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Geospatial information services based on official statistics

Statistical and geospatial information – Geostatistics Portal in Poland based on official statistics

Note by the Central Statistical Office of Poland

Summary

This document describes the Polish experience in using geospatial data during the 2010 Census Round. The use of digital maps and global positioning system (GPS) technologies increased the quality of the planning and management of the census. The document also describes the Geostatistics Portal used for geospatial representation of Polish data, which allows a number of spatial analyses.

The document is presented to the Conference of European Statisticians seminar on “Geospatial information services based on official statistics” for discussion.

I. Introduction

1. Nowadays the development process of obtaining and providing statistical information to a large extent is based spatial references. In the 2010 Census Round a combination of data coming from administrative sources and registers containing spatial data was used for the first time. The application of digital maps and the GPS technologies brought a revolutionary change when it comes to the possibilities of planning and managing census operations, both prior to and during the census.

2. For this purpose, the data obtained from the State geodetic and cartographic resources, as well as ortophotos (processed aerial photographs), were employed. With the use of the materials obtained, both from geodetic and statistical resources, it was possible to develop sampling frames for censuses, comprising statistical address points and their spatial reference.

3. Digital maps were an indispensable tool facilitating the work of census enumerators (when it comes to moving around the area, verifying the sampling frame, etc.), gmina leaders, and voivodship and central dispatchers who could verify on a map the progress of the census and, for example, the route or location of an enumerator, using a dispatching or GIS application, facilitating the work of a gmina leader.

II. Use of geospatial data in the 2010 census round

4. In accordance with the organisational principles adopted, the pre-census round was made prior to the beginning of the census. In the pre-census, a census enumerator verified the existence of buildings and supplemented the register with missing address points. An additional aspect of the round involved examining the area where the census was to take place, and possibly resolving any ambiguities which had arisen during data revision on the gmina level.

5. Mobile terminals were equipped with the GIS application, which enabled revisions and showed on the map, among other things, the current location of the census enumerator (GPS) and address points assigned to him. Using the mobile application, the enumerator could change the location of an address point, delete an address point, or add an address point not included in the register, with the help of GPS device. During the pre-census stage, the enumerator was also responsible for controlling the entire areas of the census districts assigned to him. It was particularly important when the revision in the gmina district was performed only on the basis of the registers kept, and the census enumerator was the first and in many cases the only person directly involved in field work in the framework of the census operations. The GIS application was also actively applied during the census – to manage its course. It enabled the monitoring and control of the enumerator's work, as well as the tracing of his movement in the area (among other things, to ensure his safety).

6. The introduction of (x,y) coordinates and address points in statistical data enabled changing of the previous system of spatial identification and shifting from area assignment (census districts) to point assignment. It had a fundamental significance for the applications of geoinformatics in official statistics. The change of the assignment mode allowed for more flexible grouping of data collected in public statistics for even the smallest areas. It also facilitated the creation of a spatially-oriented micro database, enabling the conduction of geo-statistical analyses.

III. The Geostatistics Portal

7. The Geostatistics Portal is used for spatial presentation of Poland's largest information resource, enabling the publication of aggregated statistical data in the form of various types of spatial analysis, presented on maps with statistical confidentiality. The Geostatistics Portal is a tool for interactive cartographic presentation and the publication of data acquired in censuses.

8. It serves the following functions:

- storing,
- presenting,
- sharing information for a broad group of recipients.

9. The Portal functions on two levels: for internal (official statistics) and external users, and the scope of presented data is defined through the appropriate roles and authorisations. Internal users have access to both unit and aggregated data, whereas external users only to aggregated data, published taking into account statistical confidentiality.

10. The interface of the Geostatistics Portal allows its users quick and easy access to resulting statistical information. Data are presented using such cartographical presentation methods as cartograms (choropleth map) and various cartodiagrams. It is also possible to set one’s own parameters for the visualisation of a thematic area for a given cartogram. These include measure, aggregation level (territorial division unit), the number of intervals, etc. Aside from the possibility of using ready-made spatial analyses, in the Geostatistics Portal, internal users can draw up custom thematic maps based on a selected feature of the data model, using dynamic spatial analyses, i.e. linear or distance analyses, or object buffering.

11. Classification of the analyses conducted by points with (x,y) coordinates gives also the possibility to become independent from boundaries changes (in the regional division of the country), usually resulting in changes of census districts and laborious recalculations. This facilitates a comparative analysis of time series, regardless of the changes taking place in this division. An additional advantage is the possibility of the data aggregation both in the structure of the NUTS administrative division and the GRID divisions prepared in CSO during the GEOSTAT projects.

12. Currently Polish statistics presents a range of grid based presentations of population density at statistical data visualization platform the Geostatistics Portal. Experience gained during the preparation of these visualizations shows that data presentation in grid cells is basically very accurate, allows an easy comparison as all cells have the same size and are stable over time. Moreover grids integrate easily with other scientific data (e.g. meteorological information) and grid systems can be constructed hierarchically in terms of cell size thus matching the study area. Grid cells can also be assembled to form areas reflecting a specific purpose and covering the study area (mountain region, water catchment).