MICRO GENESIS

MICROGENESIS INDIGIS Geospatial Technology

MicroGenesis IndiGIS Enterpise GIS

Change Detection

The AI-powered GIS-based change detection system

Summary

Geo Intelligence solution to detect and analyze changes occurring in the same geographical area over time enabled with AI based Satellite Imagery Analysis capability.

The solution includes change detection, segmentation, classification, object detection, spatio-temporal data analysis, geospatial data management

The solution is a complete local / on-premises AI infrastructure that provides users the ability to customize the AI models as per their local AOIs with a low turnaround time and have capability for quick analysis of data pertaining to their respective areas of interest.

MLOPS pipeline

Enabled with MLOPs pipeline features, the solution also can be configured for automated data analysis using state-of-the-art AI algorithms and processing techniques well integrated with the Enterprise GIS.

The ML Pipeline Toolset is the key capability of the solution, which allows the user to configure the process of building, training, deploying, and maintaining machine learning models. The user can experiment with different data preprocessing techniques, feature selections, and models by modifying individual steps within the pipeline.

Dataset Creator Tool

Dataset creator tool allows pre-processing of input imageries using the Annotation tool. ML Dataset can be easily built using the dataset creator tool. Multiple styles of user-friendly annotations can be made in dataset creator tool. After annotations are prepared in database builder tool the annotated data can be parsed to Model builder tool for developing state-of-the-art AI models, networks for automated/semi-automated processing.

Key Use Cases

1. Segmentation
2. Classification
3. Object Detection
4. Data Pre-Processing
5. AI Model Training
6. Change Detection
7. Geospatial Database Management

Features

- 01 Enterprise GIS
- 02 Supports Vector & Raster Layers
- 03 Supports multi-object/multi-class AI models
- 04 Automated Alert Generation
- 05 Anchored with geo-spatial Postgresql database
- 06 Intuitive annotation workflow
- 07 On premises solution deployment (with no external data transfer)
- 08 Advanced AI model training and database building features
- 09 Hardware acceleration – GPU, multi-core CPU
- 10 Multiple Geospatial formats – KML, XML, GEOTIFF, JPG2000
- 11 Supports EO – Pan, MX, Drone, Aerial, NIR, IR, SWIR, Multi-Spectral
- 12 Supervised, Semi-supervised & Unsupervised learning algorithms

Solution Benefits

An intelligent, automated system that processes satellite images to detect significant changes in specific geographic areas—and then created notifies.

The system compares multi-temporal satellite images (images from different times) to detect:

Physical infrastructure changes

Detection can be pixel-based, object-based, or feature-based, depending on the use case.

Environmental or land cover modifications

GIS-Based AI-Powered Change Detection System

Multi-Model AI Support

Supports Supervised, Semi-Supervised, and Unsupervised Learning for various scenarios

Supervised: For known object detection (e.g., vehicles, buildings).

Semi-Supervised: To expand model capabilities using limited labeled data.

Unsupervised: For anomaly or change detection in unknown terrains or events.

Integrates advanced models

CNNs for object recognition and segmentation

Transformers for spatial-temporal attention

Traditional ML models (Random Forest, SVM) for structured satellite metadata

Frameworks supported:
PyTorch, TensorFlow, Keras, ONNX

Multi-Format Geospatial Data Support

Fully compatible with standard and custom formats:

GeoTIFF, KML, Shapefiles (.shp), XML/GML, GeoJSON

Allows direct import/export from GIS platforms

User Experience & GIS Integration

Web-based UI with:

- Interactive layer control
- AOI-based filtering
- Multi-temporal slider
- Exports to GIS formats (GeoTIFF, KML) or web services (WMS/WFS)

Time-Series Analysis & Trend Prediction

- Visualizes changes over time with:
- Area change
- Alert frequency

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