# Artificial intelligence in ERS data processing

JSC TERRA TECH develops algorithms for automated recognition of various objects (buildings and structures, pits, logged lands, burnt areas, dumps and others) with the use of high- and ultra-high-resolution satellite images and employs latest IT advancements and technologies:

- big data
- artificial intelligence
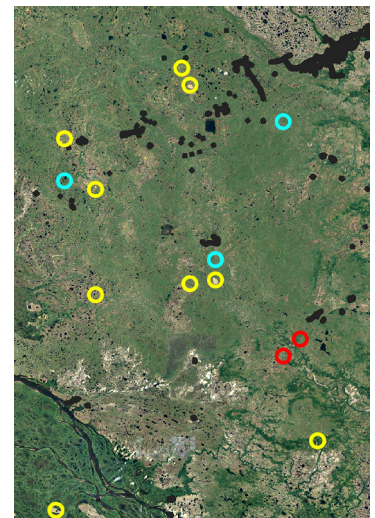- neural networks
- machine learning

Training and application of neural networks

Inventory of pits in the construction area

Training sample

gravel

break-stone

sand

Road junction construction
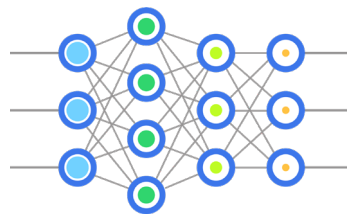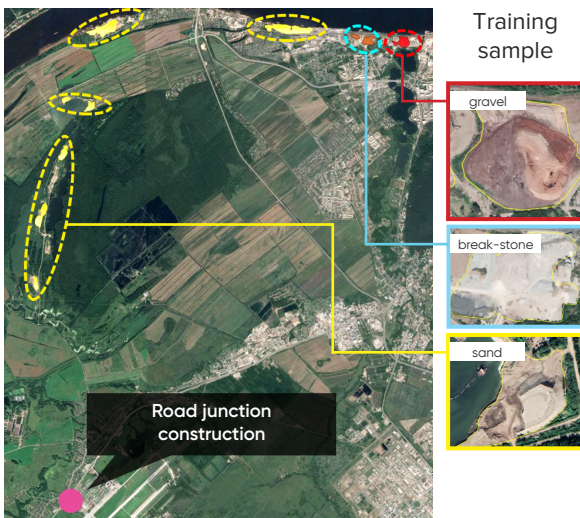
ARTIFICIAL NEURAL NETWORK

Getting a thematic map of a pits

Machine learning algorithms based on convolutional neural networks automatically recognize objects of interest, classify them and generate information about their quantitative and qualitative characteristics.

Various neural network architectures were used to build Intelligent object recognition modules that enable automatic recognition of several groups of objects:

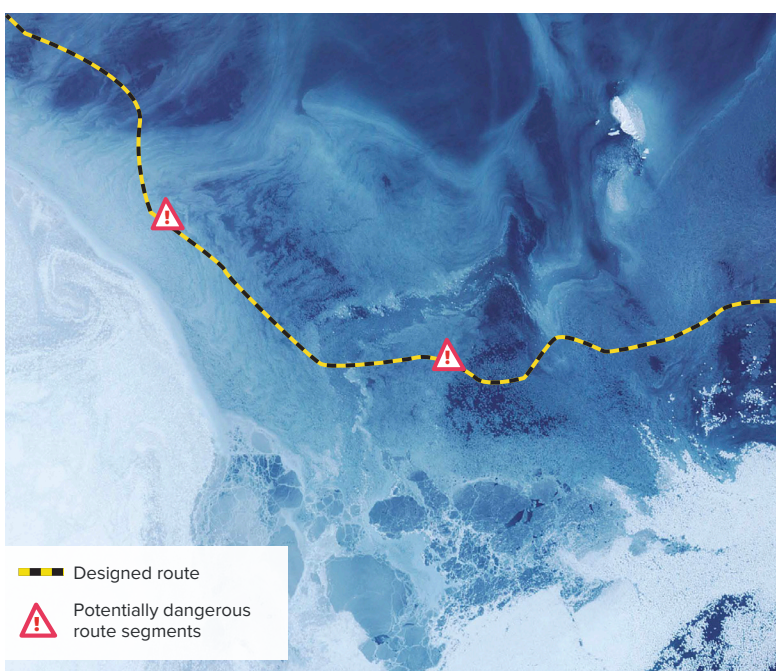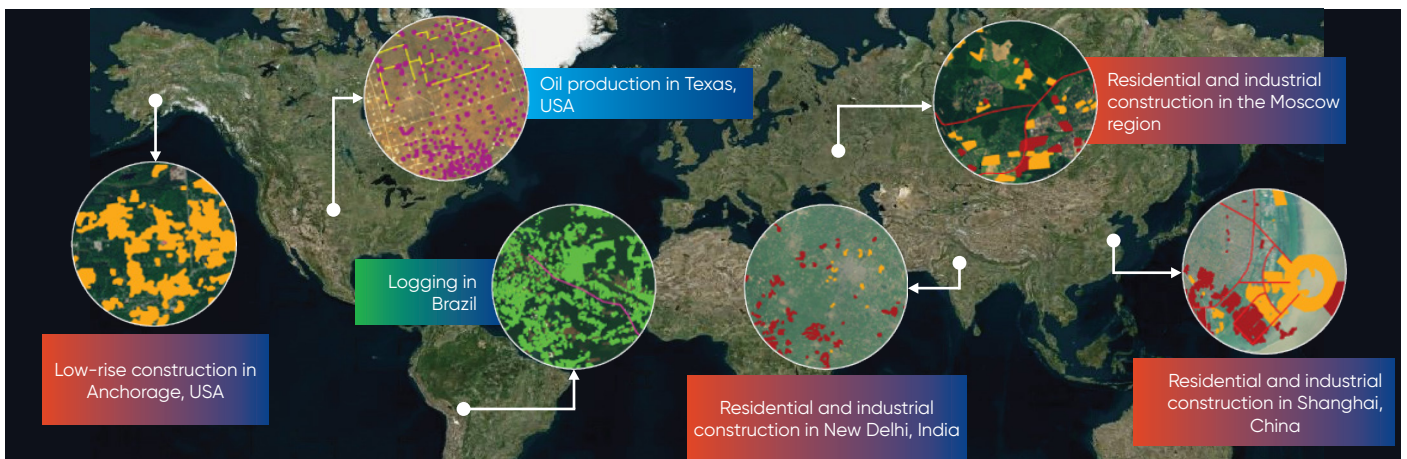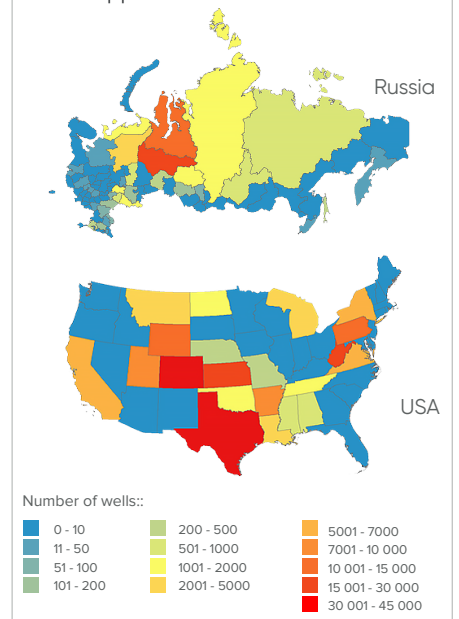pits

buildings and structures

forests

Cross-country comparisons

ERS data serves as a foundation for the assessment of changes on a global scale. Most of critically important sectors, such as fuel and energy, industry, mining, transportation, agriculture and forestry, construction, are well observable from space in retrospect. ERS data and services are used for:

- assessing and forecasting dynamics of a particular economic activity, such as trade, export, import, developments of various infrastructure, on a global, macro-regional and domestic levels. Using the data allows to make environmental assessments on the scale of countries, regions, industries

- awareness of dynamics of various processes developments in other countries of the world ensures independence and security of the country.

Source: data.gov

Comparison of a number of new functional hydrocarbon production wells that appeared from 2000 to 2015

Russia

USA

Number of wells::

- 0 - 10
- 11 - 50
- 51 - 100
- 101 - 200
- 200 - 500
- 501 - 1000
- 1001 - 2000
- 2001 - 5000
- 5001 - 7000
- 7001 - 10 000
- 10 001 - 15 000
- 15 001 - 30 000
- 30 001 - 45 000

Oil production in Texas, USA

Residential and industrial construction in the Moscow region

Logging in Brazil

Low-rise construction in Anchorage, USA

Residential and industrial construction in New Delhi, India

Residential and industrial construction in Shanghai, China

Arctic

Observation of the Arctic region from the space is conducted using optical and radar ERS satellites. Earth remote sensing allows to conduct a wide range of monitoring tasks:

- snow cover

- industrial construction zones, residential and non-residential construction

- mining infrastructure.

Tracking the movement of snow and ice

- Designed route
- Potentially dangerous route segments