisation of an object concerns determination – basing on its spatial dimensions and the assumed modelling scale – of the dominating or preferred geometric feature of the object, what significantly influences the way of its locating and cartographic presentation.

Measuring scales depend on the assumed conceptual model of a map, as well as on the assumed scale of work.

Cartographic symbolic visualisation is based on created systems of symbols, being graphical models of processed spatial data, basing on applied measuring scales. The graphical form of a symbol utilises graphical visual variables, according to the assumed method of presentation and reflects the scaling of spatial data.

The basic types of cartographic symbols referring to the quality level of spatial data and object geometrisation, include:

1. signatures (symbols) reflecting classification of objects and they geometric features. They are:
   a) point symbols, which present point objects,
   b) vector symbols, presenting directions of relations, movements or flows,
   c) linear symbols, which present linear objects,
   d) collective symbols, which represent a set of objects within their surroundings of unidentified ranges;
2. ranges presenting plain, surface objects. They are:
   a) ranges, which are presented using a line of range, colour filling, patterns or sets of symbols,
   b) ranges specified by descriptions only, of unidentified line of range;
3. regions, which present a set of surface units, distinguished by means of division into geographical, natural or administrative regions;
4. blocks (in the form of 3D symbols) presenting objects in the perspective approach;
5. presenting terrain relief forms:
   a) mounds (of features of images, symbols and ranges) on old maps,
   b) hatch symbols: perspective, which present the terrain morphology, hatches of terrain inclination, basing on angles of slope, shadowing hatches,
   c) surface shading, which stresses forms of the terrain relief,
   d) perspective visualisation based on regular (GRID) or irregular (TIN) grids,
   e) block diagrams presenting a fragment of the Earth crust together with the terrain relief, in the perspective projection.

The basic types of cartographic symbols, referring to the quantitative level of spatial data and object geometrisation, include:

1. calibrated points, mostly in the form of a dot and description of the numerical value, referring to the terrain altitude (terrain points) or to statistical values of the presented phenomenon;
2. iso-points, mostly in the form of dots with assigned weighs, presenting information about the number and locations of objects, which are located in the discrete or scattered ways;

3. iso-lines, lines, which connect points of the same numerical values, which characterise the terrain surface (contour lines) or statistical surfaces (iso-rythmic lines);

4. diagrams (point, line symbols or symbols which refer to surfaces) presenting numerical values in the continuous way (individually) or in steps (in numerical class intervals);

5. statistical block diagrams, presenting the statistical surface of a selected phenomenon, in 3D form;

6. cartograms, presenting the phenomenon mean intensity, using colours or patterns, in relation to territorial units, determined by means of division into regions or for areas, which are similar to natural areas (the dasymetric cartogram). A 3D version of data presentation is a solid cartogram.

Besides diagrams, two- or three-dimensional charts are also placed on maps. They are not cartographic symbols, but they are one of methods of presentation of statistical information on maps.

Explicit classification of cartographic presentation methods does not exist. In Poland, the most popular is classification developed by L. Ratajski. The classification of methods was also investigated, among others, by A.H. Robinson, J. Bertin, K.A. Salischev.

The classification of methods may be only based on features which are common for those methods, which may be assumed as the classification criteria. Thus, it becomes the multi-stage classification.

Considering the discussed analysis of graphical modelling of cartographic information, the following classification of cartographic presentation methods is proposed:

1. perspective methods: the block and image methods,
2. a symbol method,
3. a method of ranges (areas),
4. a method of regions (complexes, delineated territories),
5. a mound method,
6. a hatching method,
7. a shading method,
8. a block diagram method,
9. a grid method of visualisation of the digital terrain model, 1
0. a method of calibrated points,
11. an iso-point method, known as the dot method,
12. an iso-line method,
13. a cart-diagram method,
14. a cartogram method,
15. a carto-chart method, concerning charts presented on maps.

The presented idea of classification of cartographic presentation methods is the author's idea, also with respect to terminology, and it requires development of all aspects of cartographic visualisation.