QAOCDI: DEEP LEARNING STRIKES AT ORTHOPHOTOS ANALYSIS AS NEVER BEFORE

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Have you ever wondered what is the simplest way to process orthophoto with a custom neural network model? Keep reading to find the answer!

What is it about?

An orthophoto is an aerial photograph - Earth's surface image from a satellite or UAV (unmanned aerial vehicle). With a bird's eye view, one can see a bigger picture of our society and environment - from inspection of agricultural crops, through monitoring of rivers to counting buildings in a city. Although it may seem like a simple problem, processing of orthophoto is quite challenging due to the geospatial nature of the data. To facilitate this process, we present an open-source QGIS plugin for neural processing called Deepness.

Should I care about QGIS?

QGIS is a desktop geographic information system (GIS) application. It supports viewing, editing and processing of geospatial data like maps, satellite or UAV data, with multiple integration tools. Key features of QGIS:

- raster, vector and mesh data support
- multiple coordinate systems and on-the-fly reprojection
- temporal support
- customization and extensibility with external plugins written in *Python*
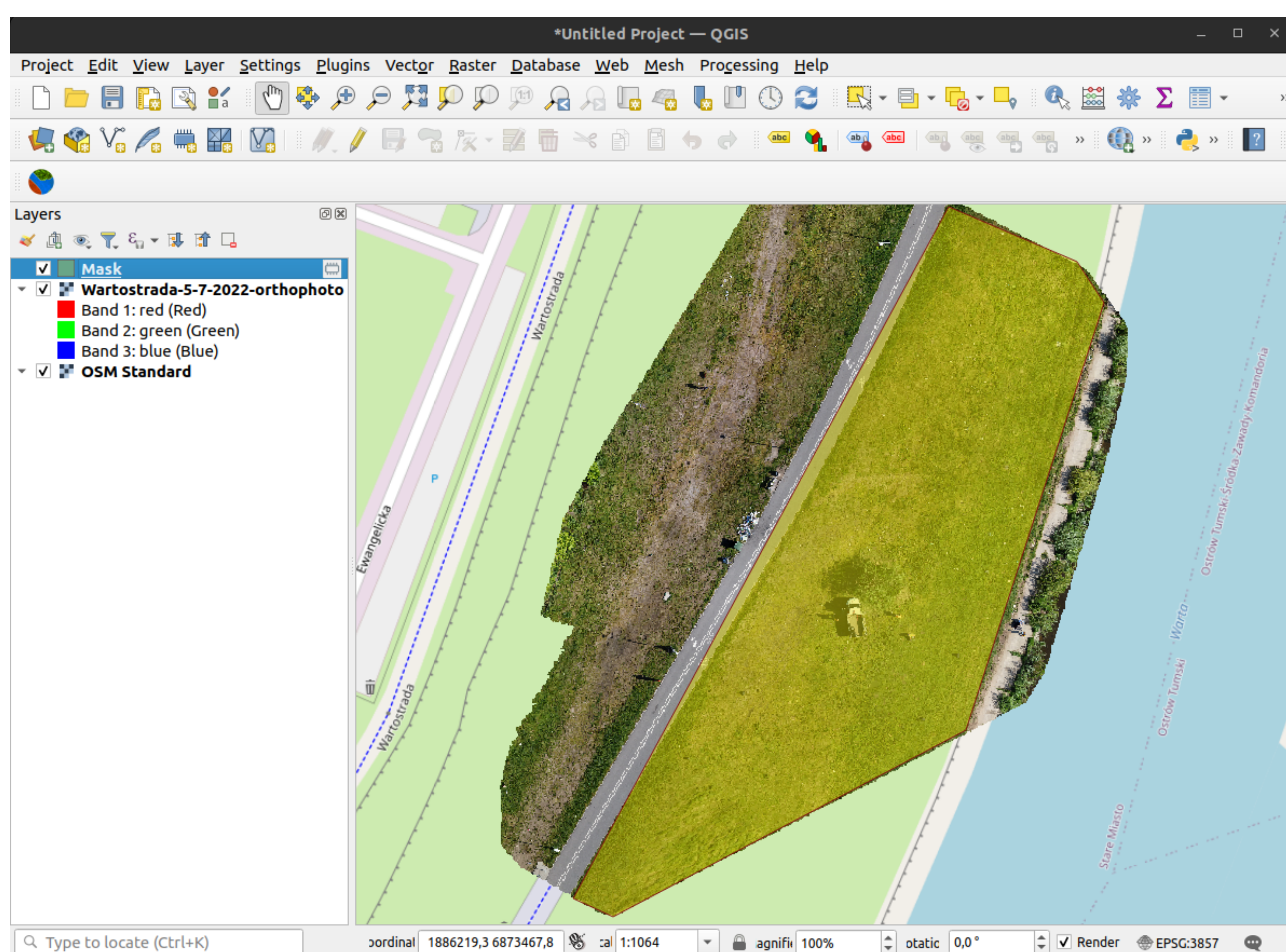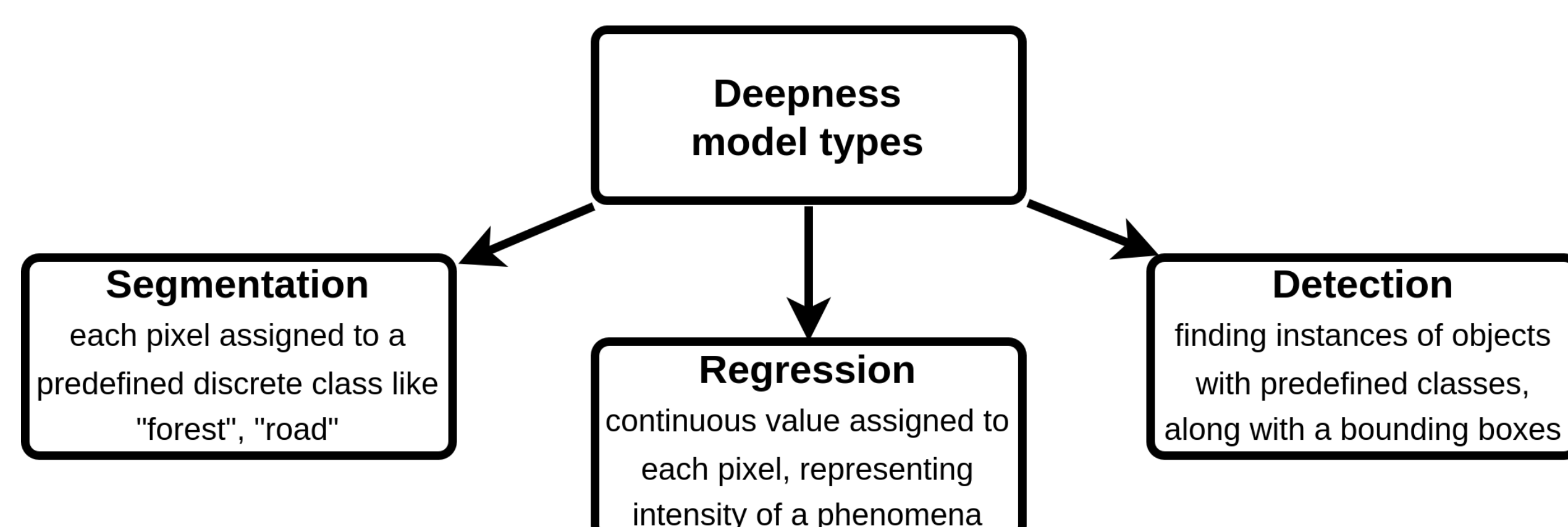- it's free and open-source!

Figure 1: Example view of QGIS application interface. Part of Poznań (near the river) mapped with UAV, overlayed on Open Street Maps.

Deepness: Deep Neural Remote Sensing Plugin

We present Deepness - a QGIS plugin to easily process any ortophoto data with neural networks. The plugin is targeted at casual QGIS users (like civil servants and geologists), who might not even hear about machine learning. All they need to know is to open the orthophoto, select an appropriate neural model and click "Run"! The plugin does the processing, stitching of intermediate data and presenting of the results. While simplifying the inference, the creation of the model is still left to the professionals.

Key features of the Deepness plugin:

- easy-to-use not only for developers
- support for ONNX models
- seamless integration with QGIS layers
- processing parametrization for advanced users (resolution, overlap, etc.)
- free and open-source (scan our QR-code to find more)
- model ZOO, to share solutions!

Figure 2: Left column: corn field with areas damaged by wildlife (UNet++). Right column: land cover segmentation (DeepLabV3+)
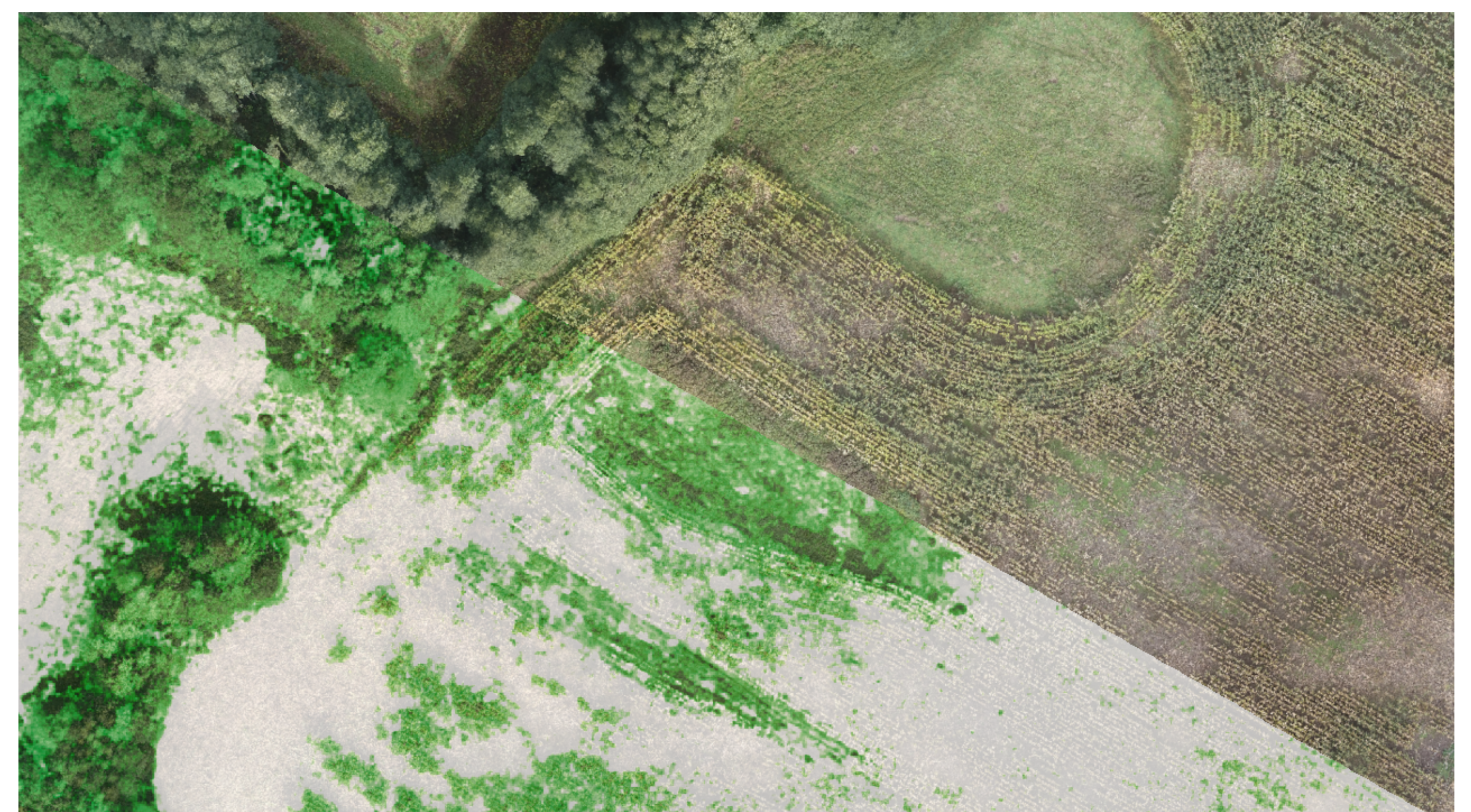

Figure 3: Agricultural field divided along diagonal. Right side: original ortophoto. Left side: Vegetation index regression, showing crops quality

Figure 4: Left: oil storage tanks detection in Gdańsk on Bing Aerial View (YOLOv5). Right: Airbus planes detection in Poznań Airport on Google Satellite (YOLOv7)