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New data sources in spatial surveys

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Spatial surveys is all about analysing data that has a spatial (location) characteristic to it. This type of analysis looks for patterns or correlation in recorded observations of some process that occurs across a space.

Various contexts:

- spatial visualization using **a map or sequence of maps**
- **processing and analysing data** using the set of functions provided by many geographical information system (GIS) software packages
- **combining of spatial and statistical techniques** to analyse spatial and temporal data in a number of scientific fields

Examples of the use of spatial surveys in official statistics:

- nomenclature of territorial units for statistics
- regional statistics

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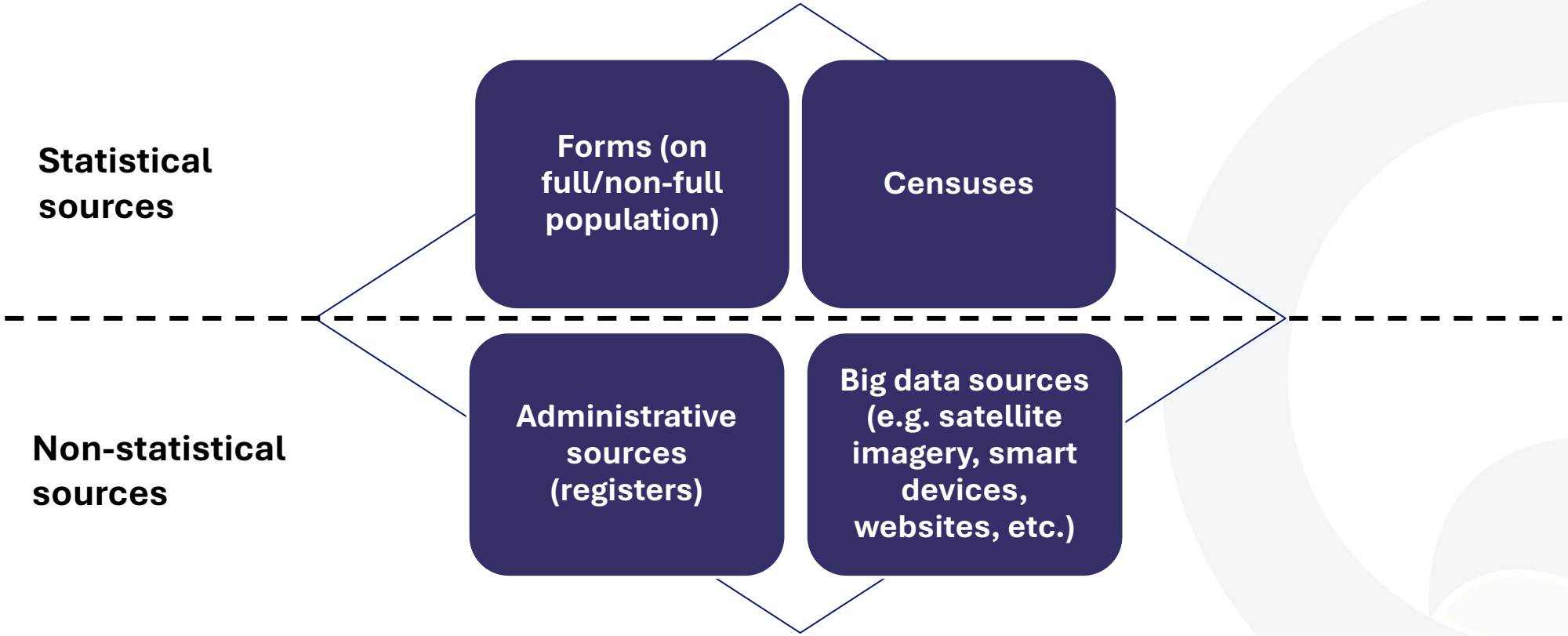
Data sources in official statistics



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New administrative sources

OPPORTUNITIES
• Improving the efficiency of statistical production (reduce survey costs and respondent burden)
• Analyses delivered to recipients on time (reduced time to deliver data)
• Increased granularity and timeliness of result data and estimates

CHALLENGES
• Integration of official statistics system with administrative systems
• Moving away from traditional population and housing censuses to register-based and combined censuses
• Adaptation of registers to the needs of statistical surveys

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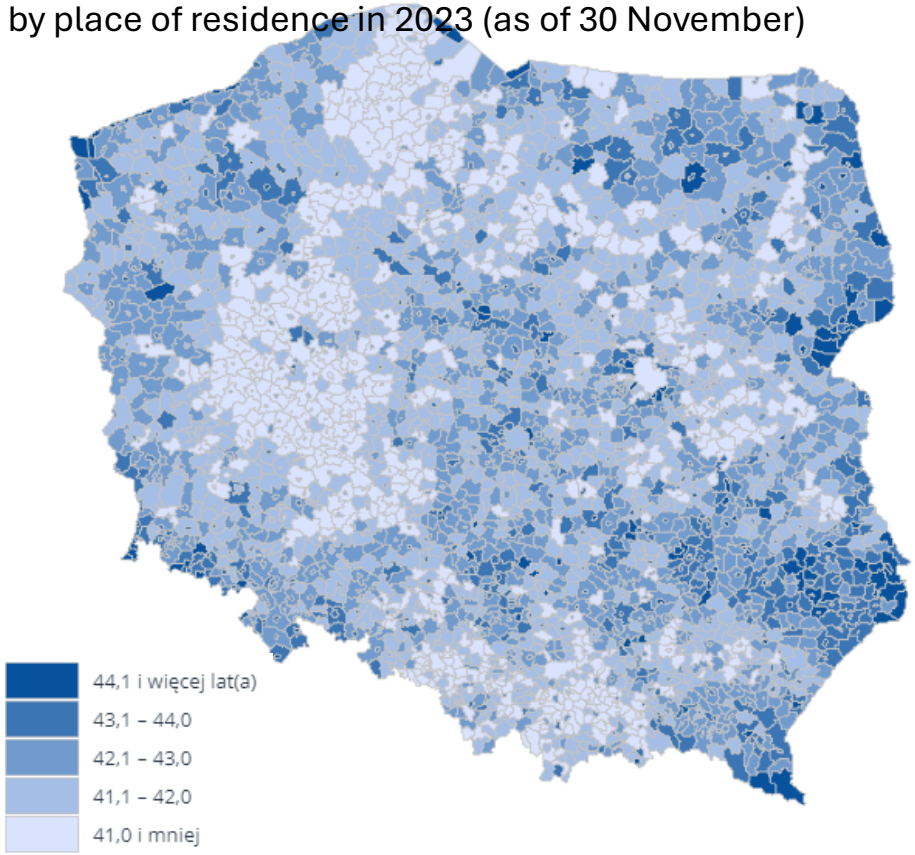
Example - Employed persons in the national economy in Poland

Median age of employed persons in the national economy
by place of residence in 2023 (as of 30 November)



Advantages:

- more detailed data
- data published monthly
- data cover employed persons in all entities of the national economy, including small entities
- new cross-sections e.g. employed persons by age, sex, place of residence

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Big Data

OPPORTUNITIES
• Reduction of survey costs and respondent burden
• Reducing the time needed to deliver data to recipients, analysis even in (almost) real time;
• Monitoring of new phenomena not yet researched by public statistics

CHALLENGES
• Cooperation with data providers from the private sector
• Law regulations not keeping up with technological progress
• Integration of data from public systems into existing public statistics systems, ensuring comparability of data
• Adaptation of IT infrastructure

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Big Data – how do we use these sources?

DATA SOURCES

- internet data
- satellite imagery
- intelligent devices (IoT)
- road sensors
- mobile data

METHODS

- web scraping
- machine learning
- coding and classification
- imputation of missing data
- optimizations of estimates

AREAS/THEMES OF RESEARCH

- online job offers
- relocation of the Ukrainian population
- characteristics of enterprises
- agricultural statistics – crop detection, yield forecasting
- monitoring urban areas
- tourism statistics - research on accommodation base
- price research (household appliances, pharmacies)
- intelligent statistics - internet and mobile applications in conducting surveys

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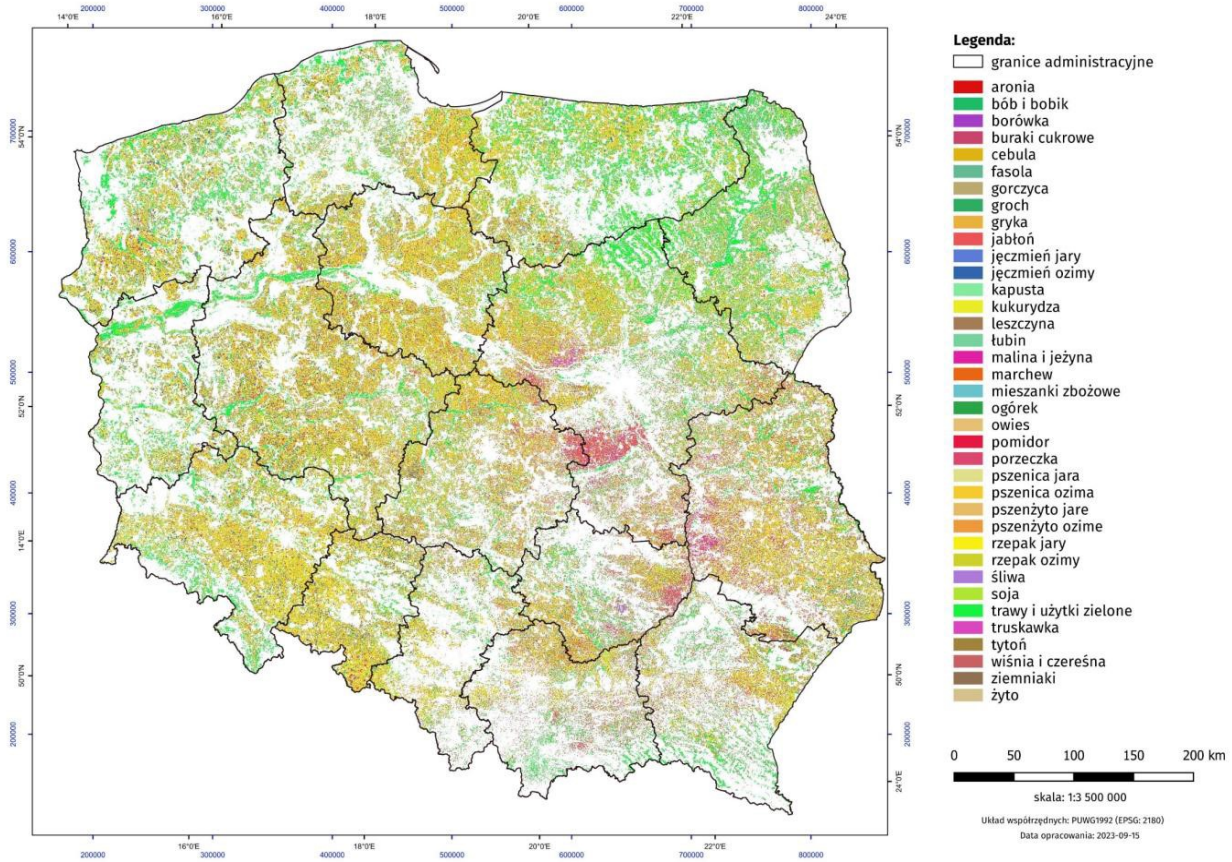
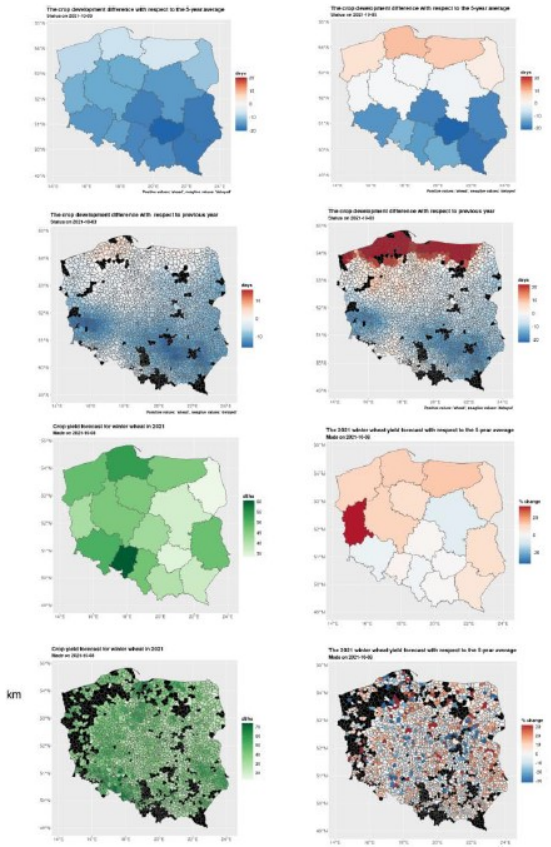
Applications of satellite remote sensing in agricultural statistics



Crop map



Map of shifting the development
phase of winter rapeseed, winter
wheat and corn (in days) for voivodeships and communes compared to the average
from the last 5 years

Yield forecast map for voivodeships and communes and their differences
from the average over the last 5 years.

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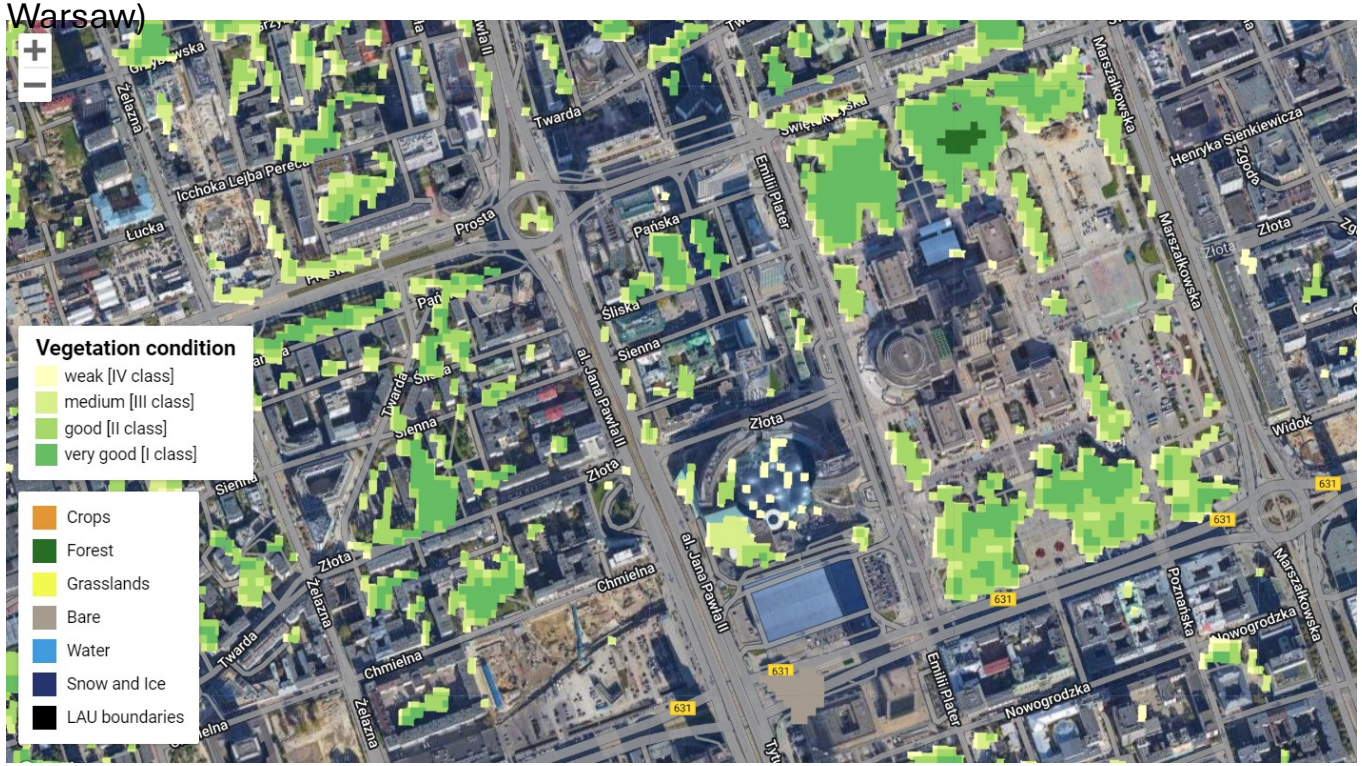
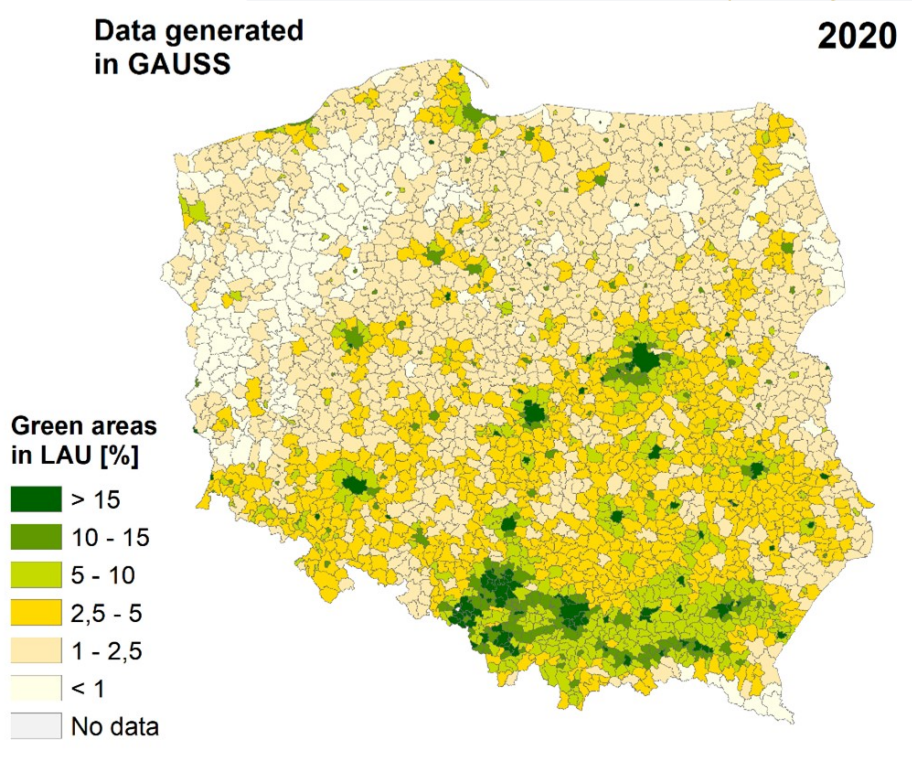
Generating Advanced Usage of Earth Observation for Smart Statistics (GAUSS)

The condition of green areas (near the Palace of Culture and Science in Warsaw)



Share of green areas in the area of communes in 2020



Źródło: https://eogauss.users.earthengine.app/view/gauss-app-2020

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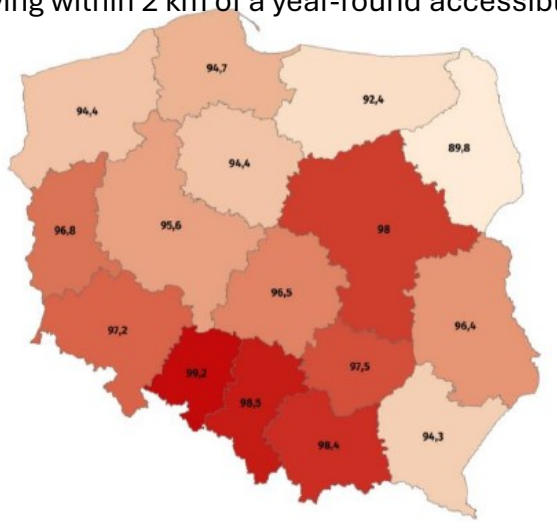
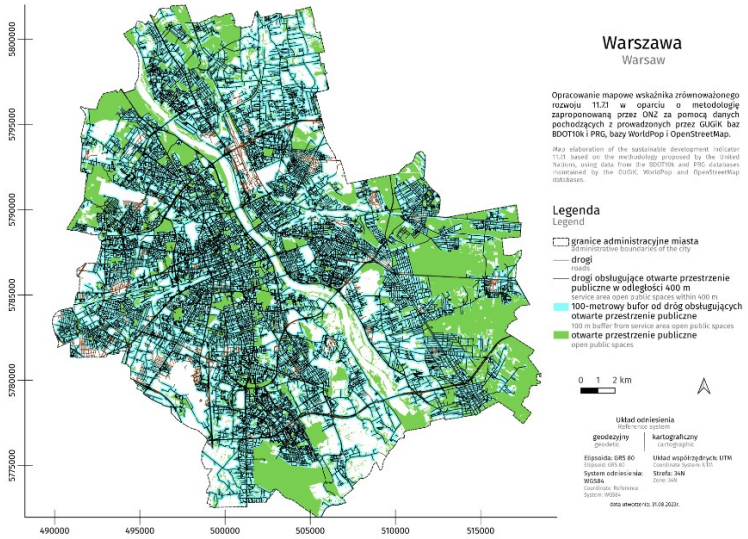
Using of satellite data for the determination of sustainable development indicators (SDGs)

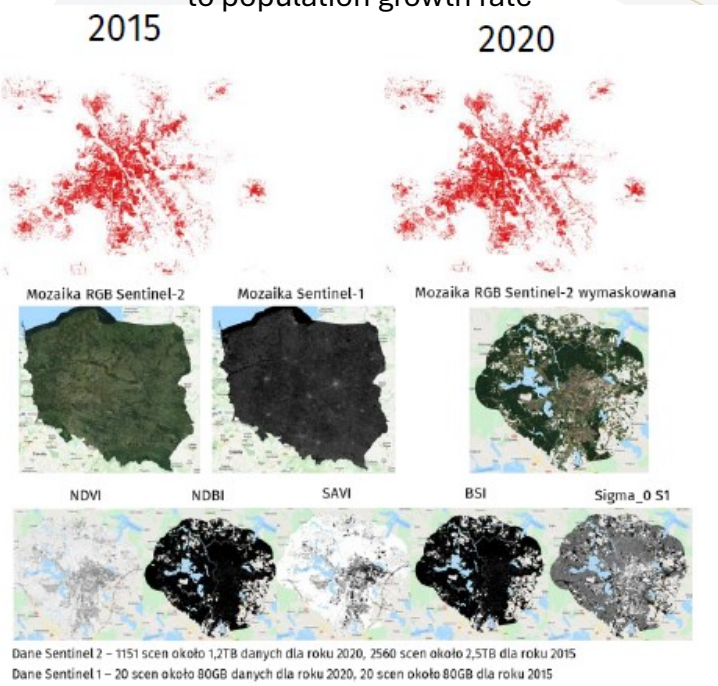
Indicator 9.1.1 – Percentage of the rural population
living within 2 km of a year-round accessible road



11.7.1 Average share of areas constituting public space
available to everyone in the total area of the city



Indicator 11.3.1 - Relation of land consumption rate
to population growth rate



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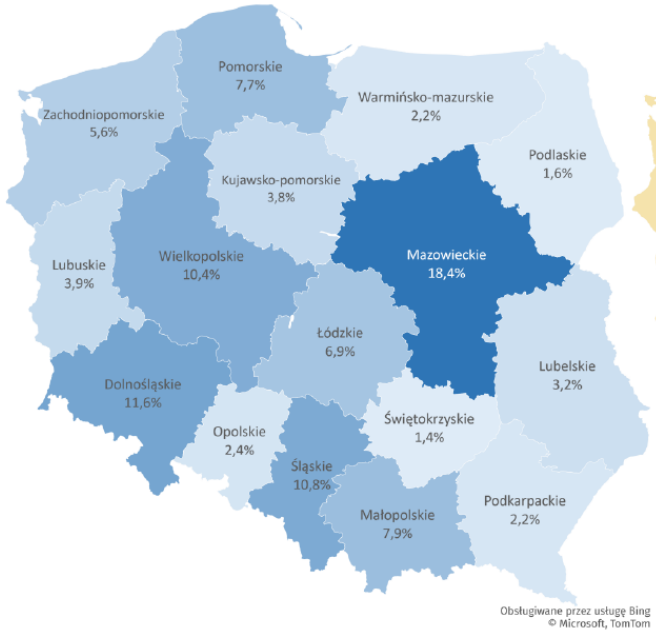
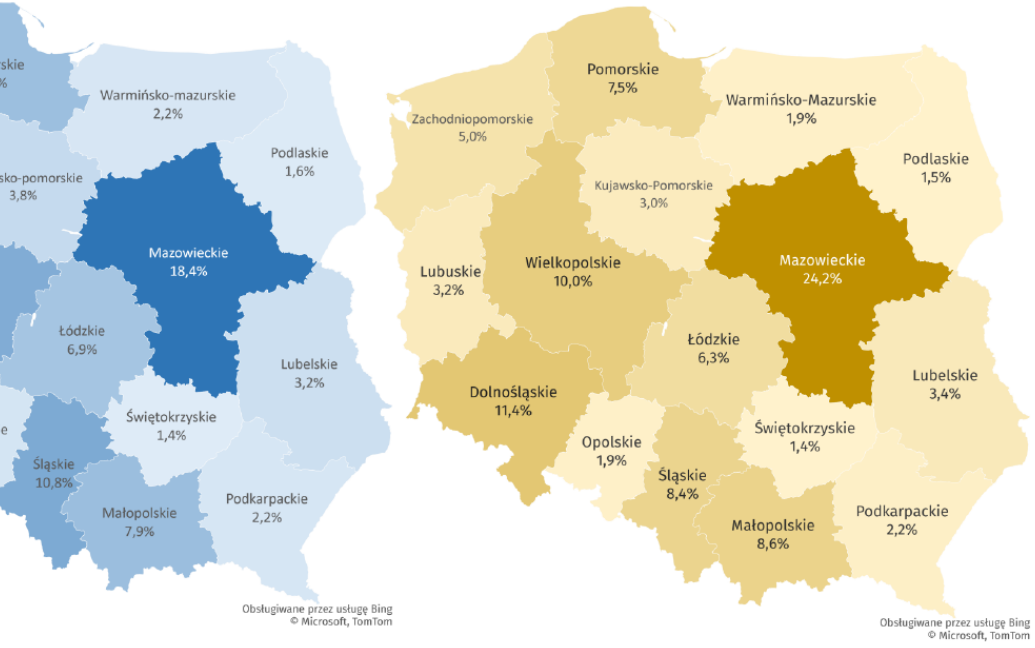
Using mobile phone data to estimate the number of refugees

Comparison of the structure of the results from mobile phone and the UKR List from the register

UKR List



Mobile phone



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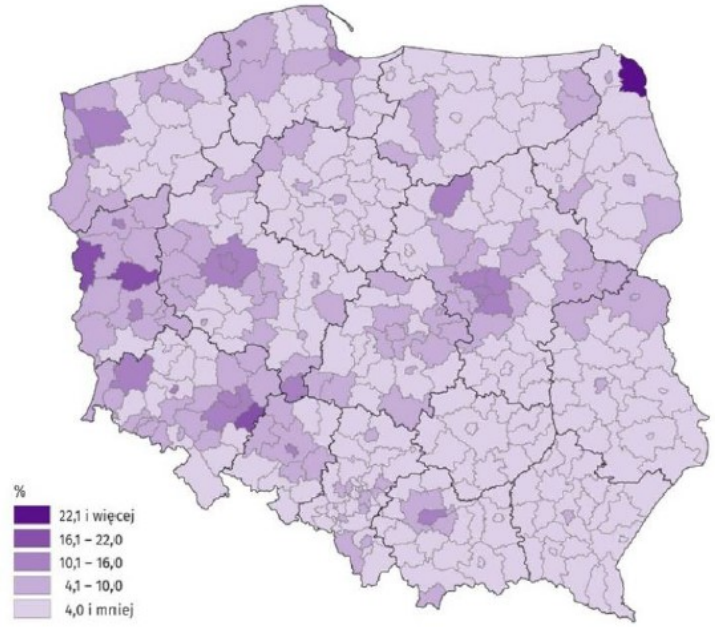
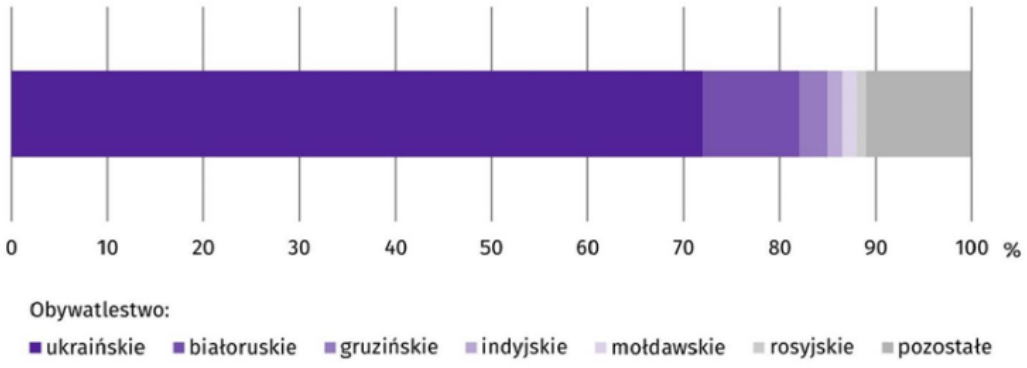
Using supervised machine learning to estimate the size of the foreigners' population and the length of their stay in Poland

Share of foreigners in the total number of people working in Poland



Structure of foreigners working in Poland by citizenship



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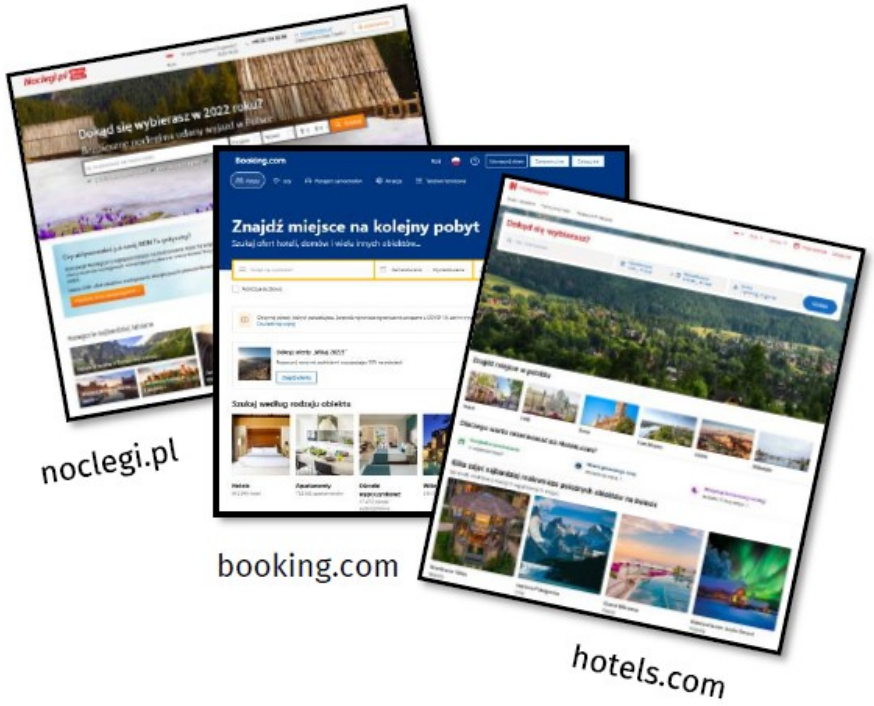
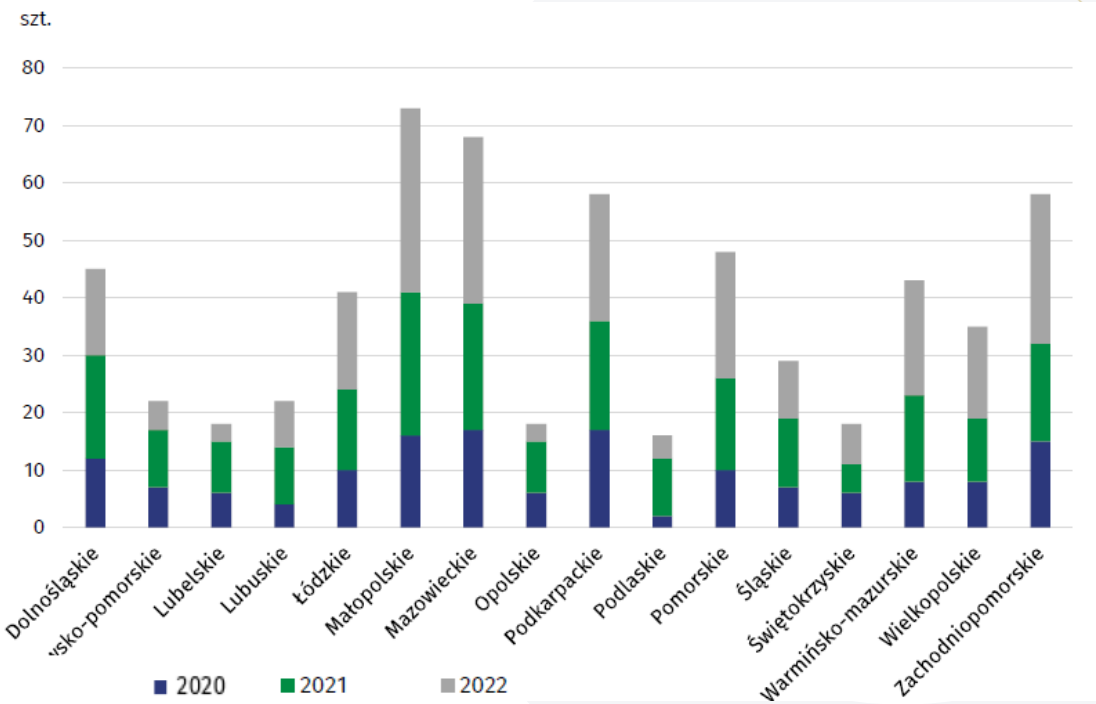
Using of web scraping in accommodation surveys (tourism statistics)





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New data sources, techniques and methods – summary

Opportunities	Reducing research costs	Reducing the burden on respondents	Reducing time to deliver data to recipients	Research new phenomena, in new cross-sections, in lower aggregations
Challenges	Cooperation with private sector data providers	Legal regulations	Integration with existing systems of official statistics	Data quality
Risks	Comparability of data	No cooperation with suppliers, fees for data access	Protection of privacy (statistical confidentiality)	Not enough information coverage

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Together we can do more!

Cooperation accelerates the transfer of knowledge and solutions
to statistics.

The main purpose is to prepare staff of NSOs to work with new sources and methods (mentoring and educational programmes).

Provision of adequate computing infrastructure (sharing of infrastructure).

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Thank you

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