Source: FORBES

AI at GUGiK – parctical use cases

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AI IN PUBLIC ADMINISTRATION – KEY NUMBERS

92,5 %
digital public services make it easier to deal with official matters

51,1 %
AI will bring more benefits to society than harm

60,4 %
the state should use artificial intelligence to create digital public services

63,2 %
The state should more strongly regulate the use of artificial intelligence in business

88 %
citizens should have more control over how their data is used by public authorities

32 %
AI can speed up and automate administrative processes and reduce the time to deliver public services

66,7 %
the state should invest more in digital public services, but only 27.2% are willing to finance these investments through tax increases

6,02 PLN (1, 40 EURO)
respondents are willing to pay per month for an application that would use AI to pre-fill forms required by a given office

Artificial Intelligence in public administration – The Polish Economic Institute, 2024

AI IN PUBLIC ADMINISTRATION – CONCERNS AND HOPES

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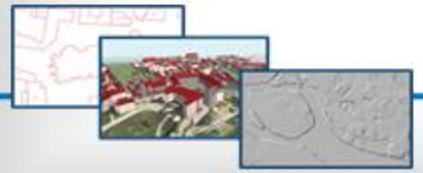
concerns about the use of AI:

- ✓ loss of privacy and threats to personal data protection
- ✓ lack of transparency of AI algorithms
- ✓ blurring of responsibility for decisions made

hopes related to the use of AI:

- ✓ improving public services and reducing waiting times
- ✓ improving accessibility of services for people with disabilities
- ✓ reducing Human Errors
- ✓ automation Repetitive Tasks and Processes
- ✓ Smoothly handles Big Data
- ✓ AI-Enabled Digital Assistants
- ✓ it is Full-Time Available



GeoChatbot in geoportal service

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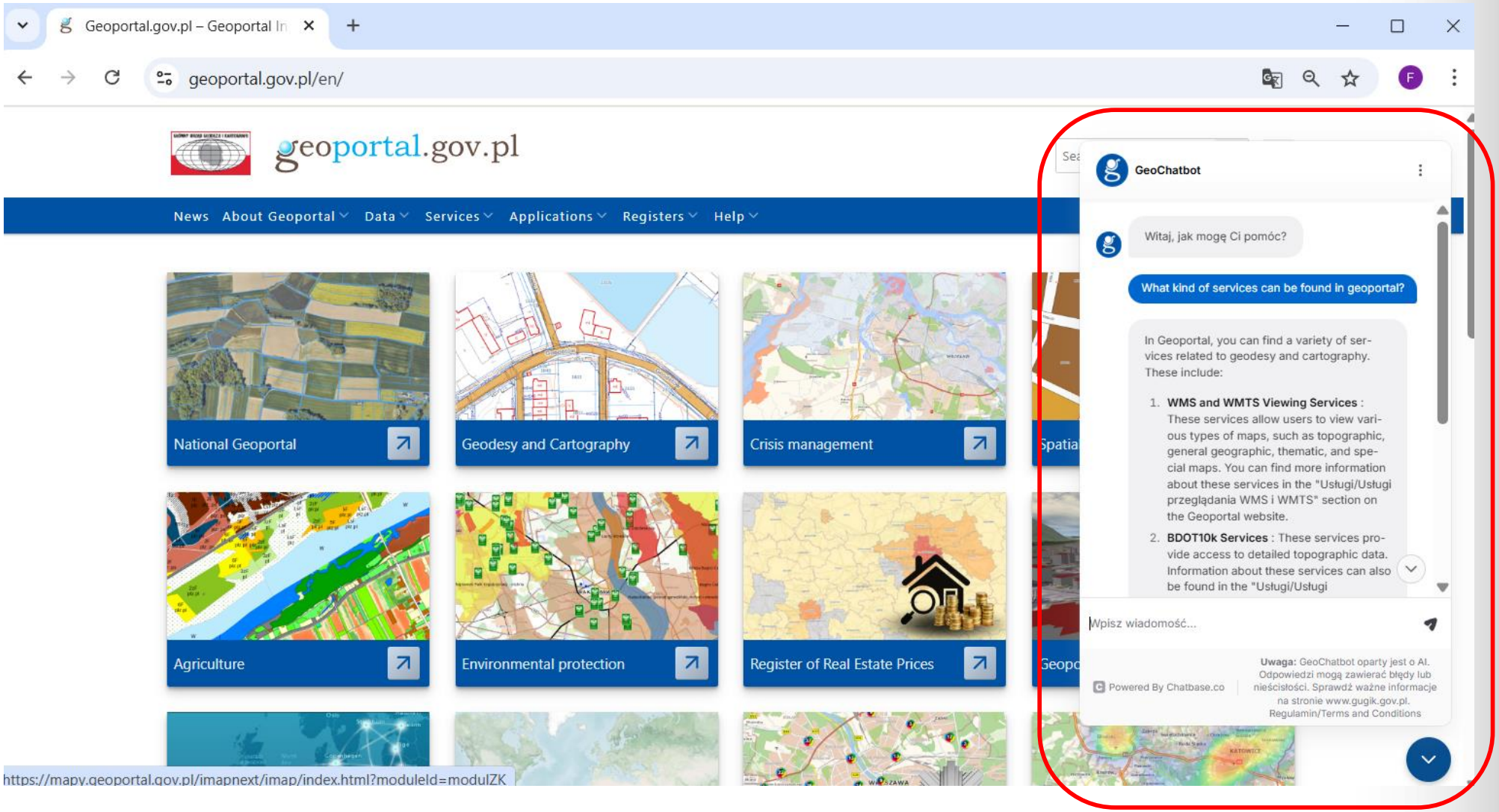
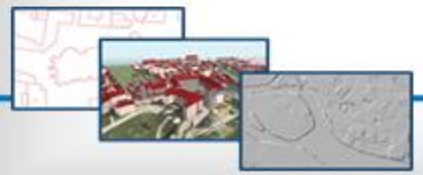
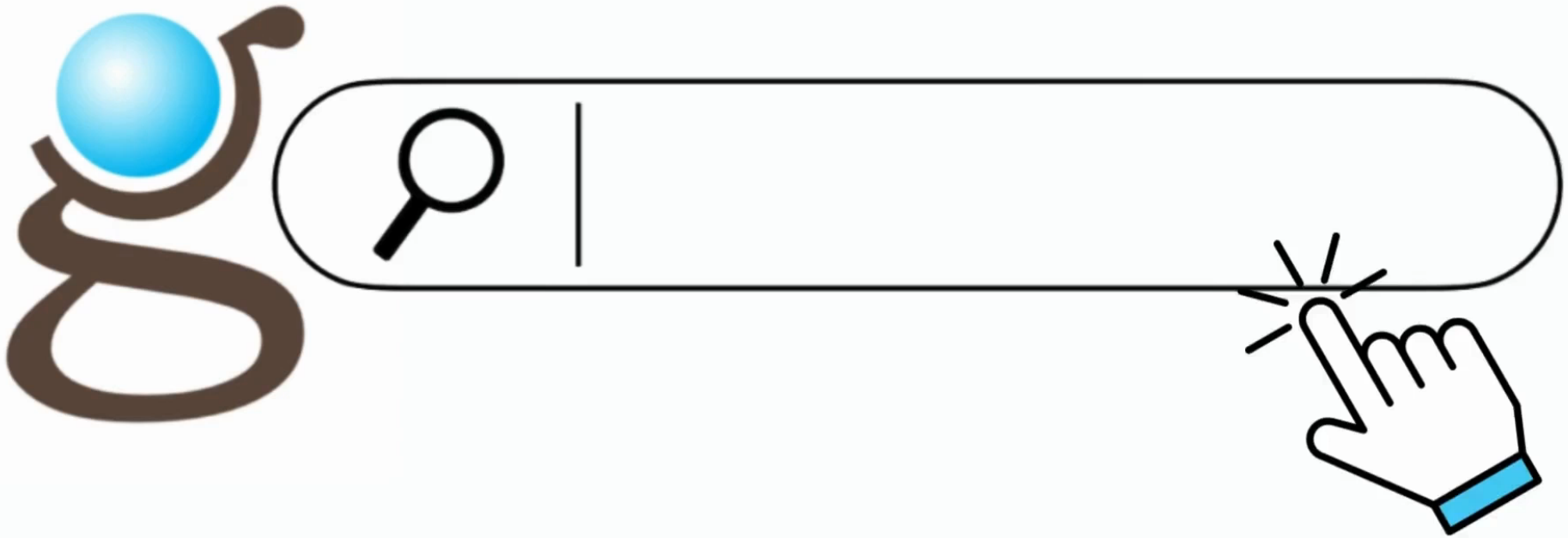
Digital Assistants based on AI technology

- ✓ AI-based chatbots reduce the need for unnecessary customer service staff.
- ✓ Helps in addressing routine and simple customer queries.
- ✓ Chatbot smartly handle customers and provide timely and accurate information on demand.



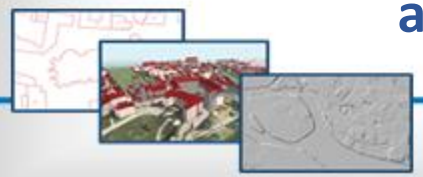


GeoChatbot in geoportal service



AUTOMATIC DETECTION OF TOPOGRAPHIC OBJECTS

- ✓ Program: **The INFOSTRATEG project is implemented by the National Center for Research and Development.**
- ✓ Estimated budget: **40 mln PLN (~ 8,6 mln EUR)**
- ✓ Project goal: **creation of tools based on artificial intelligence algorithms enabling automatic detection of topographic objects using photogrammetric data.**



Expected effects:

- ✓ automation of the BDOT10k database update process
- ✓ reduction of public funds expenditure
- ✓ shortening of update time
- ✓ increasing the frequency of register updates
- ✓ improvement of the database quality (enabling constant access to reliable data for citizens, services and institutions using the database to carry out tasks related to, among others, crisis management, spatial planning, environmental analyses and investment processes

AUTOMATIC DETECTION OF TOPOGRAPHIC OBJECTS

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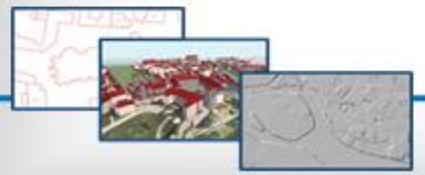
Project steps:

	phase I	phase II	phase III
training data preparation	buildings, structures and facilities communication network	land development network land cover water network	complete training data for all BDOT10k classes
model training level	min. 85%	min. 90%	min. 85% / min. 95%
initial application	initial application enabling the launch of object detection for the indicated BDOT10k categories and generating reports with the appropriate statuses: "new object", "changed object", "identical object"		final version of the application
technical documentation			full technical documentation with instructions and directions for model and application development



AUTOMATIC DETECTION OF TOPOGRAPHIC OBJECTS

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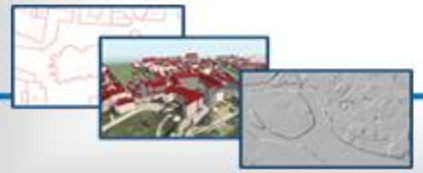
phase I

contractor 1: PROA TECHNOLOGY Sp. z o.o, LPE POLAND Sp. z o.o

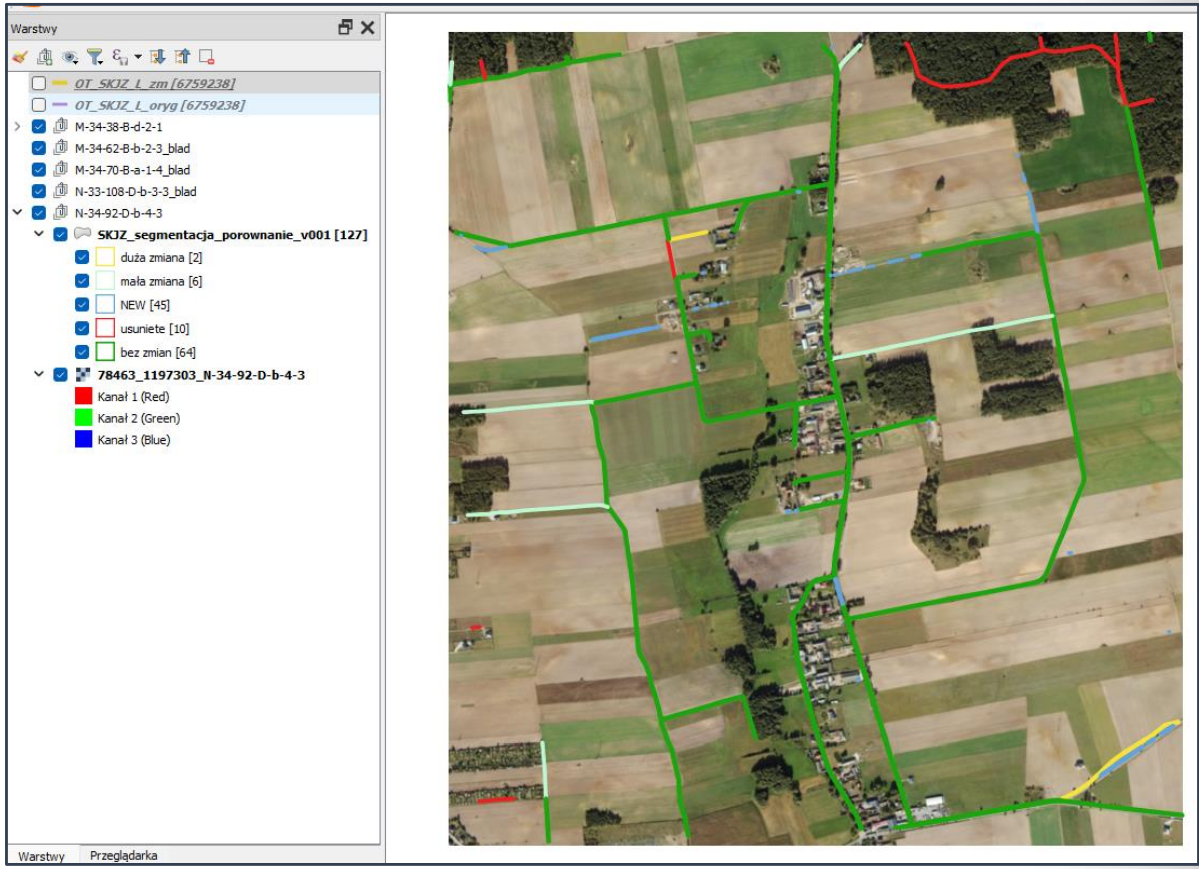
- ✓ ADEPT application with graphical user interface (GUI)
- ✓ detection level:
  - above 80% - 3 classes
  - 50% - 70% - 11 classes
  - 0% - 1 class
  - not included in the application - 9 classes
- ✓ detection time less than 3 min for an area of 5 km2



phase I

contractor 2: GISPRO TECHNOLOGIES Sp. z o.o., Maritime University of Technology in Szczecin

- ✓ GUI application in the form of 4 plugins for QGis
- ✓ detection level:
  - above 80% - 3 classes
  - 40% - 50% - 18 classes
  - 0% - 2 classes
  - not included in the application - 1 class
- ✓ detection time less than 3 min for an area of 5 km^2



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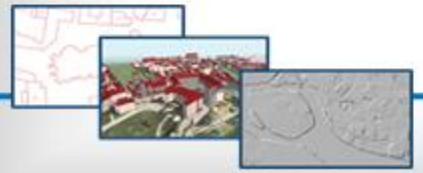
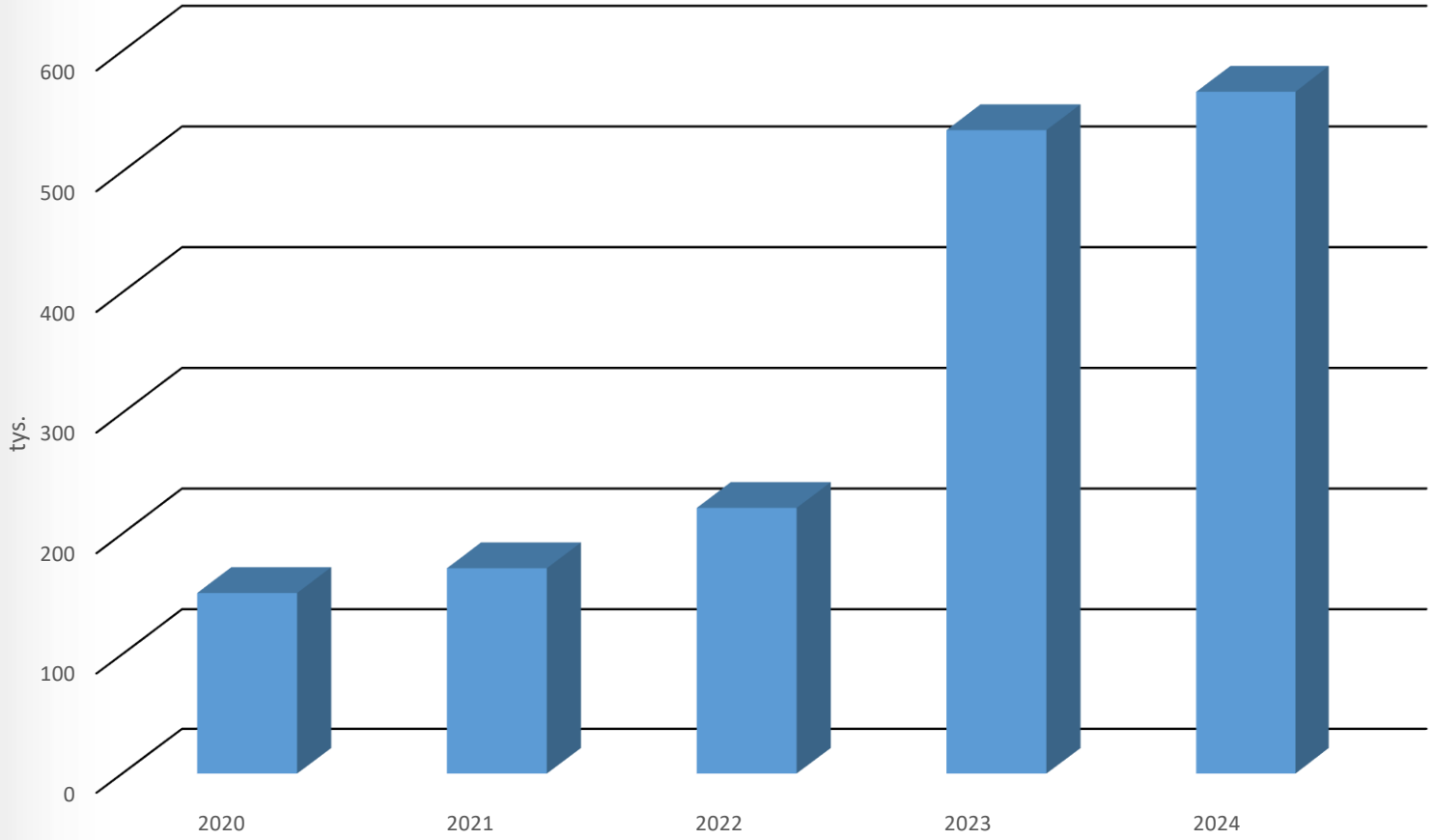
phase I

contractor 3: REASONFIELD LAB Sp. z o.o, University of Łódź

- ✓ linux-based GEOAI application
- ✓ detection level for areas smaller then 5 km2 :
  - above 80% - 2 classes
  - not included in the application - 22 classes
- ✓ no possibility to specify the detection time (the application does not perform a comparison for an area of 5 km2)

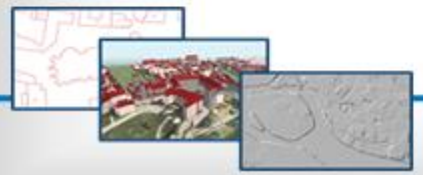


CertiFlAI – QUALITY CONTROL OF AERIAL IMAGES



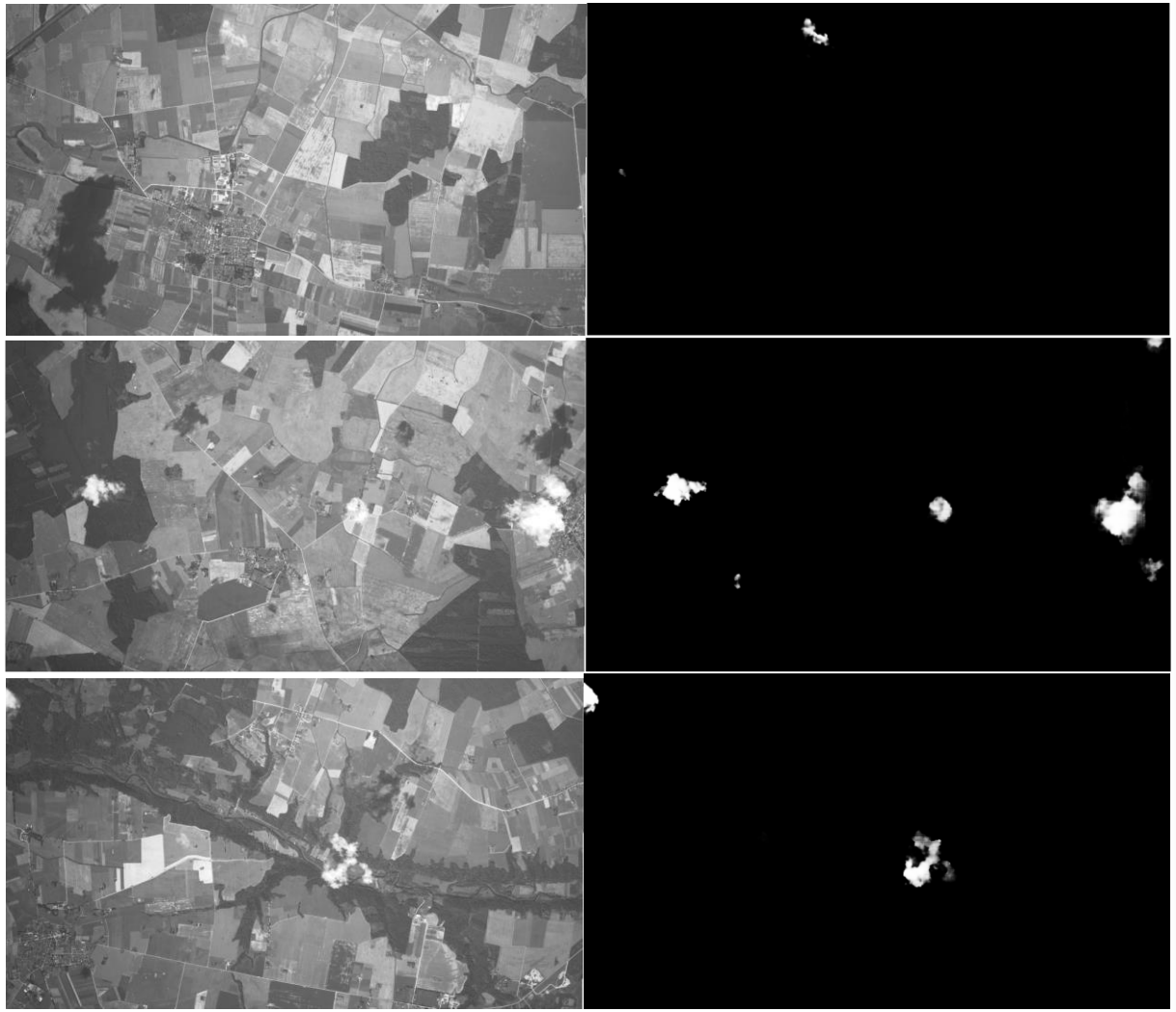
The number of aerial images taken is growing in an exponential rate due to:

- ✓ the lower GSD,
- ✓ more frequent data acquisitions, new aerial platforms and sensors (oblique cameras)
- ✓ new products that requires higher overlaps (true-ortho, 3D meshes).



CertiFlAI – QUALITY CONTROL OF AERIAL IMAGES

Examples of images with clouds (left)
and corresponding probability images
that predict the artificial neural network (right).



Examples of photos with discoloration

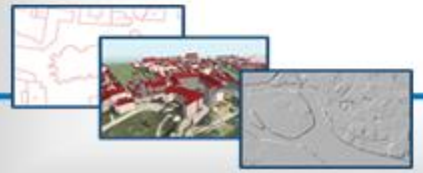
Example of a blurred image detected (left)

Example of reflectors, burn-in

Key technical challenges:

- ✓ Huge diversity of aerial images. The requirement for the solution to be effective for all photos taken, regardless of the pixel size, type of land cover, season, or the angle of the sun's rays.
- ✓ Errors occurring in the photos also vary in appearances. For example, clouds can have any shape, size, and thickness, which means that the image of the Earth's surface may be completely obscured or partially visible through the cloud.
- ✓ Lack of large-scale training data, more than 98% of images delivered are without errors.

The basic condition for the development of an effective model of radiometric QA in aerial photos based on machine learning techniques is the **preparation of a sufficiently large and varied set of training data**. The training was done on more than 10 thousand aerial images.



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- ✓ **Blur**

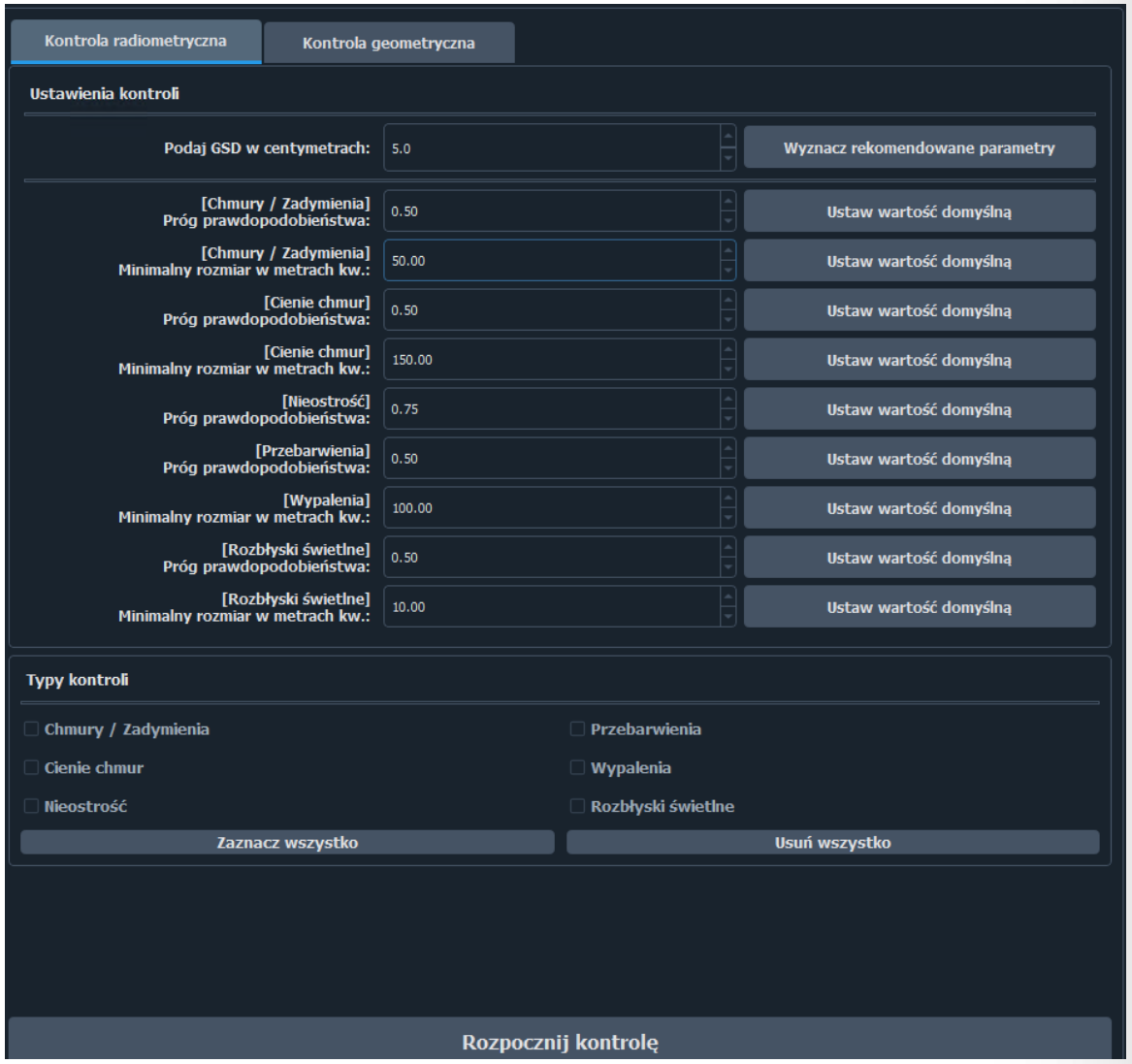
Deep learning model uses full resolution of the image to detect even small blur

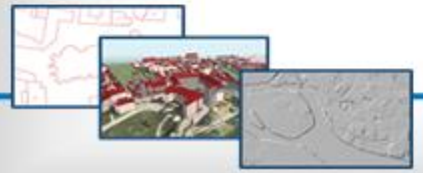
- ✓ **Radiometric errors**

Detection of discoloration, burn-in and glare, reflectors

- ✓ **Clouds, clouds shadows and smoke**

Important feature can be obstructed by such elements, so it is important to correctly asse their impact on the datasets





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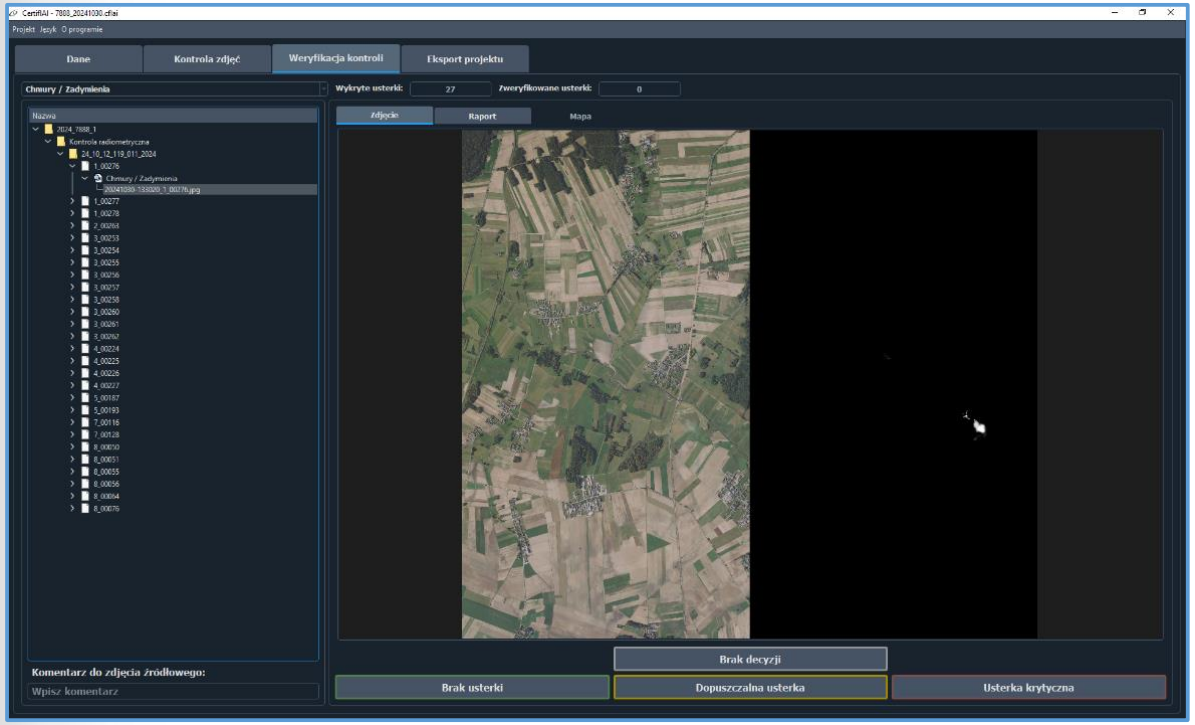

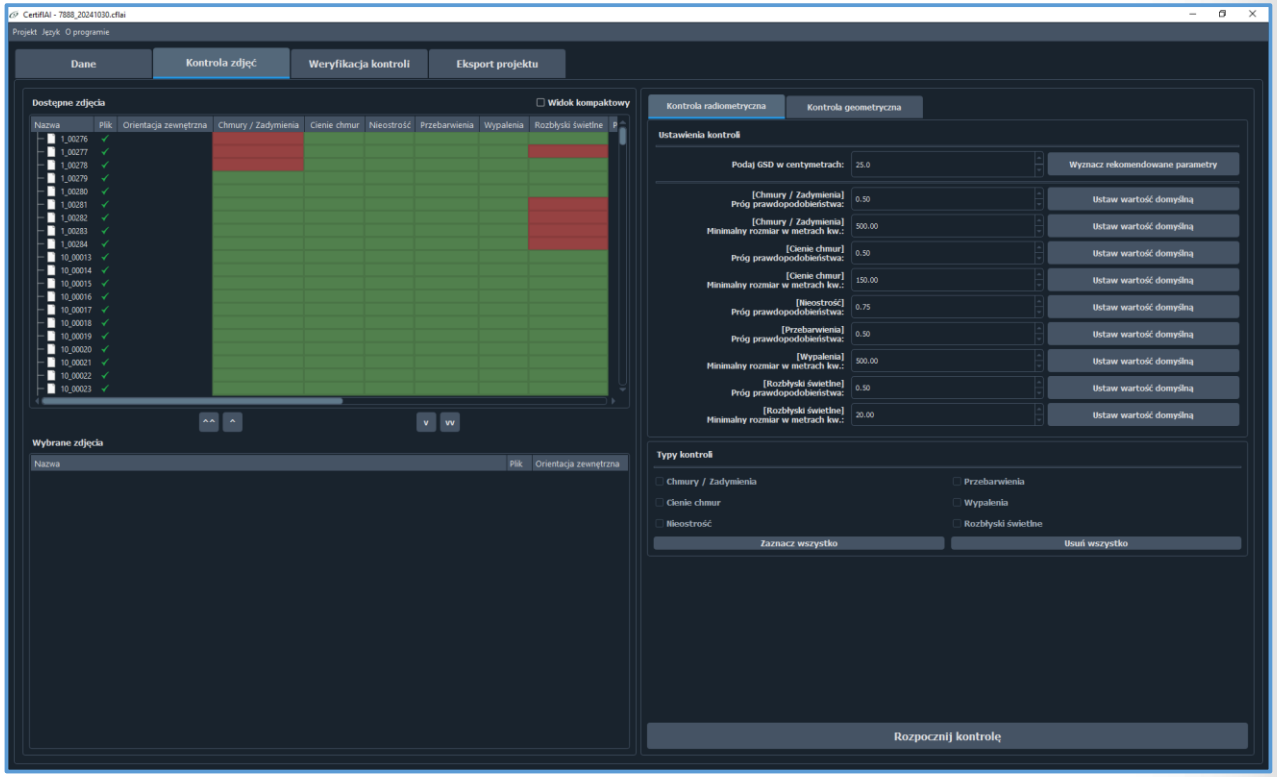

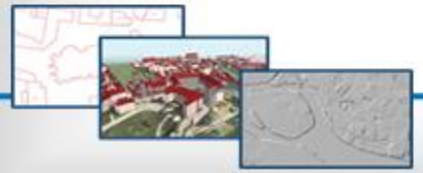

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APPLICATION FOR THE RECOGNITION OF TEXT AND SIGNS FROM SOIL MAP

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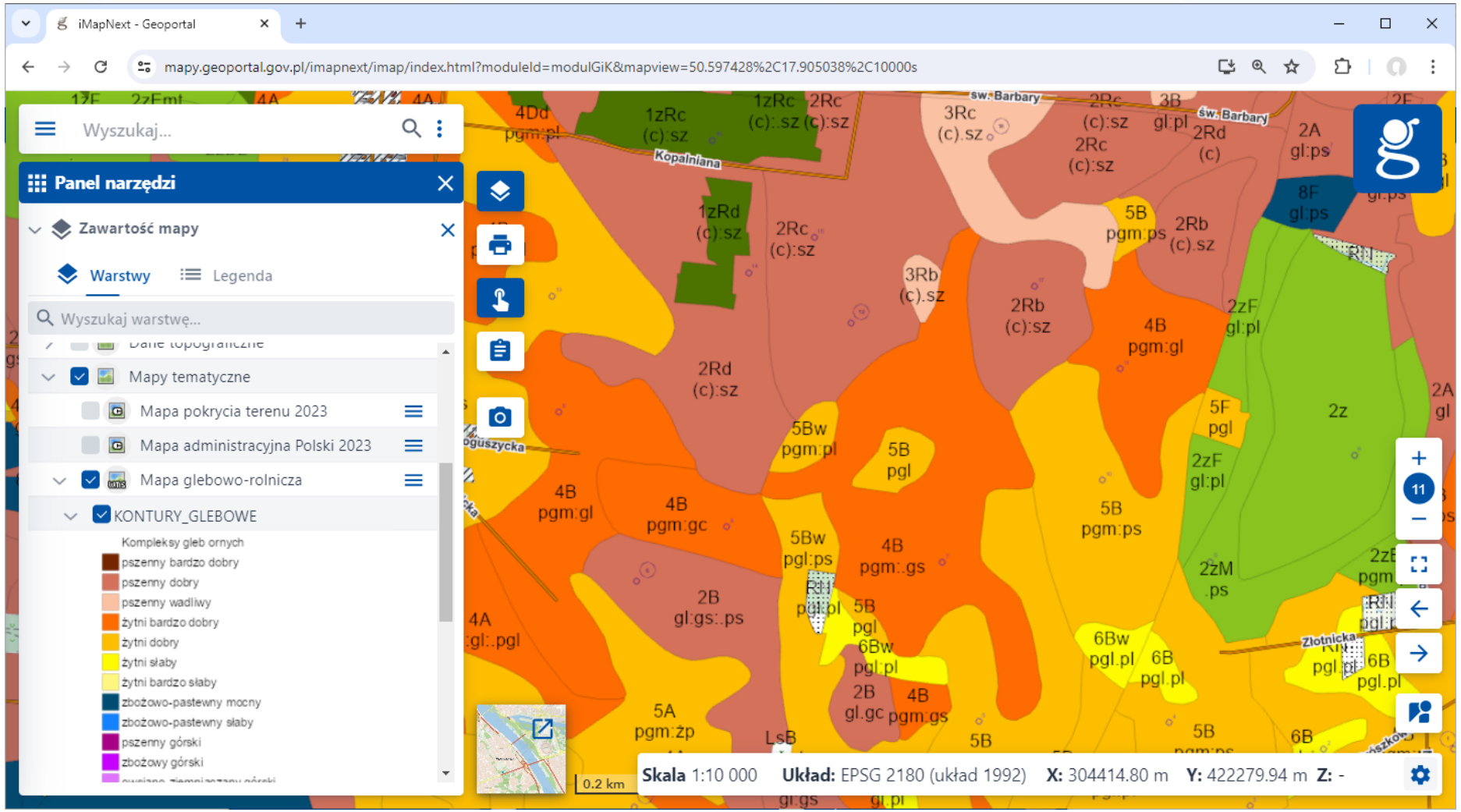
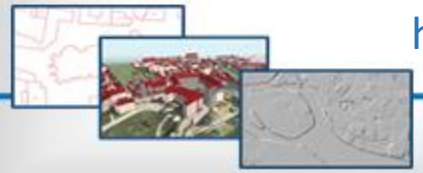
WMS

WMTS



https://mapy.geoportal.gov.pl/wss/service/pub/guest/MapaGlebowoRolnicza/MapServer/WMSServer



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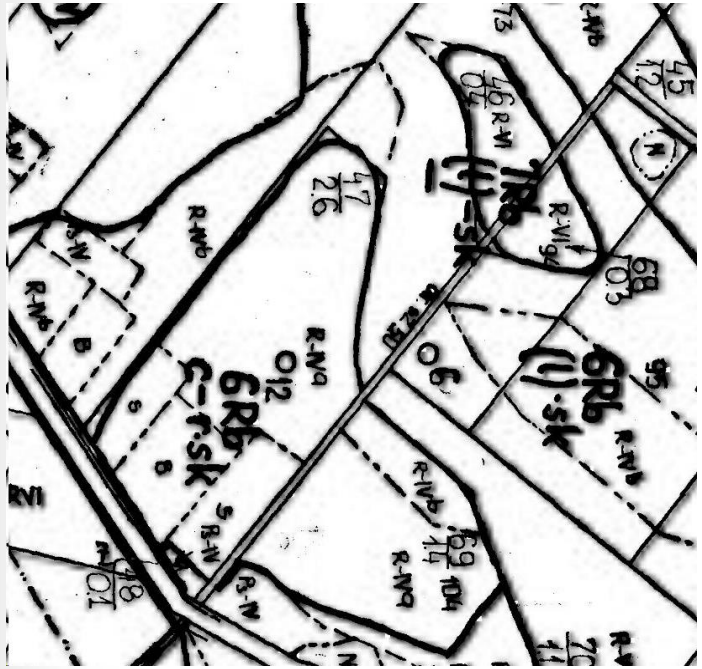

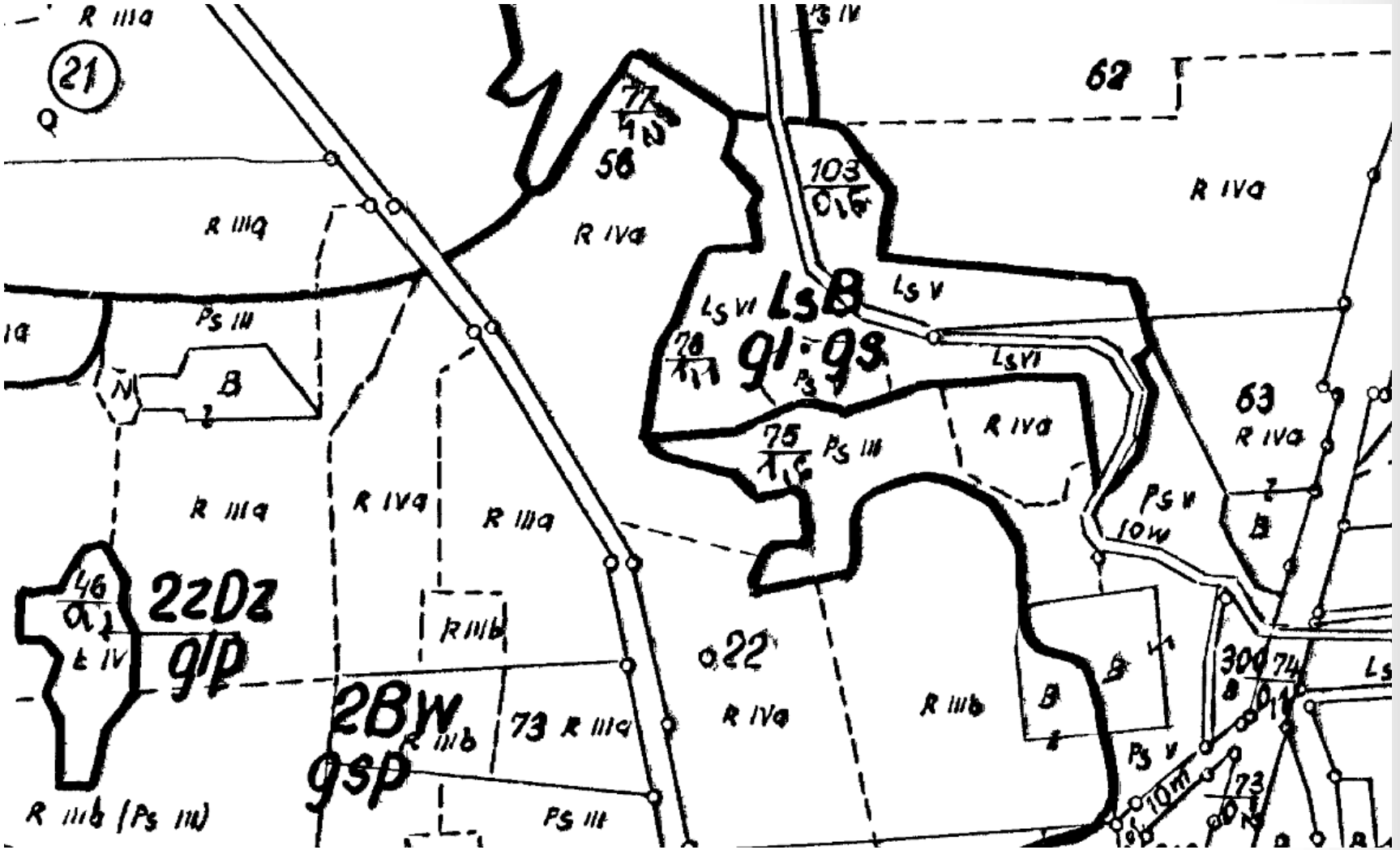

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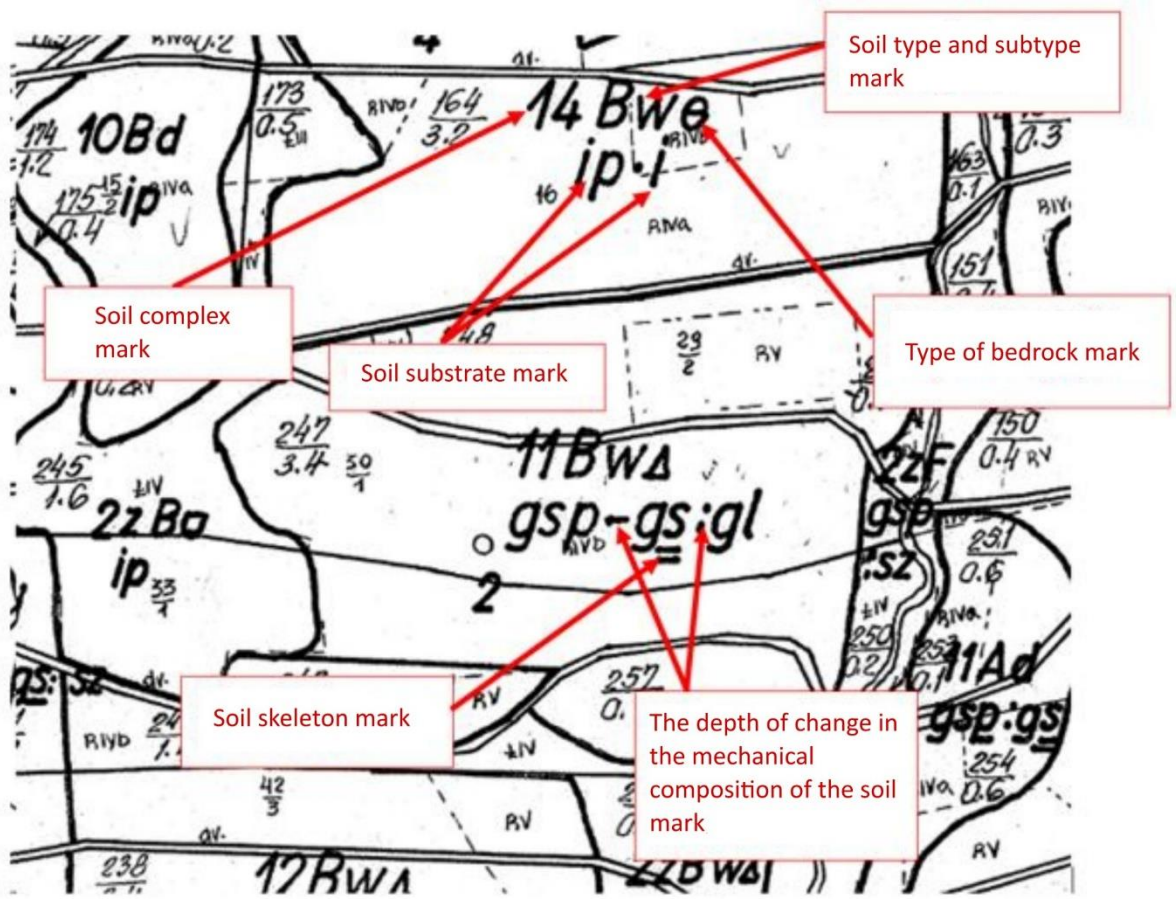
CONTENT OF THE SOIL MAP 1:5000



OZNACZENIA

KOMPLEKSY

1 – kompleks pszenny bardzo dobry
2 – kompleks pszenny dobry
3 – kompleks pszenny wadliwy
4 – kompleks żytni bardzo dobry
5 – kompleks żytni dobry
6 – kompleks żytni słaby
7 – kompleks żytni najsłabszy
8 – kompleks zbożowo-pastewny mocny
9 – kompleks zbożowo-pastewny słaby
14 – gleby orne przeznaczone pod użytki zielone
1z – użytki zielone bardzo dobre i dobre
2z – użytki zielone średnie
3z – użytki zielone słabe i bardzo słabe
RN – gleby rolniczo nieprzydatne nadające się pod zalesienie
Tz – tereny zabudowane o zwartej zabud.
Ls – lasy
W – wody
WN – wody nieużytki
N – nieużytki rolnicze

TYPY

A – gleby bielicowe i pseudobielicowe
B – gleby brunatne właściwe
Bw – gleby brunatne wyługowane i brunatne kwaśne
D – czarne ziemie właściwe
Dz – czarne ziemie zdegradowane i gleby szare
F – mady
G – gleby glejowe
E – gleby mułowo-torfowe i torfowo mułowe
T – gleby torfowe i murszowo-torfowe
M – gleby murszowo-mineralne i murszowate

RODZAJE I GATUNKI

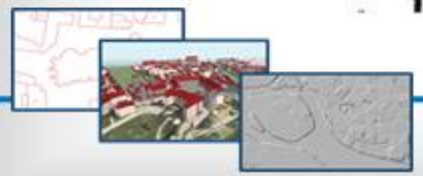
ż – żwiry piaszczyste
żg – żwiry gliniaste
pl – piaski luźne
ps – piaski słabo gliniaste
pgl – piaski gliniaste lekkie
pgm – piaski gliniaste mocne
gl – gliny lekkie
gs – gliny średnie
gc – gliny ciężkie
płz – pyły zwykłe (gleby pyłowe lekkie i śr.)
płi – pyły ilaste
ls – lessy i utwory lessowate, gleby lessowe i lessowate lekkie i średnie
li – lessy ilaste-gleby lessowe i lessowate mocne
ip – ity pylaste (gleby ilaste – ciężkie i średnie)
i – ity (gleby ilaste bardzo ciężkie)
p – oznaczenie pylastości gleb

RODZAJE GLEB TORFOWYCH I TORFOWO-MUŁOWYCH

n – torfy niskie
mt – gleby mułowo-torfowe
tm – gleby torfowo-mułowe

OZNACZENIA DODATKOWE

· – podłoże zalega płytko (do 50 cm)
: – podłoże zalega średnio głęboko (50-100 cm)
∴ – podłoże zalega głęboko (100-150 cm)
○ 2 – lokalizacja i numer odkrywki opisanej przez redaktora terenowego
○ (3) – lokalizacja i numer odkrywki, z której pobrano próbki do analiz
2 – numer konturu
5,2 – powierzchnia
≈ – gleba podlega zalewom rzecznym.



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APPLICATION FOR THE RECOGNITION OF TEXT AND SIGNS FROM SOIL MAP

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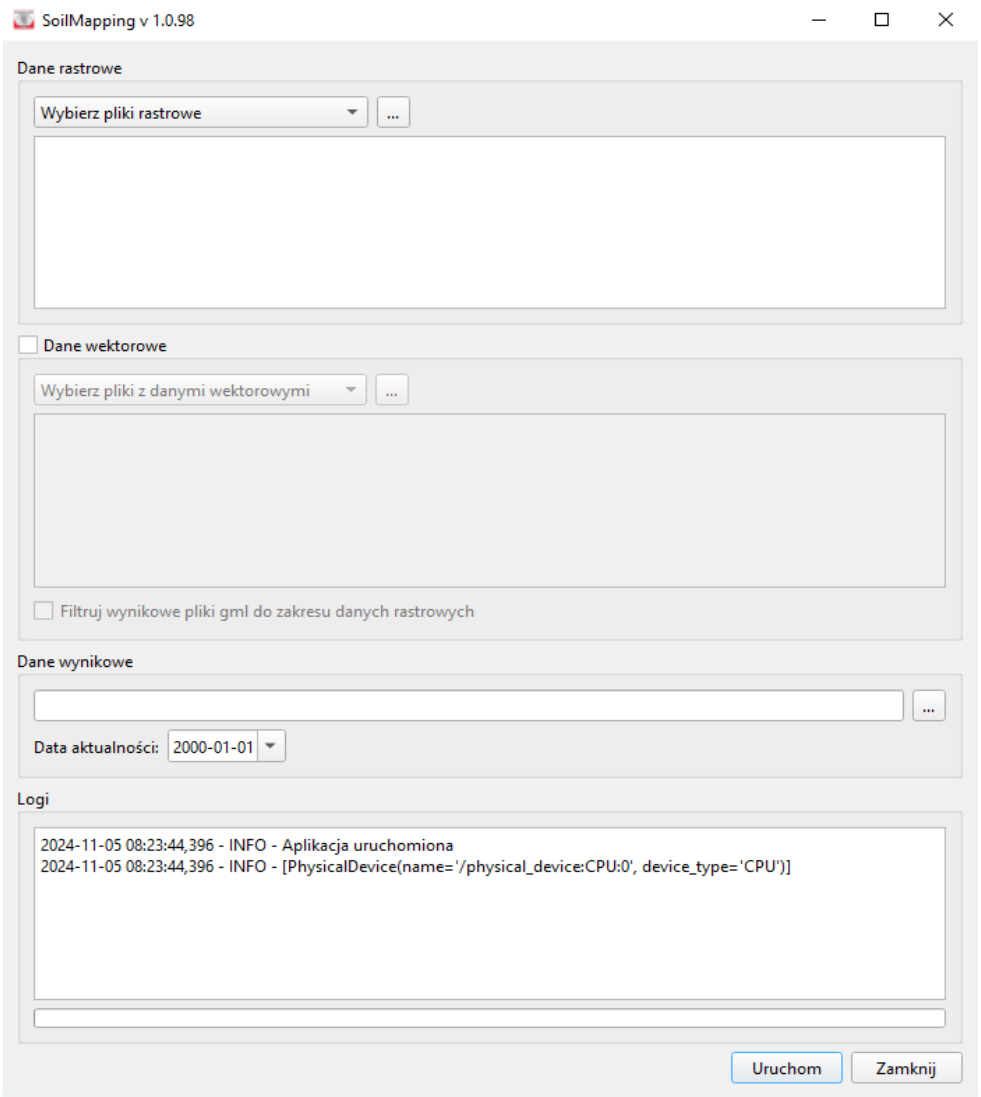
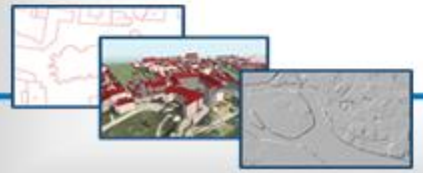
The input data:

- ✓ georeferenced raster data in GeoTIFF format in the coordinate system EPSG:2180.
- ✓ vector data on soil contours and outcrops in GML, XML and SHP format (optional).





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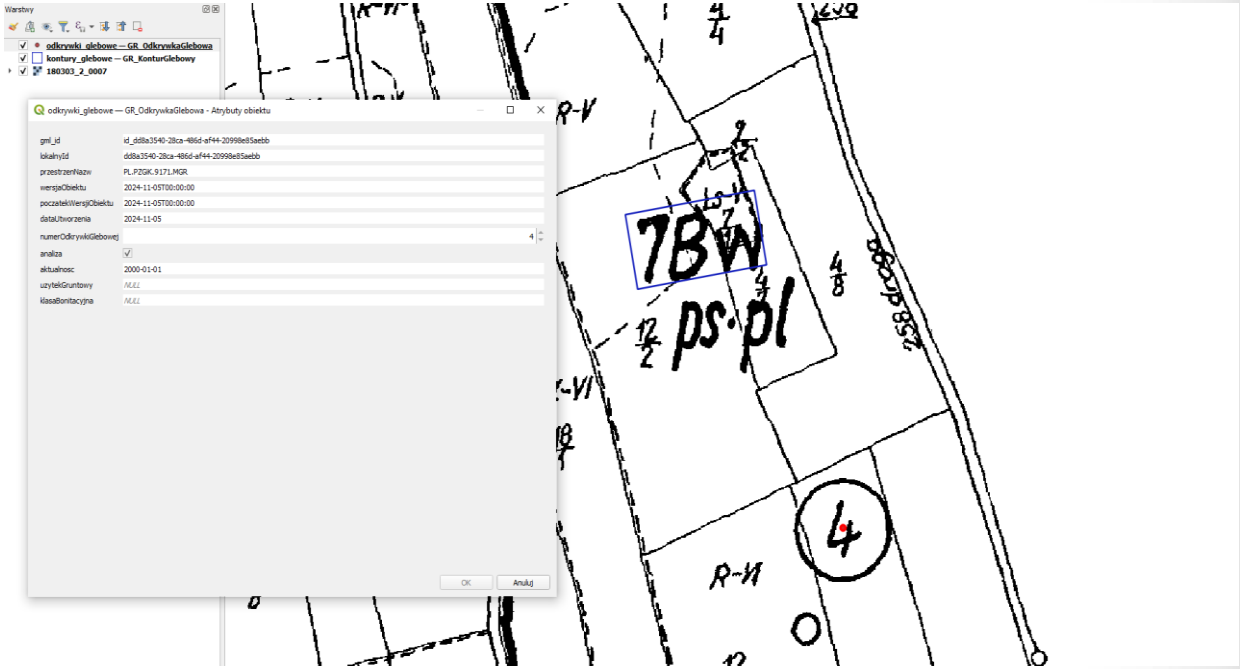
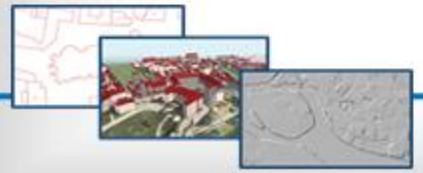
Soil contours:

Soil outcrops:





- ✓ The application uses the developed machine learning models trained on a very large volume of training data (**The Convolutional Neural Network (CNN)** architecture of the U-Net).

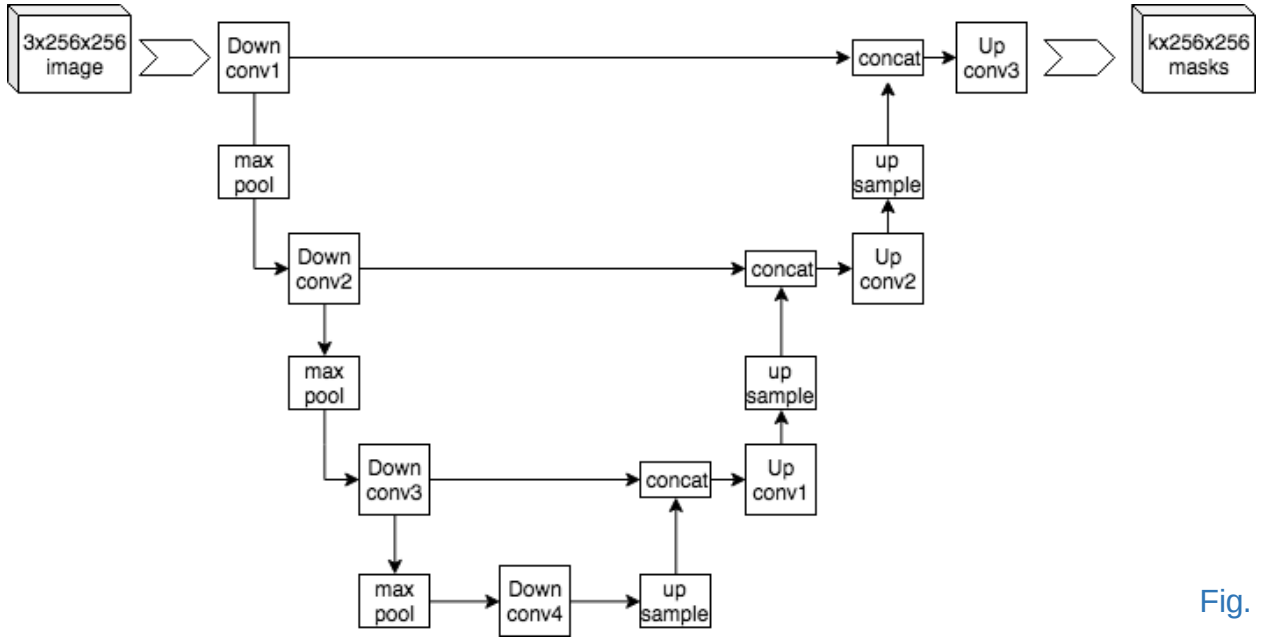


Fig. Source: https://en-m-wikipedia-org

Source: FORBES

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