GXP Automatic Tools for Object Recognition (GATOR)

An efficient supplement or alternative to Machine Learning that delivers more precise object recognition results

Addressing exponential increases in the volume of imagery collected through a variety of sensors worldwide, GXP Automatic Tools for Object Recognition (GATOR) delivers a streamlined out-of-the-box tool that rapidly detects vehicles and other objects in a variety of image types. Depending on user needs and mission objectives, GATOR can either be used together with our Machine Learning (ML) algorithm, or independently to deliver a robust output including polygon outlines and accurate centering of recognized objects, without the need for time-consuming training of object detection models.

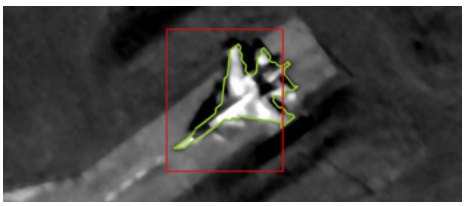
Integrated into our SOCET GXP® software and available through the GXP Xplorer® Workflow Manager, users configure GATOR with 3-D models in a FACET format that are graphical, dimensionally accurate, and scaled models of the objects of interest. GATOR includes the following benefits:

- Geolocation, dimensions, orientation, articulation, shadows, and image coordinates of recognized objects.
- Two-color mask overlay option to distinguish objects from shadows.
- Polygon overlays displayed in proper perspective via photogrammetry confirm object types.
- Image chips of objects stored in NITF standard format maintain full image metadata and ensure compatibility.

GATOR is particularly effective at detecting rare, hard-to-find objects that are seldom seen in the open, as well as objects in man-made high clutter environments. Integrated seamlessly into GEOINT workflows, GATOR object detections can also be used to train ML software.

Note: GXP® also offers ML capabilities, integrated with both GXP Xplorer and SOCET GXP software, that enable advanced identification and interpretation of objects of interest.

GATOR vs. Machine Learning



GATOR (Green outline)

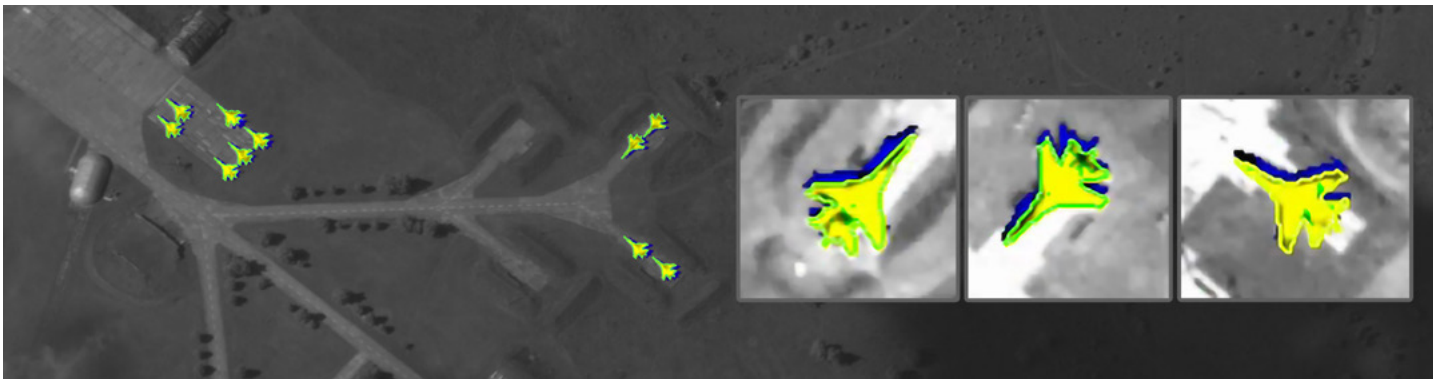
- Requires an image and 3-D models of objects.
- Outputs polygon outlines of object and shadows.
- Object orientation and dimension are detected.
- Object and shadow pixels are distinguished by a segmented mask.
- Center of object is known more precisely.

Machine Learning (Red box)

- Requires labeled training data and ML model training to detect objects.
- Most ML object detectors output a simple bounding box.
- Object is not distinguished from surrounding pixels.
- Bounding box is not always centered on object.

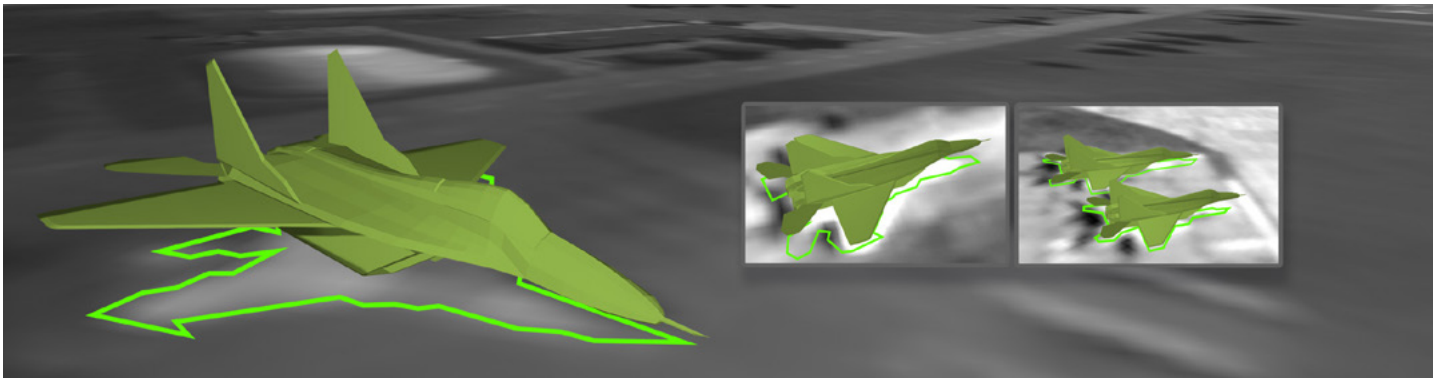
Inputs: Either previously created or newly developed 3-D models of objects

GATOR is not Machine Learning, so no training is needed.



Outputs: Labeled Data

The image chips in NITF format, including 2-D and 3-D polygons. Segmentation: yellow indicates object, blue indicates shadow. Radar shadows are indicated for Synthetic Aperture Radar (SAR).



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Analyst validation

Object detections are rendered on the image as 3-D models or 2-D graphic polygons for validation and quality approval.

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