

Ar greitai žemėlapius sudarinės dirbtinis intelektas?

Dr. Kęstutis Papšys
Vilniaus Universitetas
CartoCon 2018
Vilnius



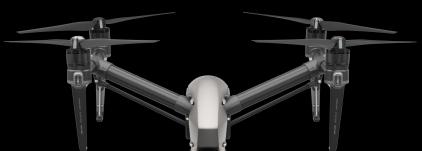
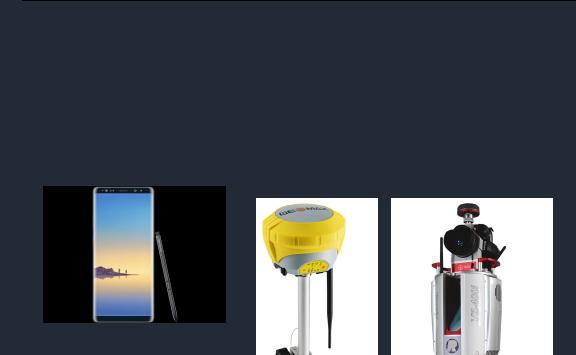
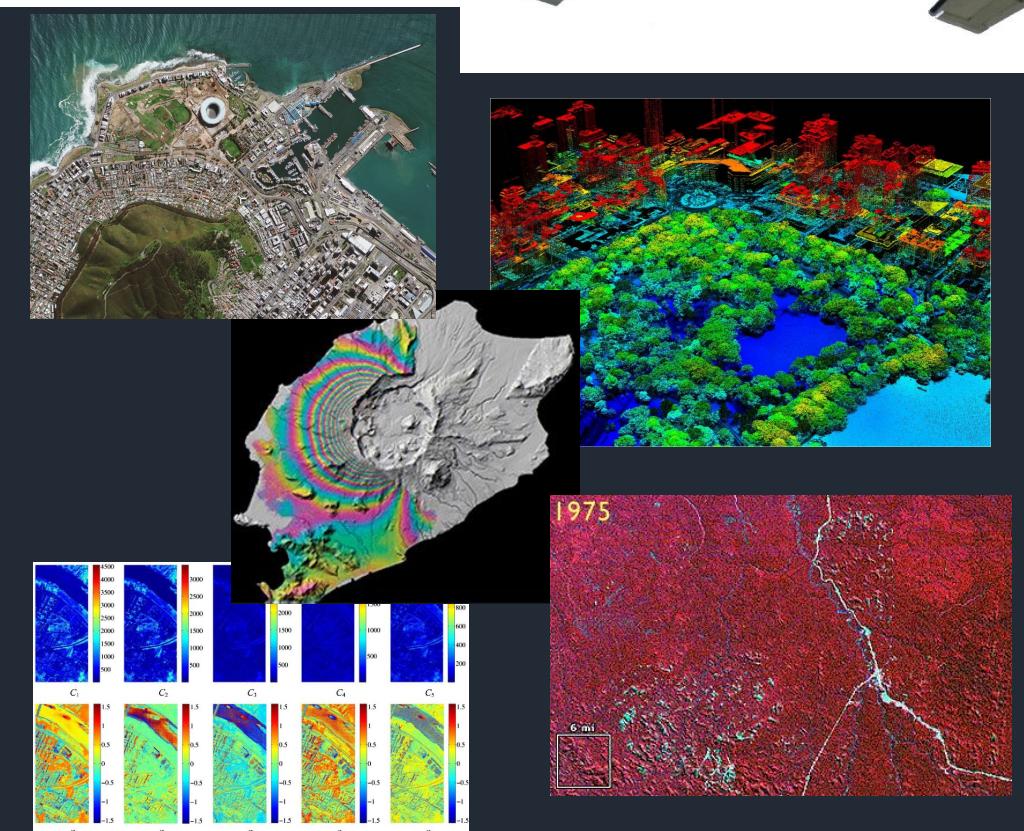
Ką reiškia sudaryti žemėlapį?

Informacijos gavimas

- Aalto-1
- ADEOS-II
- ADEOS
- AEM-2
- Aeneas
- Aeolus
- AeroCube-3
- AIM (Aeronomy of Ice in the Mesosphere)
- AlSat (Automatic Identification System Nanosatellite)
- AISSat-1 and 2 (Automatic Identification System Satellite)
- ALEXIS
- ALMASat-1
- Almaz
- ALOS (Advanced Land Observing Satellite) / Daichi
- ALOS-2 (Advanced Land Observing Satellite-2) / Daichi-2
- ALOS-3
- Alphasat / Inmarsat
- AlSat-2 (Algeria Satellite-2)
- AMPERE
- ANDE-2
- ANDE
- ANUSat (Anna University Microsatellite)
- AprizeSat-3 and 4
- Aqua
- Argo (Data collection in the global oceans)
- Argos DCS
- ARGOS
- ASNARO (Advanced Satellite with New system ARchitecture for Observation)
- ASNARO-2 (Advanced Satellite with New system ARchitecture for Observation-2)
- ASTERIA
- ATLAS
- Aura
- Badr-B
- BEOSAT
- Biomass (Biomass monitoring mission for Carbon Assessment)
- BioSentinel
- BIRD
- BIROS (Bi-spectral InfraRed Optical System)
- BlackSky Constellation
- BUAA-Sat
- C/NOFS (Communication/Navigation Outage Forecast System)
- CADRE
- CALIPSO (Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations)
- CanX-2 (Canadian Advanced Nanosatellite eXperiment-2)
- CartoSat-1 / IRS-P5
- CartoSat-2
- CartoSat-2A
- CartoSat-2B
- CartoSat-2D
- CASSIOPE (Cascade SmallSat and Ionospheric Polar Explorer)
- CBERS - First Generation
- CBERS-3 and 4
- CFESat
- CFOSAT (Chinese-French Oceanography Satellite)
- CHAMP
- Chibis-M
- Chubusat-1
- CICERO
- CINEMA
- CIRAS (CubeSat Infrared Atmospheric Sounder) – a pathfinder mission for EON-IR (Earth Observation Nanosatellite -IR)
- CloudSat
- Cluster
- Colony-1 Cubesats
- COMPASS-1
- COMPASS-2
- COMS-1 (Communication, Ocean and Meteorological Satellite-1)
- Copernicus Program
- Copernicus: Sentinel-1
- Copernicus: Sentinel-2
- Copernicus: Sentinel-3
- Copernicus: Sentinel-4
- Copernicus: Sentinel-5
- Copernicus: Sentinel-5P
- COPPER
- Coriolis / WindSat
- Coronas-Photon
- COSMO-SkyMed - Second Generation
- COSMO-SkyMed
- COSPAS-S&RSAT
- CryoSat-2
- CryoSat
- CSSWE (Colorado Student Space Weather Experiment)
- CubeSat - Launch 1
- CubeSTAR
- D-SAT
- DANE (Drag and Atmospheric Neutral Density Explorer)
- Deimos-1
- Deimos-2
- Dellingr CubeSat Demonstration Mission
- DICE
- Diwata-1
- DMC-1G (Disaster Monitoring Constellation - First Generation)
- DMC-3 (Disaster Monitoring Constellation-3)
- DMSP (Defense Meteorological Satellite Program)
- DMSP Block 5D-3 Satellite Series
- DORIS
- Dove-1 and 2
- DSCOVR (Deep Space Climate Observatory)
- DSP
- DSX
- DTUSat-2
- DubaiSat-1
- DubaiSat-2
- E1P-2
- EARS
- EarthCARE
- EDSN (Edison Demonstration of SmallSat Networks)
- EGS / Ajisai
- EgyptSat-1
- EgyptSat-2
- Electro-1 / GOMS-1
- Electro-L / GOMS-2
- ELFIN
- EnMAP
- EnviSat
- EO-1 (Earth Observing-1)
- EQUULEUS and OMOTENASHI
- ERBS
- EROS-A
- EROS-B (Earth Remote Observation Satellite-B)
- ERS-2
- ESEO (European Student Earth Orbiter)
- Etalon-1 and -2
- ETS-VII / Kiku-7
- ETS-VIII / Kiku-8
- EURECA
- EV-1
- EV-9 (ExactView-9)
- ExoCube
- EXPORTS
- FalconSat-2
- FalconSat-5
- FASat-Bravo
- FASTRAC
- FASTSat-HSV
- FedSat
- FIREBIRD
- Firefly
- FLEX
- Flock 1 Imaging Constellation
- Flying Laptop
- FormoSat-1 / ROCSat-1
- FormoSat-2 / ROCSat-2
- FormoSat-3 / COSMIC
- FormoSat-5
- FORTE
- FREESTAR
- FrequencyComb
- FY-1 (FengYun-1)
- FY-2 (FengYun-2)
- FY-3 (FengYun-3)
- FY-4
- Galassia
- Gaofen-1 (GF-1)
- Gaofen-2
- GaoJing / SuperView
- GCOM (Global Change Observation Mission)
- GCOM-C1
- Genesis inflatable space complex
- GEO-KOMPSAT-2
- GeoEye-1
- GEOS Program - ESA
- GEOS Program - NASA
- GEOSAT
- GeoSTAR
- GEOTAIL
- GFO (GEOSAT Follow-On)
- GFZ-1
- GHG-CCI
- GHGSat-D
- Glory
- GMS
- GOCE (Gravity field and steady-state Ocean Circulation Explorer)
- GOES 2nd Generation
- GOES-N, O, P satellites
- GOES-R (Geostationary Operational Environmental Satellite-R)
- Gokturk-1
- Göktürk-2
- GOLD (Global-scale Observations of the Limb and Disk)
- GOLIAT
- GOMX-1 (GomeSpace Express-1)
- GOMX-3 (GomSpace Express-3)
- GomX-4
- GOSAT (Greenhouse gases Observing Satellite) / Ibuki
- GOSAT-2 (Greenhouse gases Observing Satellite-2)
- GP-B (Gravity Probe B)
- GPIM (Green Propellant Infusion Mission)
- GPM (Global Precipitation Measurement)
- GRACE (Gravity Recovery And Climate Experiment)
- GRACE-FO (Follow-On)
- GRIFEX
- HARP
- HawaiiSat-1 / ORS-4
- Hawkeye
- Himawari-8 and 9
- HJ-1 (Huan Jing-1)
- Ho'oponopono
- Hodoyoshi-3 and 4
- HORYU-2
- HummerSat-1 / FN-1
- HY-1A / Ocean-1A
- HY-1B / Ocean-1B
- HY-2A / Ocean-2A
- IBEX (Interstellar Boundary Explorer)
- IceCube
- ICESat-2 (Ice, Cloud and land Elevation Satellite-2)
- ICESat
- ICON (Ionospheric Connection Explorer)
- Ikonos-2
- IMAGE (Imager for Magnetopause-to-Aurora Global Exploration)
- IMP-8
- IMS-1
- INDEX / REIMI
- INSAT-2
- INSAT-3 Series
- INSAT-3D
- INSAT-3DR (Indian National Satellite-3D Repeat)
- INTEGRAL (INTERnational Gamma-Ray Astrophysics Laboratory)
- IPS
- IRAZU CubeSat Mission
- Iridium NEXT
- Iridium PRIME
- IRS Program
- IRS-1C/1D
- IRS-P3
- ISEE
- ISS Utilisation: NanoRacks Airlock
- ISS Utilization - NightPod
- ISS Utilization: ASIM (Atmosphere-Space Interactions Monitor)
- ISS Utilization: CATS (Cloud-Aerosol Transport System)
- ISS Utilization: ColAIS
- ISS Utilization: Columbus Module
- ISS Utilization: Cupola
- ISS Utilization: ECOSTRESS
- ISS Utilization: ISS-RapidScat
- ISS Utilization: JEM/Kibo-EF / HREP
- ISS Utilization: JEM/Kibo-EF
- ISS Utilization: JEM/Kibo
- ISS Utilization: LIS (Lightning Imaging Sensor)
- ISS Utilization: MUSES
- ISS Utilization: OPALS and HDEV
- ISS Utilization: SAGE-III
- ISS Utilization: Sample imagery
- ISS Utilization: UrtheCast
- ISS Utilization: WORF / ISAAC, ISERV
- ISS: CEDI
- ISS: Sample imagery - Part 2
- Jason-1
- Jason-2 / OSTM
- Jason-3
- JERS-1 / Fuyo-1
- Kalpana-1 / MetSat-1
- Kanopus-V 1
- Kanopus-V-IK 1
- KazEOSat-1
- KazEOSat-2
- KazSTSAT
- Kestrel Eye
- KhalifaSat
- Kometa
- KOMPSAT-1 / Arirang-1
- KOMPSAT-2 / Arirang-2
- KOMPSAT-3 / Arirang-3
- KOMPSAT-3A / Arirang-3A
- KOMPSAT-5 / Arirang-5
- KOMPSAT-6
- Kondor-E
- KR1 (Kent Ridge 1)
- KySat-2 (Kentucky Satellite-2)
- LAGEOS (Laser Geodynamics Satellite)
- LAICE
- Landsat-1 to 3
- Landsat-4 and 5
- Landsat-6
- Landsat-7
- Landsat-8
- Landsat-9
- LAPAN-A2
- LAPAN-A3
- LARES (LAser RElativity Satellite)
- LEAP
- Lemur-2
- LituanicaSat-1
- LituanicaSat-2
- M3MSat (Maritime Monitoring and Messaging Microsatellite)
- MagSat
- MakerSat
- MATS (Mesospheric Airglow/Aerosol Tomography and Spectroscopy)
- Max Valier Sat
- MCubed-2 / COVE
- Megha-Tropiques
- MERLIN (Methane Remote Sensing Mission)
- Meteor-3
- Meteor-M-1
- Meteor-M-2
- Meteor
- Meteosat First Generation
- Meteosat Second Generation (MSG)
- MetOp-SG (Second Generation)
- MetOp
- MicroCarb
- MicroMAS-1
- MicroMAS-2
- MicroSCOPE
- MightySat
- MIMOSA
- MINISAT-01
- MIOSat
- MiRaTA
- MITA
- MOMS
- Monitor-E
- MSX (Midcourse Space Experiment)
- MTI
- MTSAT (Multifunction Transport Satellite)
- Munin
- Myriade
- NanoSatC-Br1 (Brazilian CubeSat Project-1)
- NEMO-AM
- NigeriaSat-2
- NigeriaSat-X
- Nimbus-7
- NISAR (NASA-ISRO Synthetic Aperture Radar) Mission
- NOAA POES Series - 5th Generation
- NorSat-1 and 2
- NovaSAR-S
- NPOESS
- nSIGHT

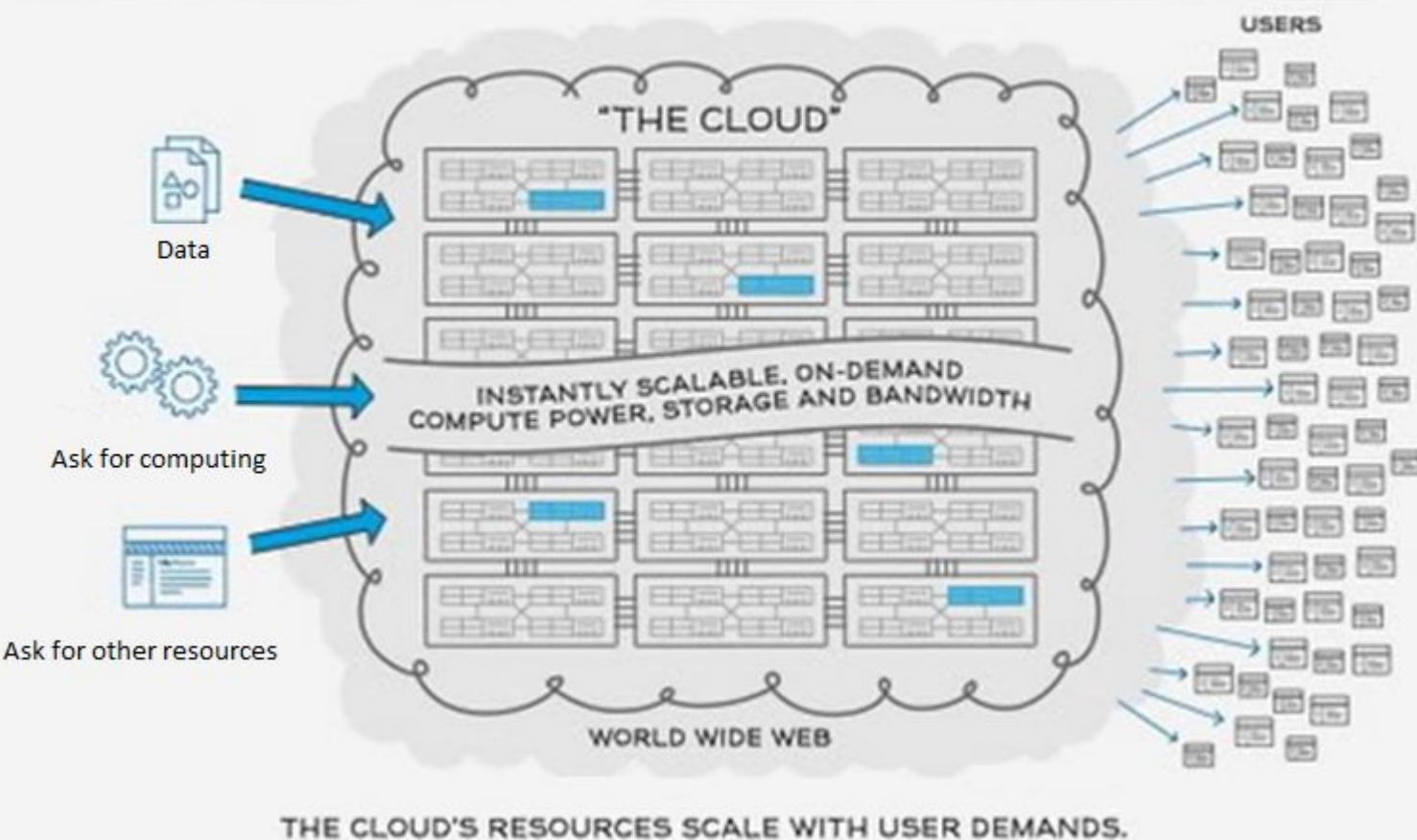
- OceanSat-2
- OCO-2 (Orbiting Carbon Observatory-2)
- OCO
- Odin
- Oersted
- Okean
- OkeanO1
- OkeanO
- OPAL (Atmospheric)
- OPS-SAT
- OptiSAR
- OrbView-1
- OrbView-2
- OrbView-3
- OrbView-4
- ORS-1 (Operationally Response Space-1)
- OTB-1 (Orbital Test Bed-1)
- PARASOL
- PAZ
- PeruSat-1
- PICASSO
- Pico Dragon
- PISat (PESIT Imaging Satellite)
- Pleiades
- POLAR
- POPACS (Polar Orbiting Passive Atmospheric Calibration Sphere)
- Priroda
- PRISM
- PRISMA Hyperspectral
- PROBA-1
- PROBA-3
- PROBA-V (Project for On-Board Autonomy - Vegetation)
- QBITO
- QSat-EOS
- QuakeSat
- QuickBird-2
- QuikSCAT (Quick Scatterometer)
- RACE (Radiometer Atmospheric CubeSat Experiment)
- RADARSAT-1
- RADARSAT-2
- RAIKO
- RapidEye Constellation
- RASAT (Earth Observation Satellite)
- RAVAN
- RAX
- RazakSat
- RCM (RADARSAT Constellation Mission)
- ResourceSat-1 / IRS-P6
- ResourceSat-2
- Resurs-DK1
- Resurs-O1
- Resurs-P (Prospective)
- RISAT-1 (Radar Imaging Satellite-1)
- RISAT-2 (Radar Imaging Satellite-2)
- RISESat
- Rising-2
- SAC-C
- SAC-D/Aquarius
- SAMPEX
- SAOCOM (SAR Observation and Communications Satellite)
- SAPPHIRE (Stanford AudioPhonic)
- SAR-Lupe Constellation
- SARAL
- SCATSat-1
- SCD (Satélite de Coleta de Dados)
- SciSat-1 / ACE
- SDS-4 (Small Demonstration Satellite-4)
- SeaSat
- Sentinel Asia Constellation
- Sentinel-6/Jason-CS
- Shenzhou
- Shi Jian
- SHIMMER
- Sich-1M
- Sich-2
- SIR-A
- SIR-B
- SIR-C
- SIR
- Skylab
- SkySat constellation
- SmallGEO
- SMAP (Soil Moisture Active/Passive)
- SMART
- SMOS (Soil Moisture and Ocean Salinity)
- SNOE
- SOMP
- SOURCE (Solar Radiation and Climate Experiment)
- Spacelab-1
- SPIDER
- SPIRALE
- SporeSat
- SPORT
- SPOT-4
- SPOT-5
- SPOT-6 and 7
- SpriteSat
- SPROUT (Space Research on Unique Technology)
- SRMSat
- SRTM
- SSBUV
- SSETI
- SSOT
- ST5
- Starlette
- STARSHINE
- STPSat-1
- STS-85
- STSat-1
- STSat-2
- STSat-3 (Science and Technology Satellite-3)
- StudSat-1
- SumbandilaSat
- SUNSAT
- Suomi NPP
- Swarm
- SwissCube
- SWOT (Surface Water Ocean Topography)
- T2E
- TacSat-1
- TacSat-2
- TacSat-3
- TacSat-4 (Tactical Satellite-4)
- TAIKI
- Tandem-L
- TanDEM-X
- TanSat
- TARANIS
- Tatiana-2
- TEAMSAT
- TechDemoSat-1 (Technology Demonstration Satellite-1)
- TechEdSat5
- Technologies and Applications
- TechSat
- TecSAR
- TelkyoSat-3
- TeLEOS-1
- TEMPEST-D (Temporal Experiment for Storms and Tropical Systems Technology - Demonstration)
- TEMPO (Tropospheric Emissions: Monitoring of Pollution)
- Terra Mission
- TerraSAR-X
- TET-1 (Technology Experiment Carrier-1)
- THEMIS / ARTEMIS
- THEOS (Thailand Earth Observation System)
- TIMED (Thermosphere, Ionosphere, Mesosphere Energetic and Dynamics)
- TOMS
- Tomsk-TPU-120
- TOPEX/Poseidon
- TopSat
- TRMM (Tropical Rainfall Measuring Mission)
- TROPICS
- Tianshinghua-1
- Tsubame
- TSX-5
- TSX-NG (TerraSAR-X Next Generation)
- TUBSAT
- TurkSat-3USat
- TWINS
- UARS
- UK-DMC-2 (United Kingdom - Disaster Monitoring Constellation-2)
- UNIFORM-1 (University International Formation Mission-1)
- UoSAT
- Van Allen Probes
- VARION
- VELOX-1
- VELOX-CI
- VENUS (Vegetation and Environment monitoring on a New MicroSatellite)
- VesselSat
- VNREDSat-1
- VRSS-1 (Venezuelan Remote Sensing Satellite-1)
- WEOS
- WESTPAC
- WIND Solar-Terrestrial
- WNISAT
- WorldView-1
- WorldView-2
- WorldView-3
- WorldView-4
- X-37B OTV
- XSat
- YouthSat
- Yubileiny2
- Yubileiny
- Zero 2 Infinity
- ZY-1-02C
- ZY-3A

Sensoriai:
Matomo spektro
Artimo infraraudonojo spektro
Multi spektriniai
Hyper spektriniai
SAR – Synthetic aperture radar
LIDAR - Light Detection and Ranging
Spektroradiometriniai
Gravimetriniai
Fotometriniai ir t.t.



Cloud computing

HOW "THE CLOUD" WORKS



Worldwide Big Data and Business Analytics Revenues Forecast to Reach \$187 Billion in 2019*

**pagal IDC*

The Datafloq Open Source Landscape 2.0

Data Analysis & Platforms



ERP BI Solutions

Open Source Business Intelligence Solutions for ERP



Business Intelligence



Data Mining



Big Data search



Multivalue database



KeyValue



Document Store



Object databases



Databases / Data warehousing



In-Memory Computing



Programming



Data aggregation



Multidimensional



Graph databases



Operational



Social



Multimodel



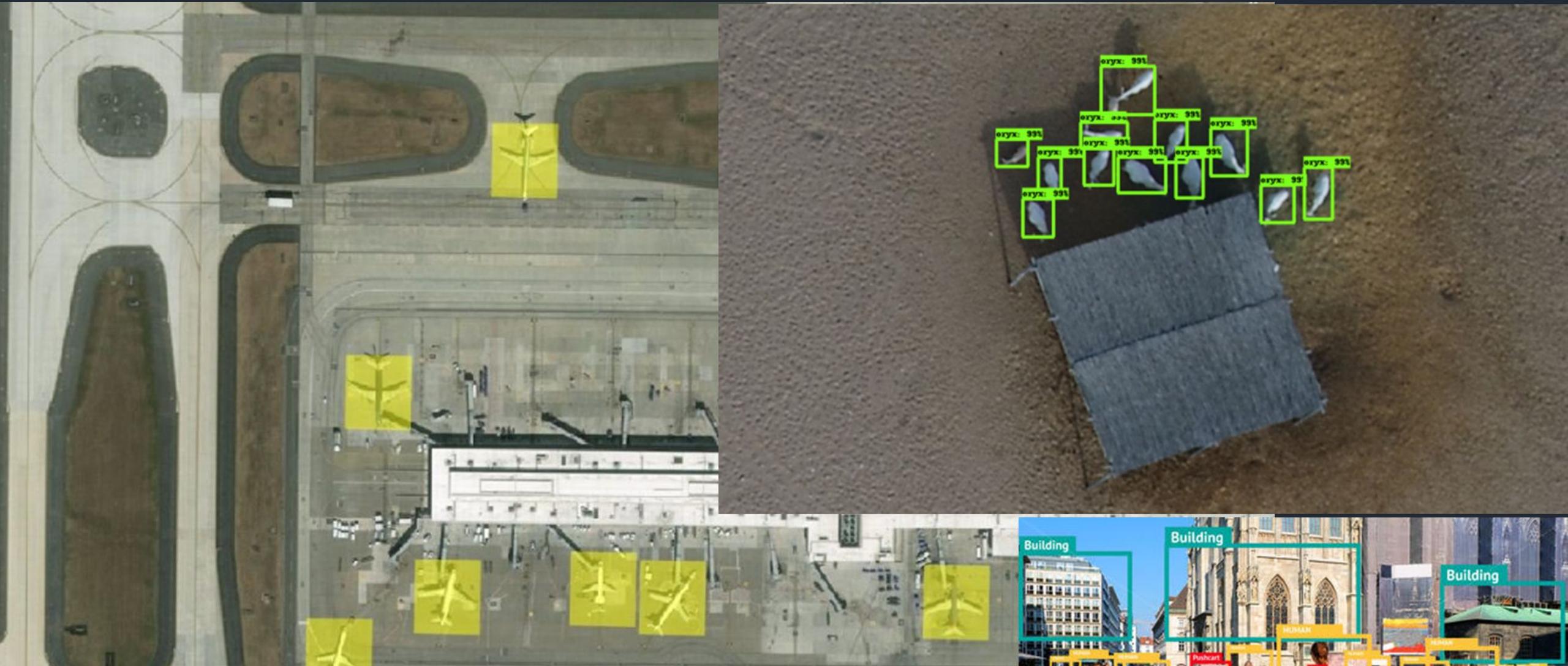
XML Databases



Grid Solutions

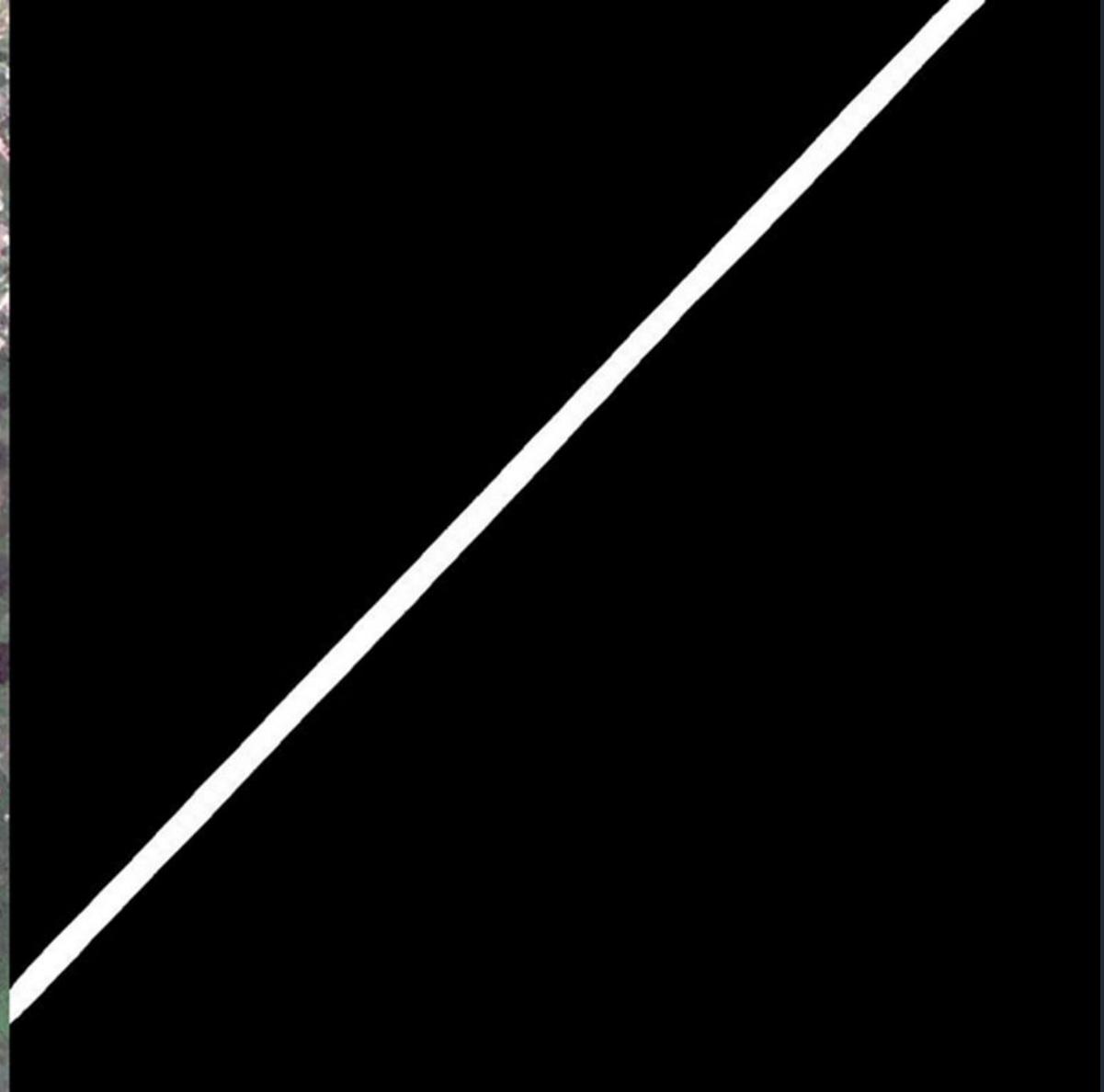


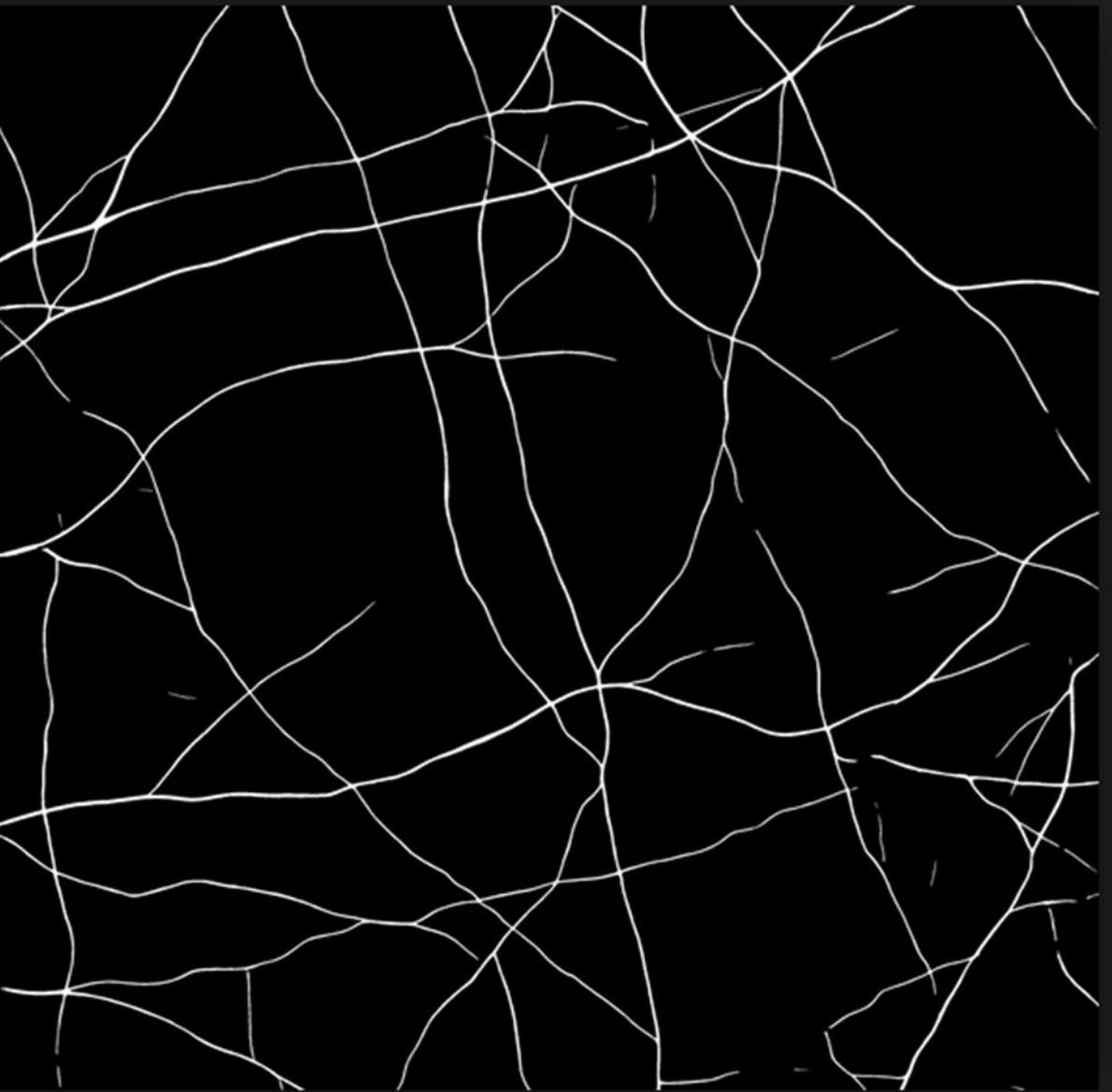
Automatizuotas erdvinių duomenų atpažinimas











kaggle



Dstl Satellite Imagery Feature Detection

Can you train an eye in the sky?

\$100,000 · 419 teams · 2 years ago

Overview Data Kernels Discussion Leaderboard Rules

Public Leaderboard

Private Leaderboard

The private leaderboard is calculated with approximately 81% of the test data.

This competition has completed. This leaderboard reflects the final standings.

⟳ Refresh

■ In the money ■ Gold ■ Silver ■ Bronze

#	△pub	Team Name	Kernel	Team Members	Score ⓘ	Entries	Last
1	—	Kyle			0.49271	180	2y
2	▲ 1	n0ZF1Tuzrb3o			0.47936	171	2y
3	▲ 5	Vladimir & Sergey			0.47873	125	2y
4	▲ 1	deebsense.io		 +5	0.45885	107	2y



National Geospatial-Intelligence Agency

21,220 followers

2w

Have an idea on how to accurately and automatically delineate satellite imagery? NGA is offering \$15K for the best agricultural delineation system. Submissions due Nov. 19. Learn more in our latest press release.

AGRICULTURAL DELINEATION SYSTEM CHALLENGE

\$15K
PRIZE

Submissions Due:
November 19

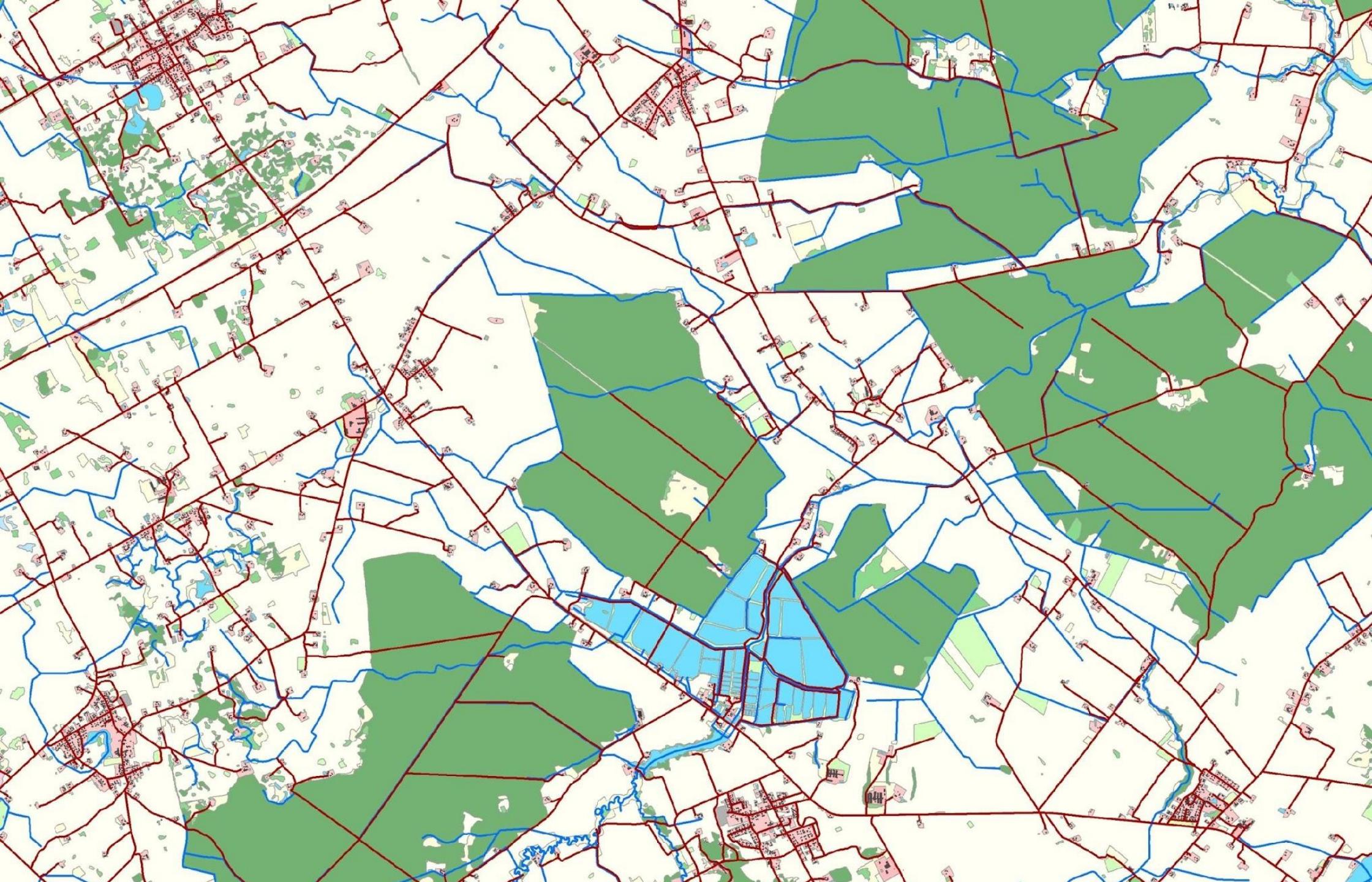


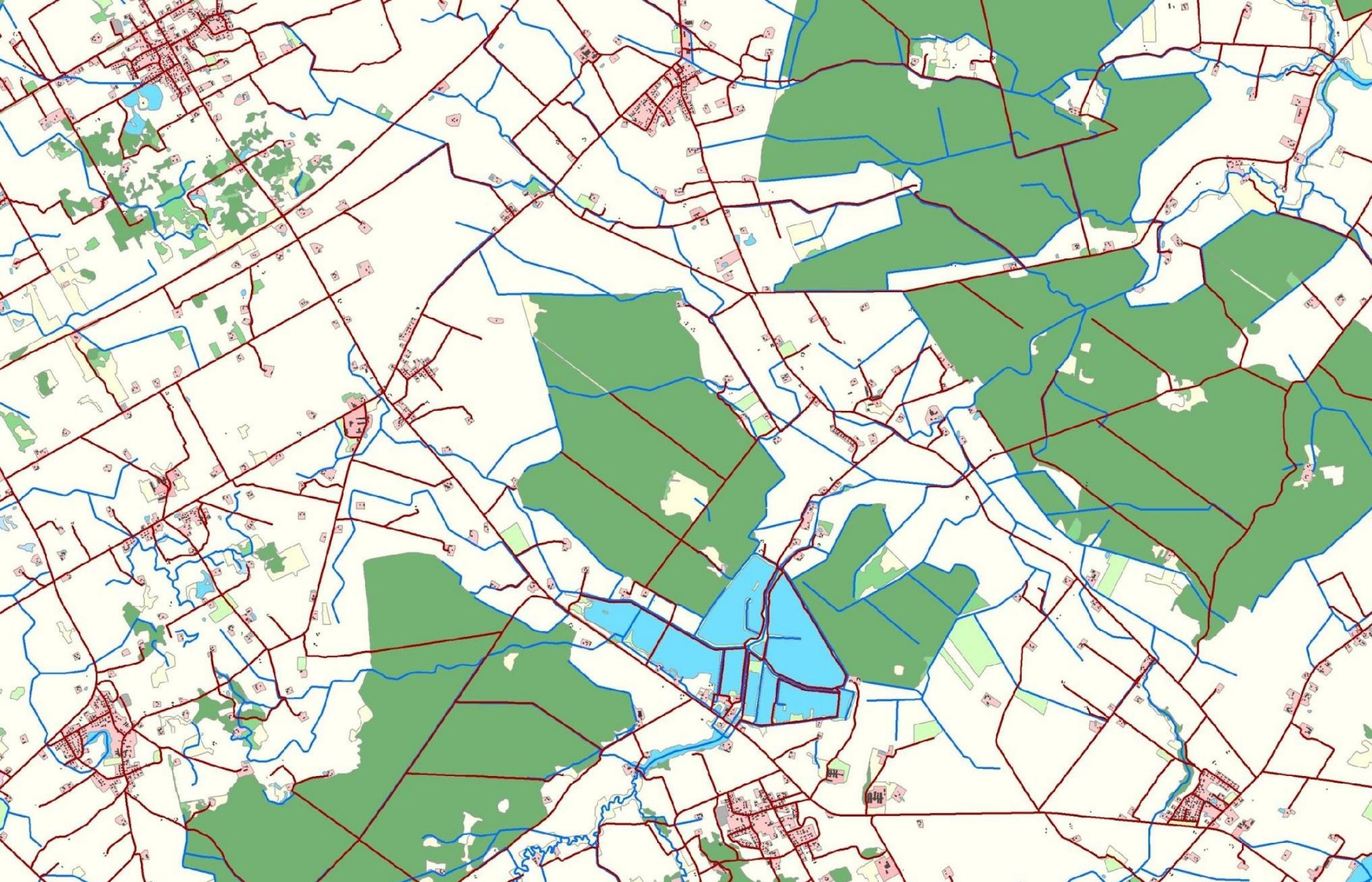
● Messaging

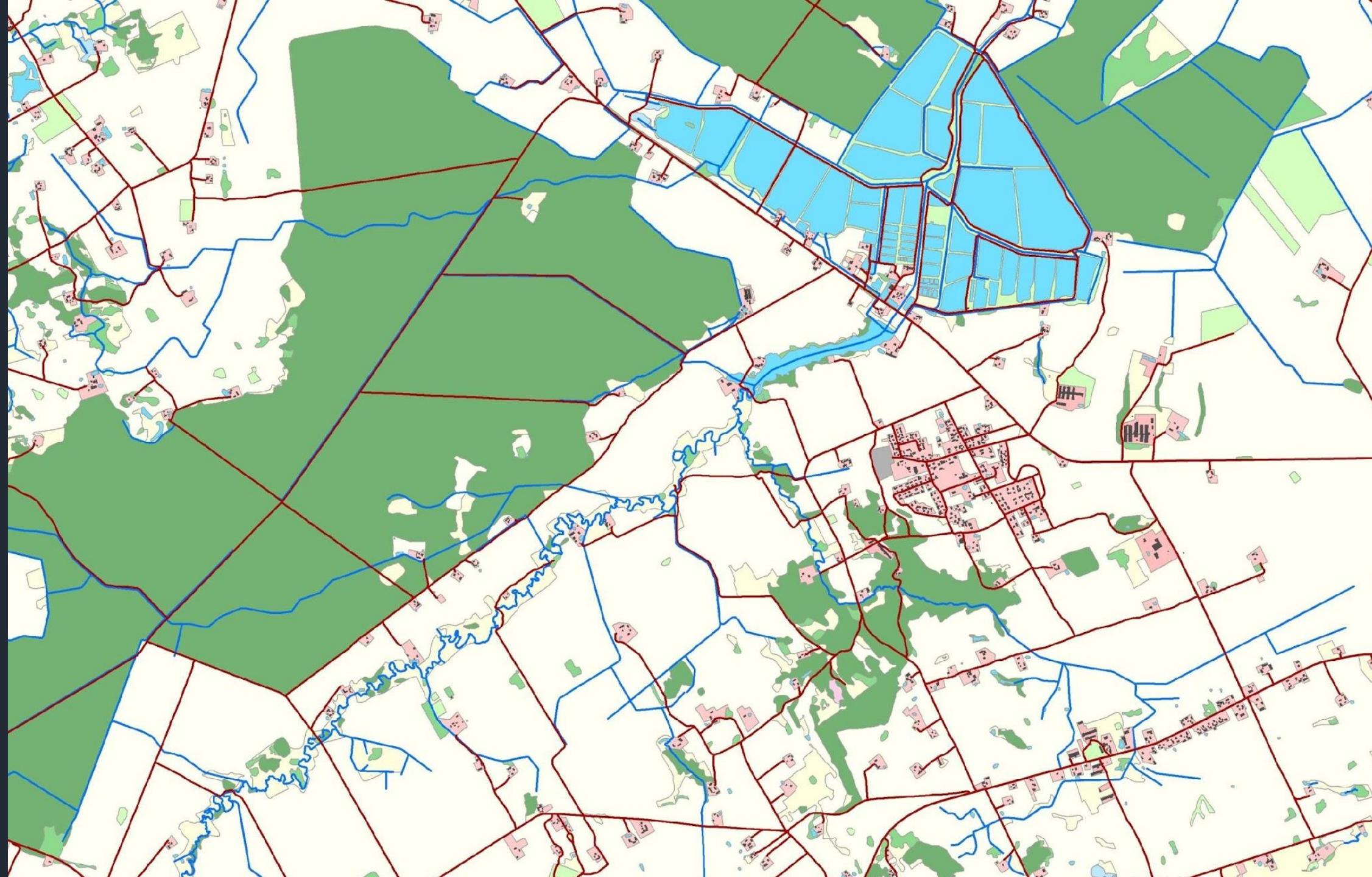
Automatizuota generalizacija

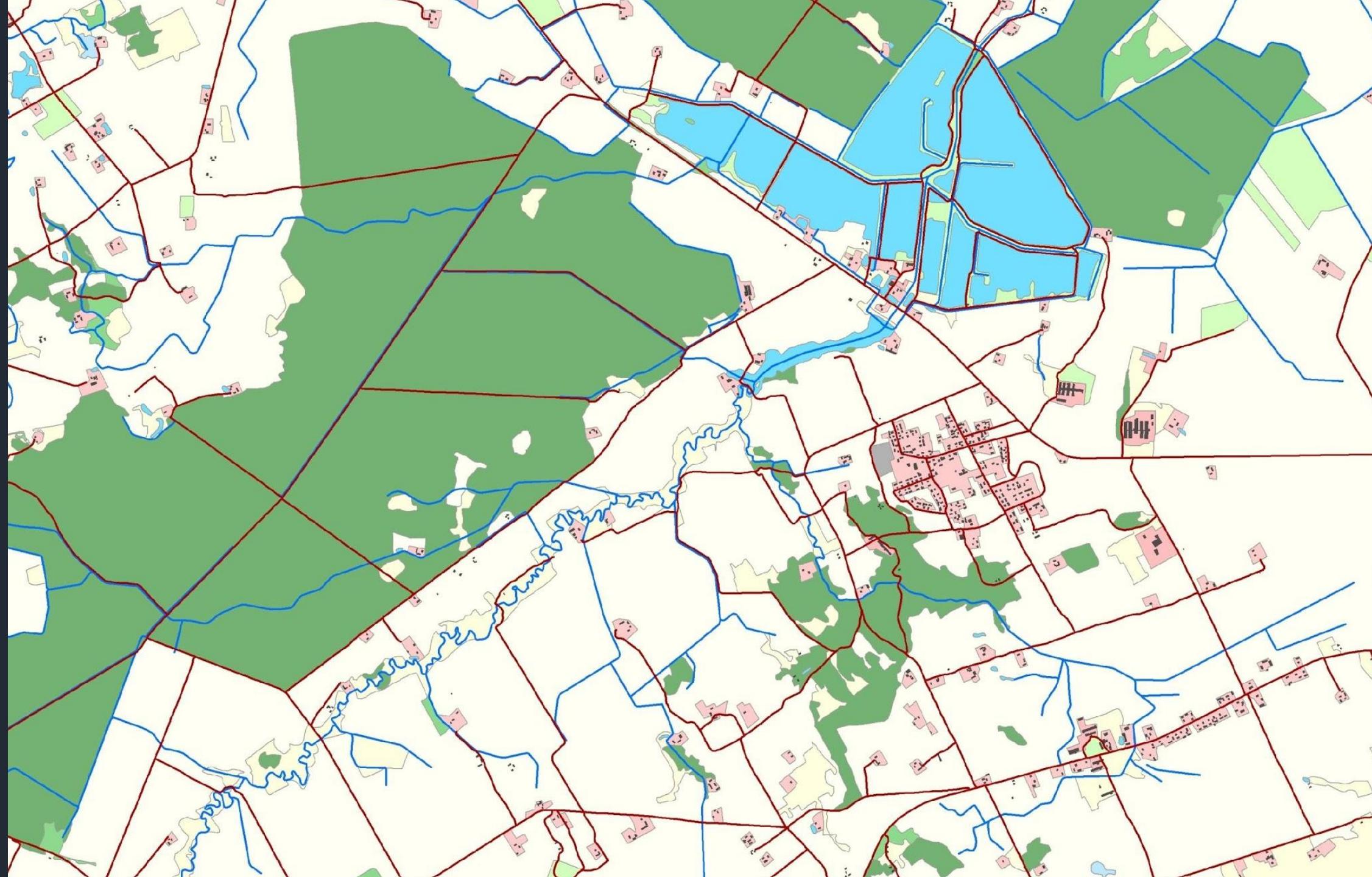






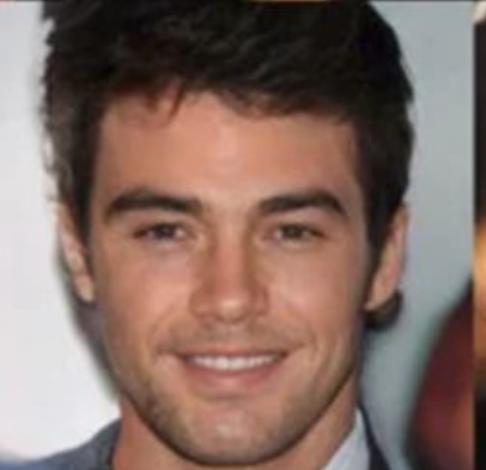
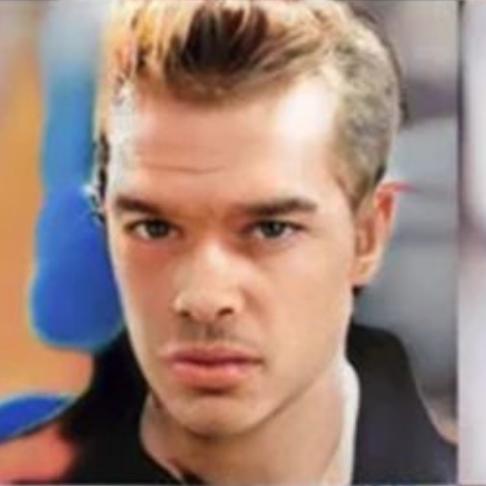
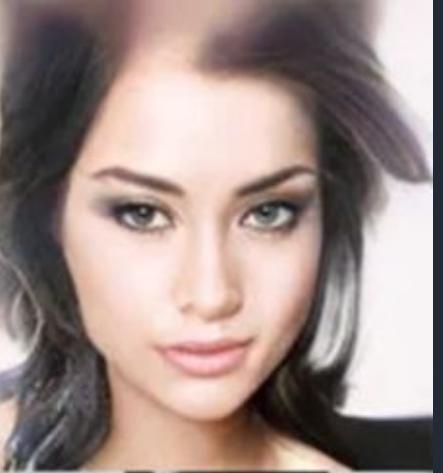


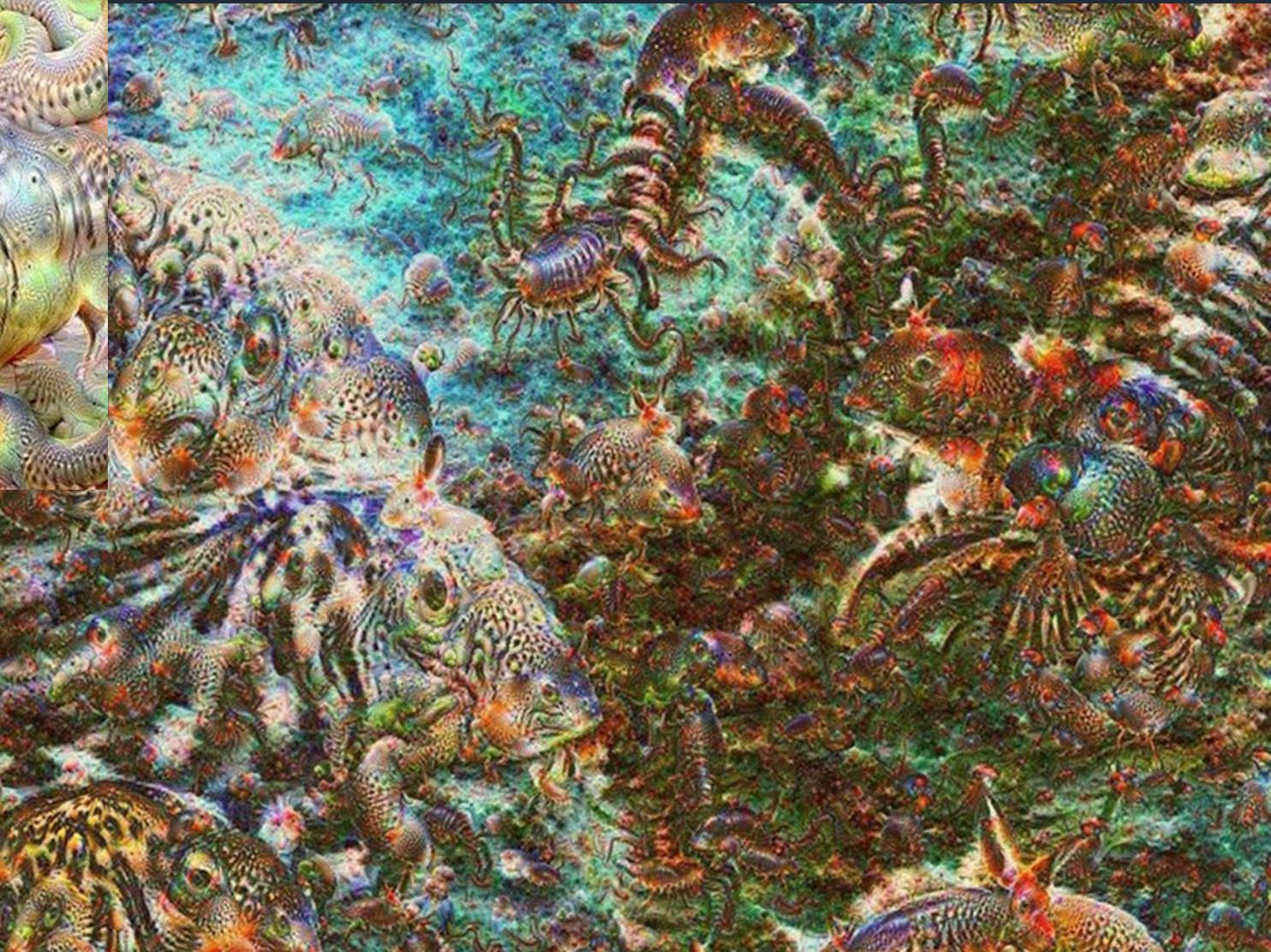


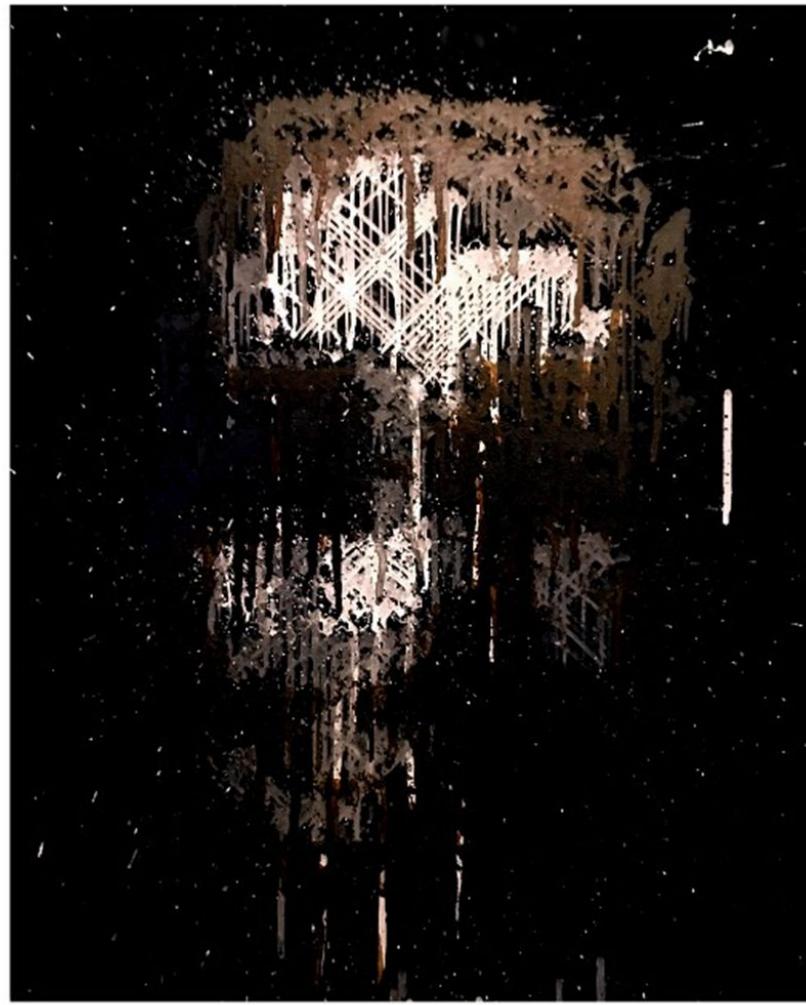
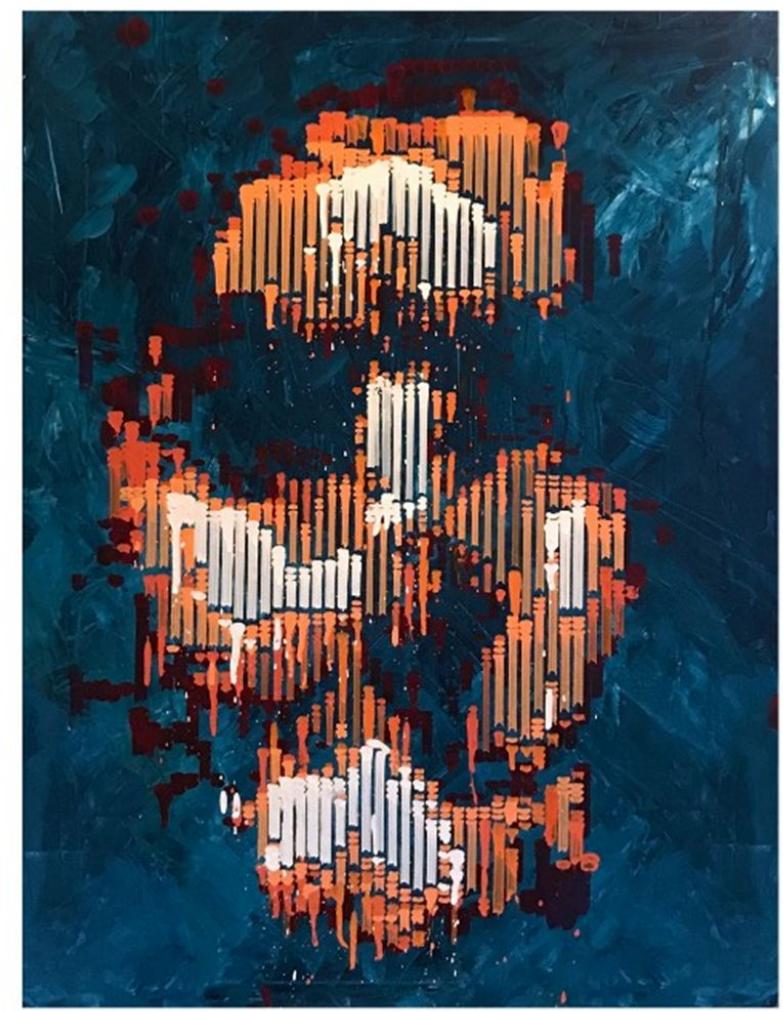


Sunkiausia dalis?

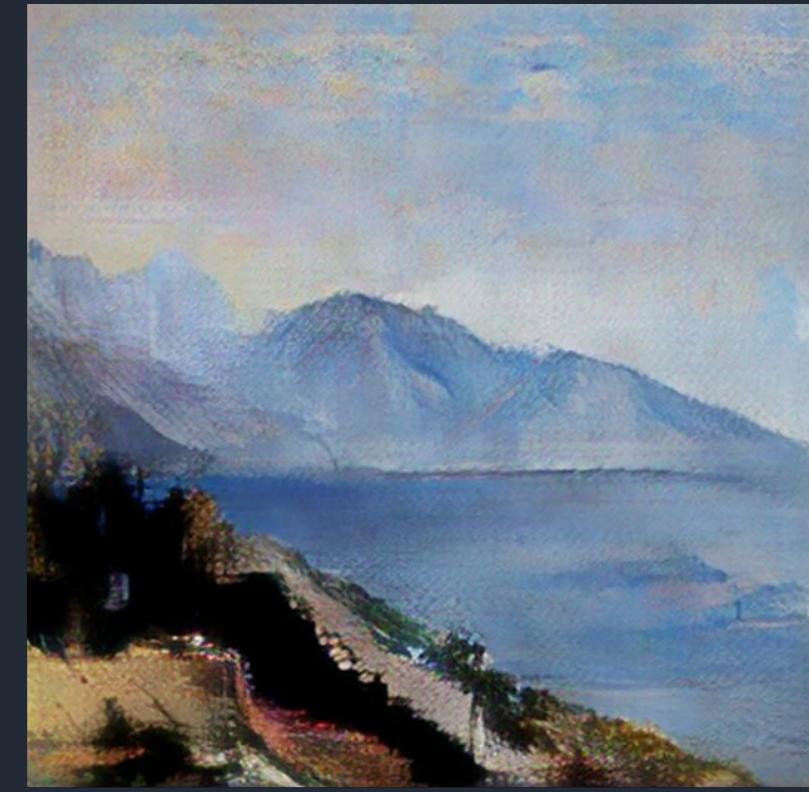
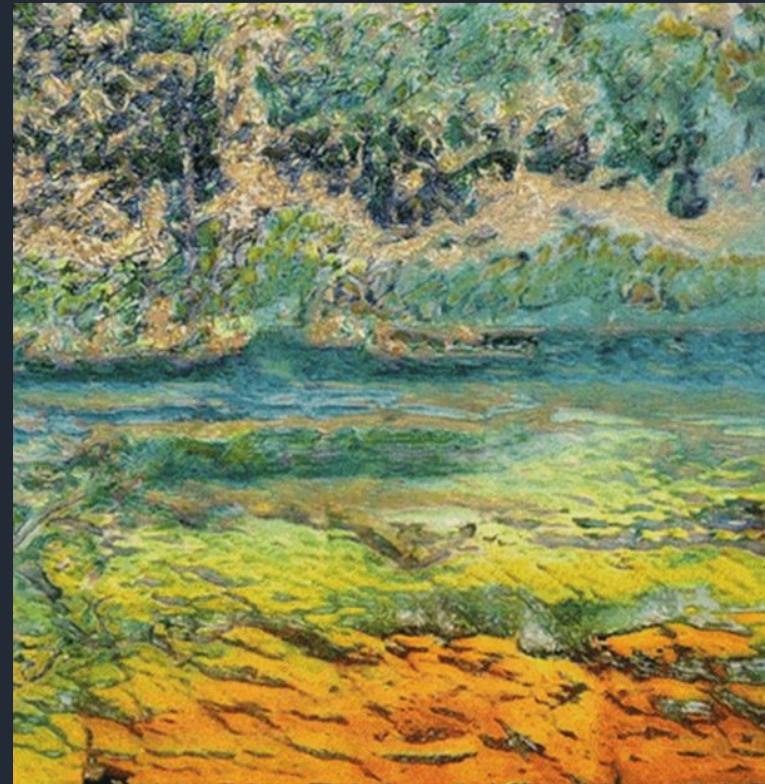
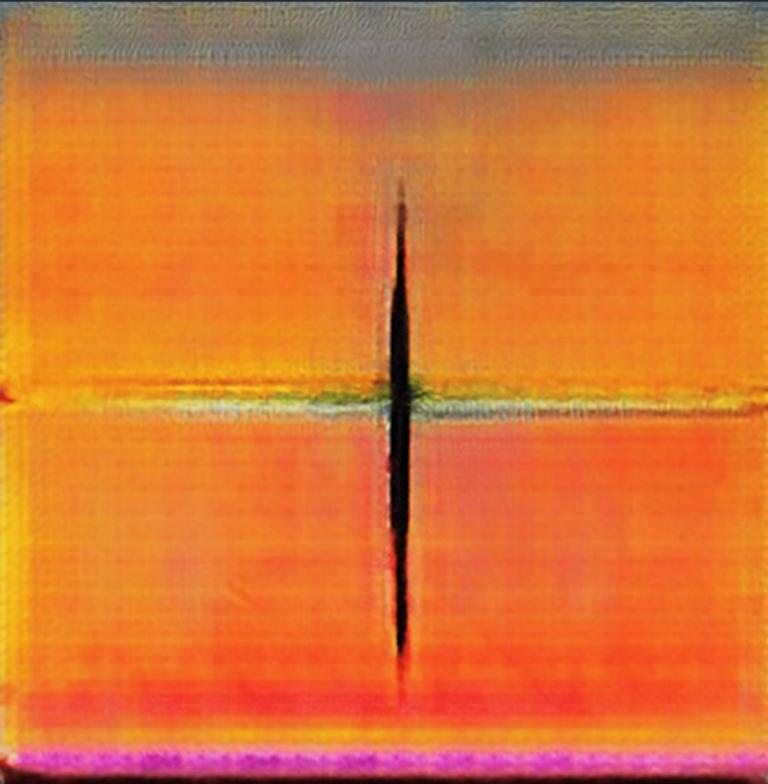




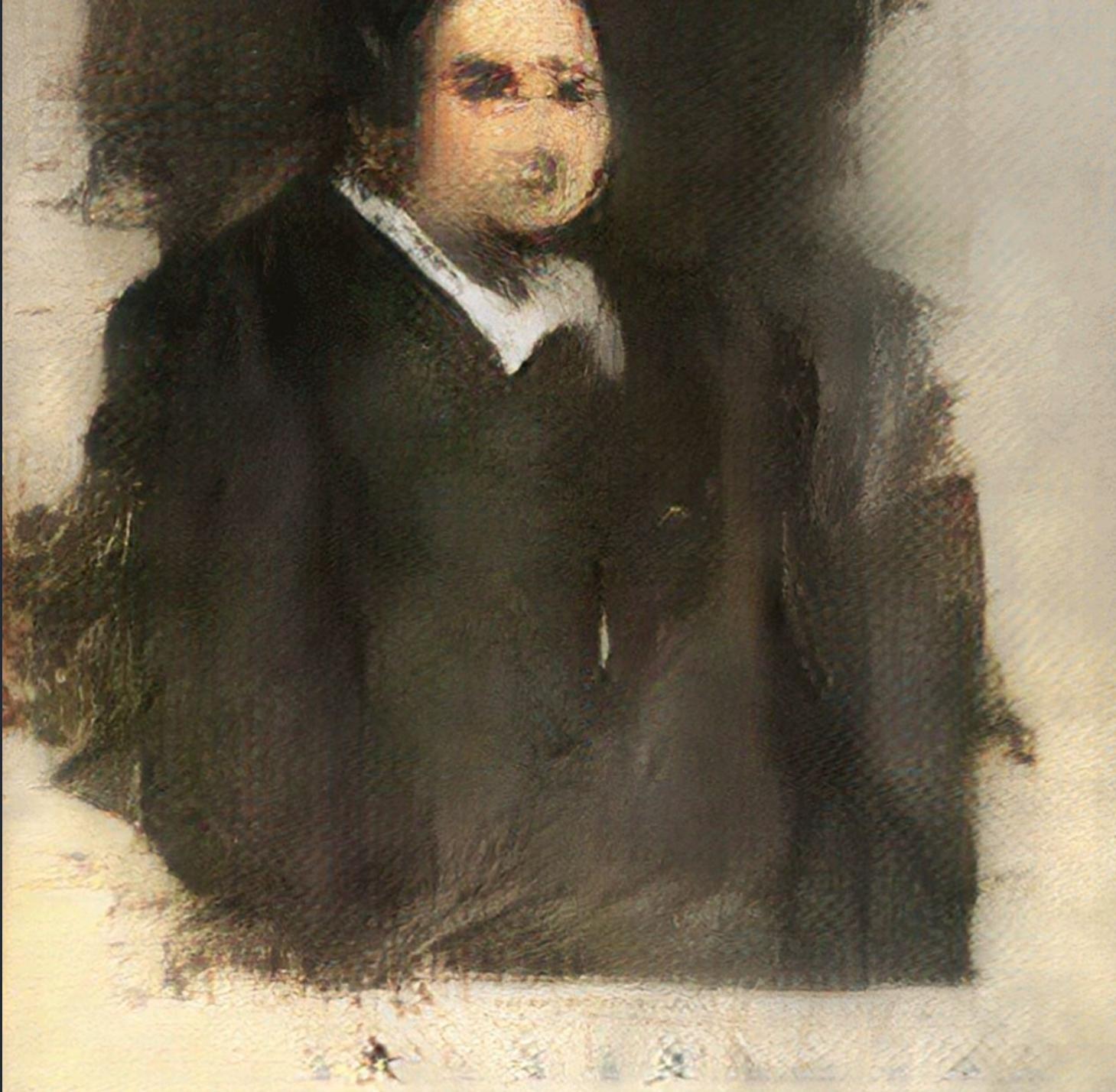












Galime įsivaizduoti debesyje veikiančia sistemą, valdomą dirbtinio intelekto, galinčią automatiškai surinkti duomenis iš nutolusių sensorių, išsaugoti ją, atlikti automatinių objektų atpažinimą, jų atranką. Taip pat galime manyti, kad įmanomos sistemos dalys automatiškai atliekančios analizę ir publikuojančios žemėlapius tinkle...

- 99% Data Entry Keyers
- 96% Surveying and Mapping Technicians
- 91% Geological and Petroleum Technicians
- 88% Cartographers and Photogrammetrists
- 63% Geoscientists, Except Hydrologists and Geographers
- 48% Computer Programmers
- 38% Surveyors
- 25% Geographers
- 1.4% Hydrologists
- 0.65% Computer Systems Analysts

THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERISATION?
Carl Benedikt Frey ir Michael A. Osborne







“The present is theirs; the future, for which I really worked, is mine.”

— Nikola Tesla