

1 Title

AI-Powered Swimming Pool Detection for Home Insurance Underwriting & Claims Intelligence

2 Background / Context

Home insurance underwriting depends heavily on accurate property risk assessment. One major risk factor in residential insurance is the presence of a **swimming pool** — which increases:

- Liability exposure (slip & fall, third-party injury)
- Drowning risk
- Property damage exposure
- Premium mispricing risk

However, many insurers rely on:

- Self-declared information by policyholders
- Manual inspections
- Outdated property records
- Limited field verification

This creates several operational challenges:

- Undisclosed pools leading to underpriced policies
- Manual and slow underwriting workflows
- Fraud during claims (e.g., post-event pool construction)
- High inspection costs
- Inconsistent risk classification

With the availability of high-resolution satellite imagery, aerial photography, and computer vision, insurers can now automate detection of swimming pools and integrate that insight into underwriting and claims processes.

Insurers need AI-powered geospatial intelligence to automatically identify swimming pools, monitor changes over time, and flag risk anomalies.

3 Problem to Solve

Participants need to:

Build or design an AI-powered swimming pool detection and risk intelligence system

That helps home insurers automate underwriting validation and claims assessment

By solving the lack of automated property-level visual risk detection.

The system should be able to:

- Detect swimming pools from satellite or aerial images
- Classify pool type (in-ground, above-ground, covered, uncovered)
- Detect newly constructed or removed pools via time-series comparison
- Generate a property-level risk indicator
- Flag non-disclosed pools during underwriting
- Support claims validation by verifying pool existence before loss date
- Provide explainable visual evidence for underwriters

4 Objectives

Participants should aim to:

- ✓ Improve underwriting accuracy
- ✓ Reduce manual inspection costs
- ✓ Detect misrepresentation or non-disclosure
- ✓ Support fraud detection in claims
- ✓ Provide explainable AI outputs for decision-making

- ✓ Enable scalable property-level risk intelligence

5 Scope & Constraints

In Scope

Participants may build solutions that include:

- Computer vision models for pool detection
- Satellite / aerial image processing pipelines
- Change detection across time-series imagery
- Property-level risk scoring
- Bounding box / segmentation visualization
- Explainable AI overlays
- Interactive dashboard for underwriting or claims review

Technologies Allowed

Participants may use:

- Computer vision (CNN, Vision Transformers, YOLO, Mask R-CNN, etc.) or Vision Large models
- Geospatial analytics (GIS tools, GeoJSON, raster processing)
- Time-series image comparison
- Machine learning & deep learning models
- Cloud platforms
- Data visualization tools
- Any programming language or framework

Data Sources Allowed

Participants may use publicly available datasets such as:

Satellite & Aerial Imagery

- Google Open Buildings Dataset
- Sentinel-2 Satellite Imagery (ESA Copernicus)
- USGS Earth Explorer
- OpenAerialMap

Geospatial Property Data

- OpenStreetMap building footprints
- Public cadastral data (where available)
- Kaggle building footprint datasets

Image Datasets for Training

- Kaggle Swimming Pool Detection datasets
- xView Satellite Dataset
- SpaceNet Dataset

Participants may combine additional open datasets if properly cited.

Out of Scope

Participants are NOT required to:

- Integrate directly with real insurance systems
- Build regulatory compliance modules
- Develop premium pricing engines
- Deploy real-time satellite feeds
- Handle PII or customer-sensitive data

Constraints

- Hackathon duration: as specified by organizers
- Prototype-level solution acceptable
- Public datasets only (unless approved)
- Internet access as per event rules

Expected Deliverables

Teams should provide:

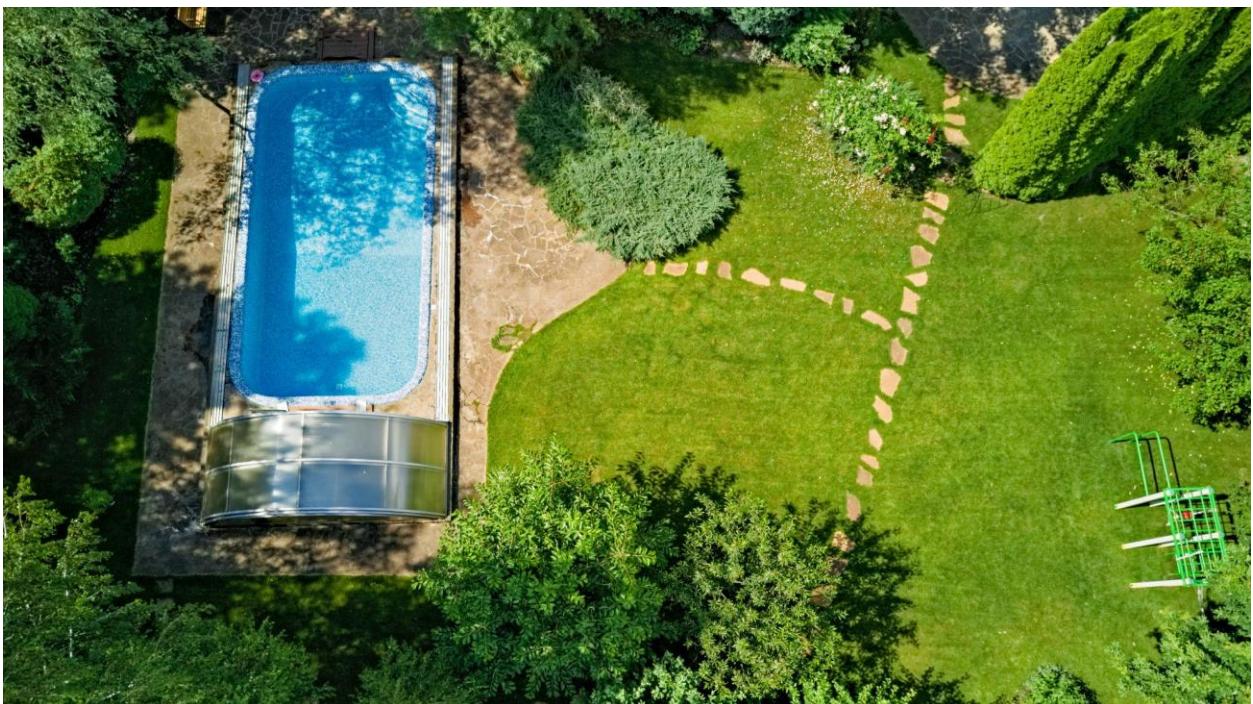
- ✓ Working prototype or functional demo
- ✓ Source code repository
- ✓ System architecture diagram
- ✓ Model design explanation
- ✓ Short presentation explaining use case & value
- ✓ Documentation describing datasets and approach

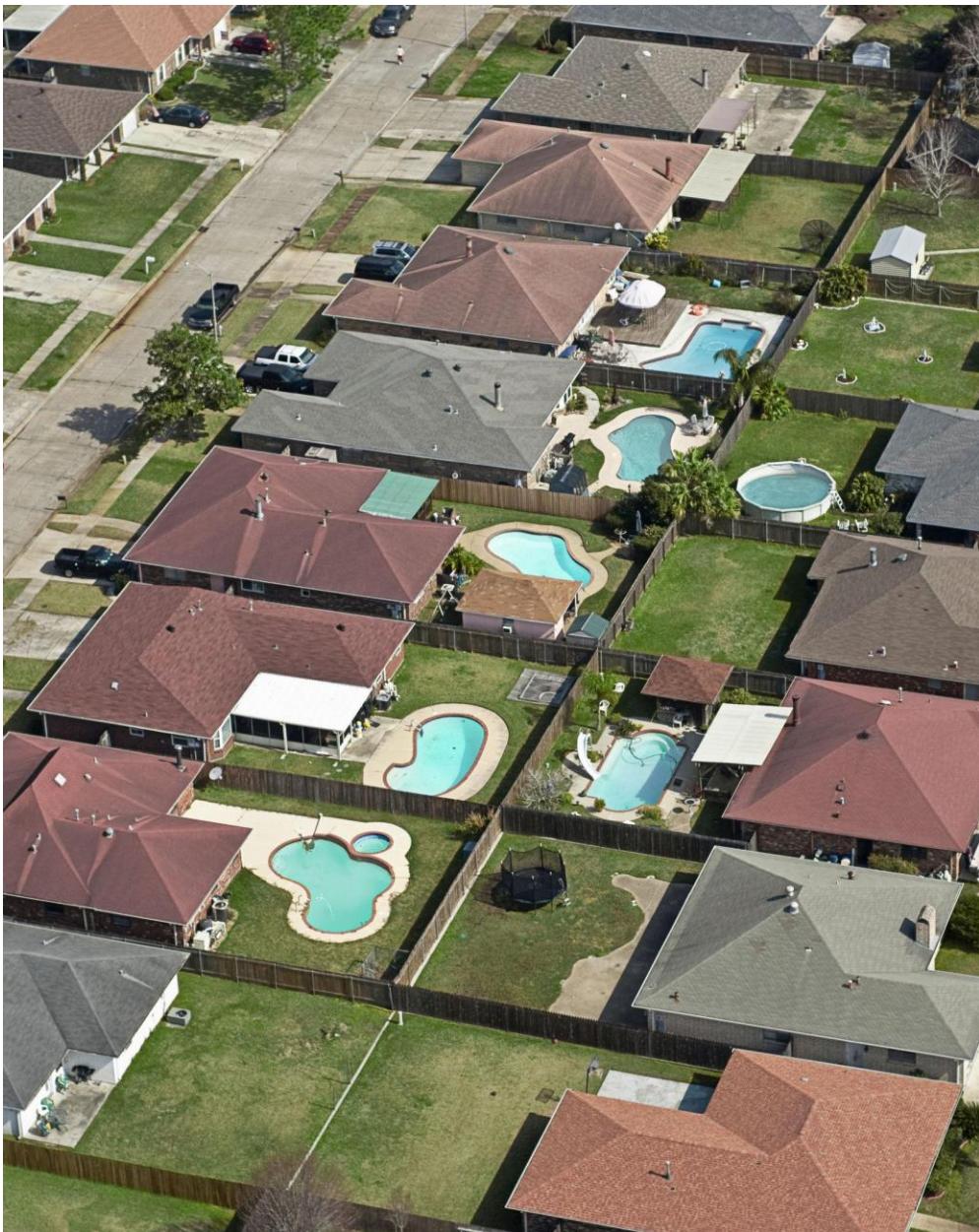
Optional:

- Model performance metrics (Precision, Recall, IoU, F1 Score)
- Risk scoring methodology
- Before/After change detection demo
- Explainability visualization

7 Example Solution Components (Illustrative)

* Pool Detection via Satellite Imagery







AI model identifies rectangular/oval blue structures within property boundaries and segments pool areas.

