AUTOMATED POI VALIDATION & SCENARIO CLASSIFICATION

Analysis through Rule-Based and ML Approaches

OUR TEAM

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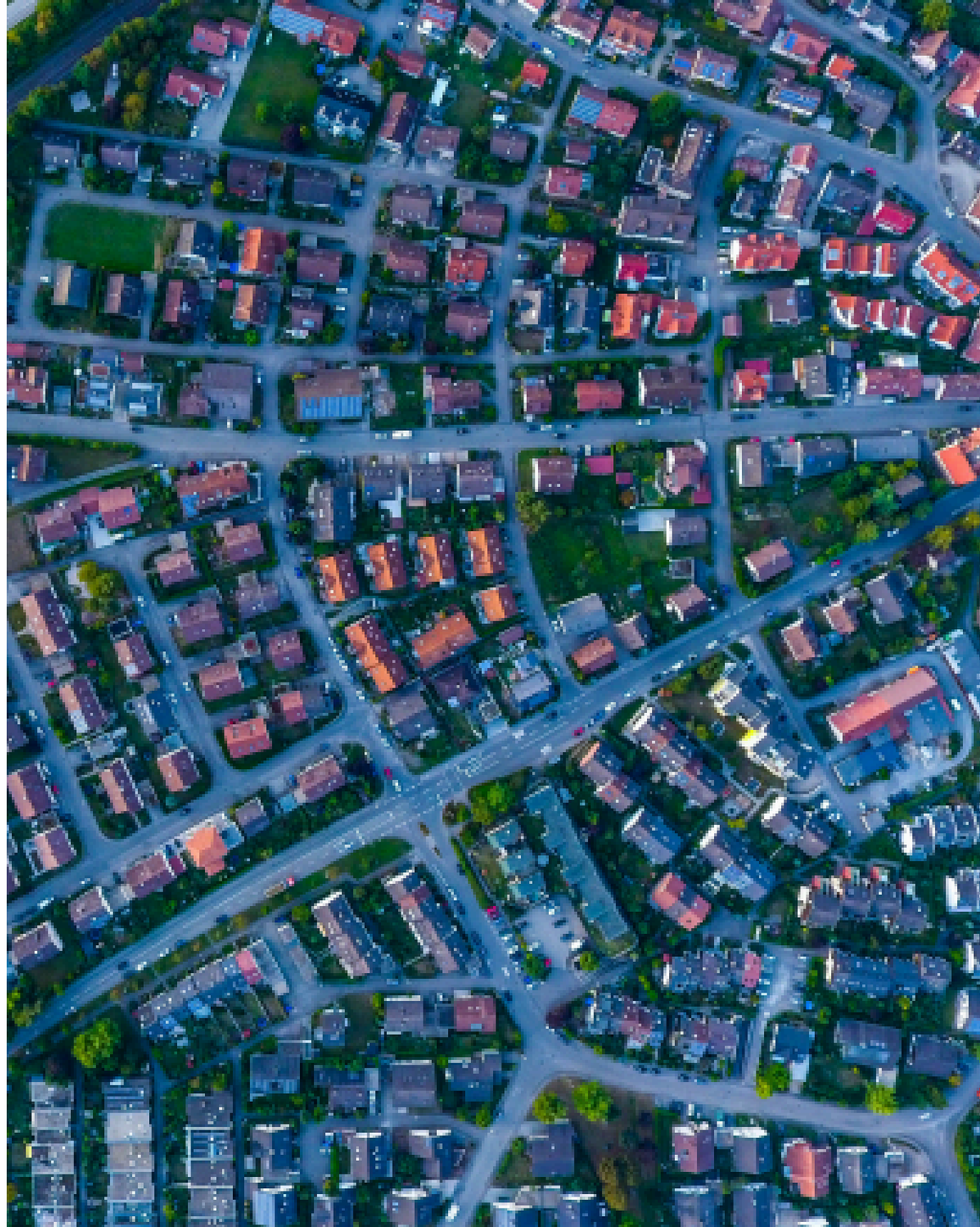
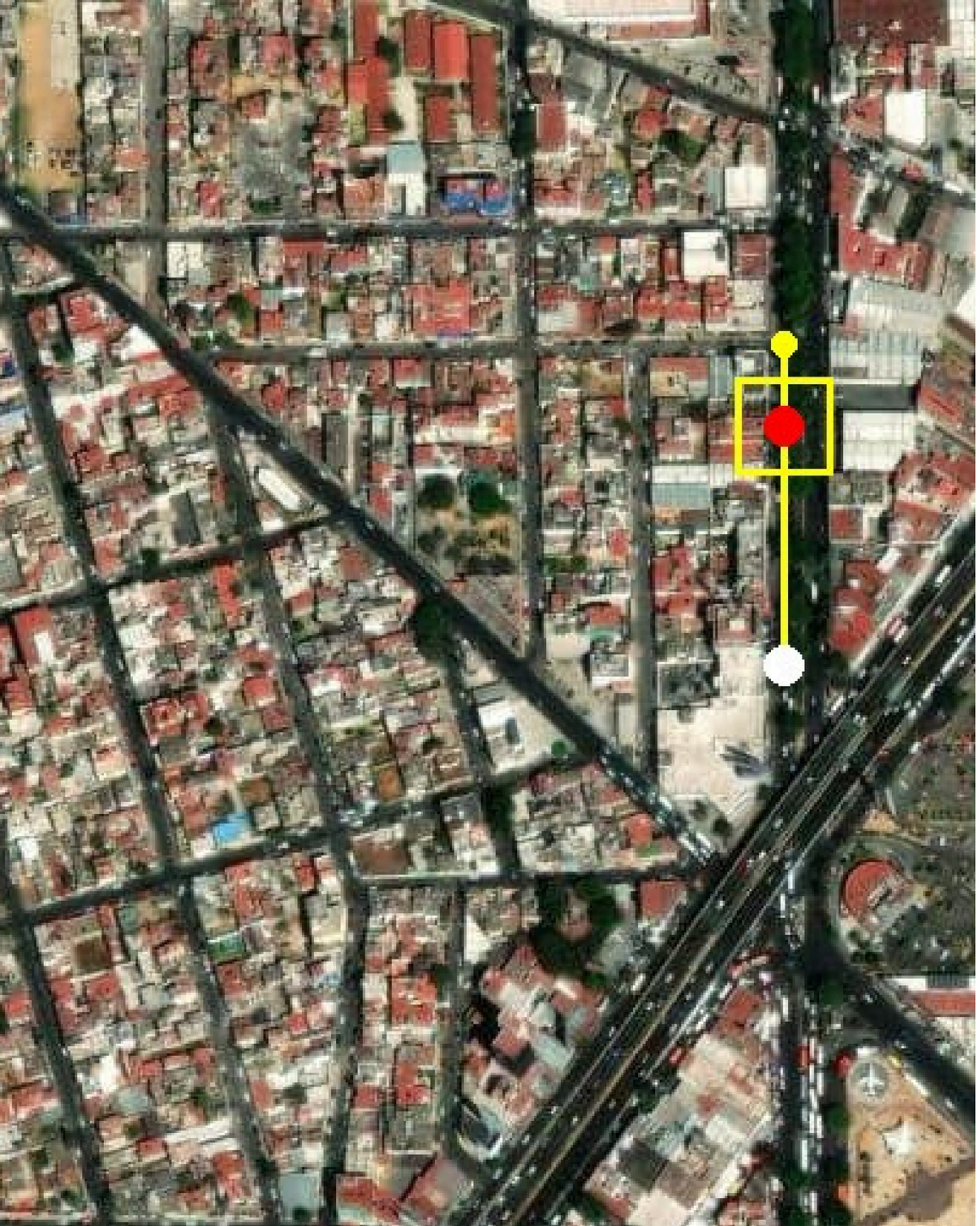
Problem statement

Manually correcting large geospatial datasets, like verifying POI placements, is impractical at scale due to the need for precise spatial alignment, street-side accuracy, and consistency. Traditional QA relies on slow, error-prone visual checks, creating a bottleneck as datasets grow. Automation is essential to ensure quality efficiently.





WHAT WE BUILT

- Satellite Viewer for spatial inspection
- Rule-based engine for scenario detection
- ML model for scenario classification
- Duplicate identifier
- Real-time feedback overlay

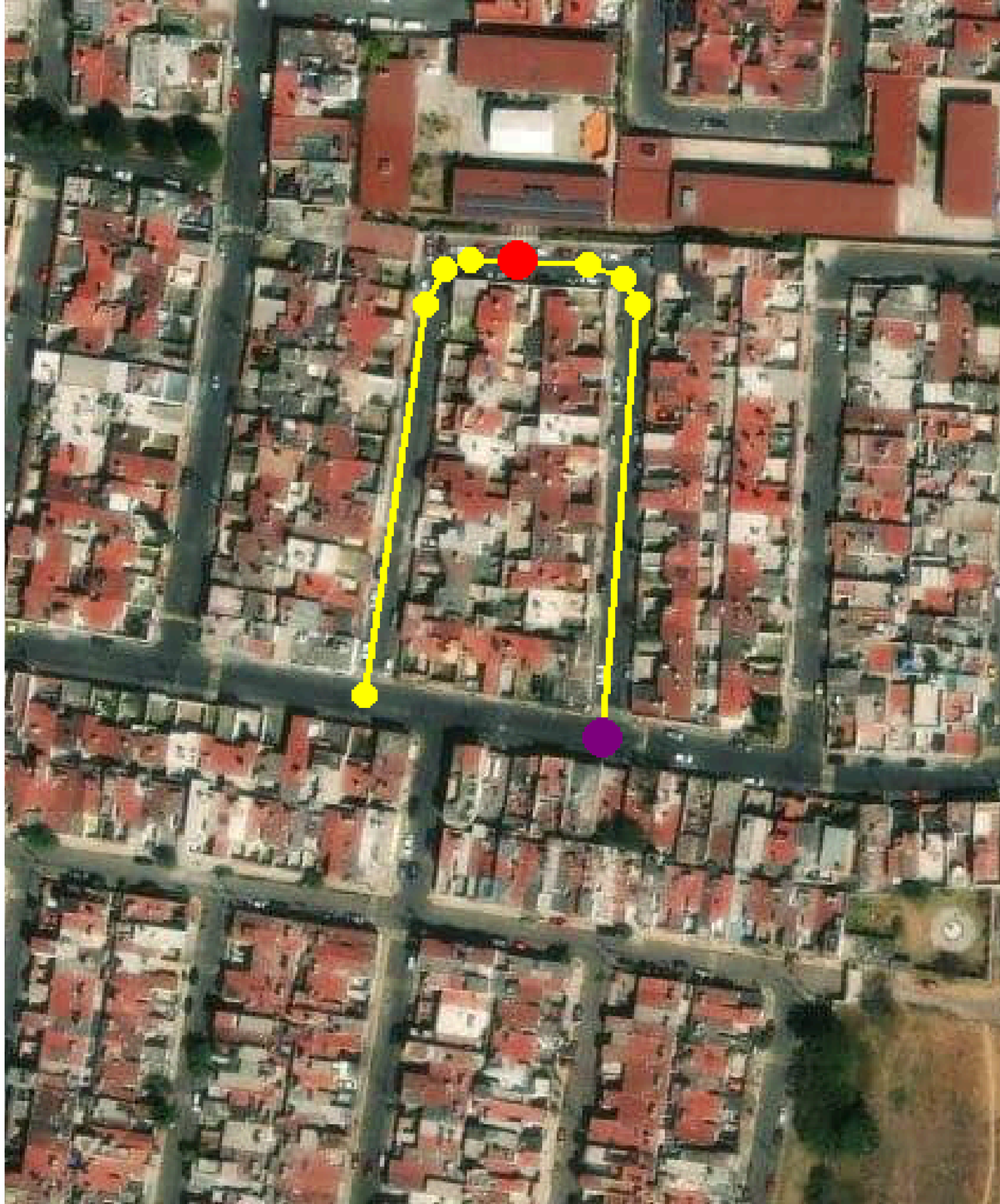
Rule-Based Validation Logic

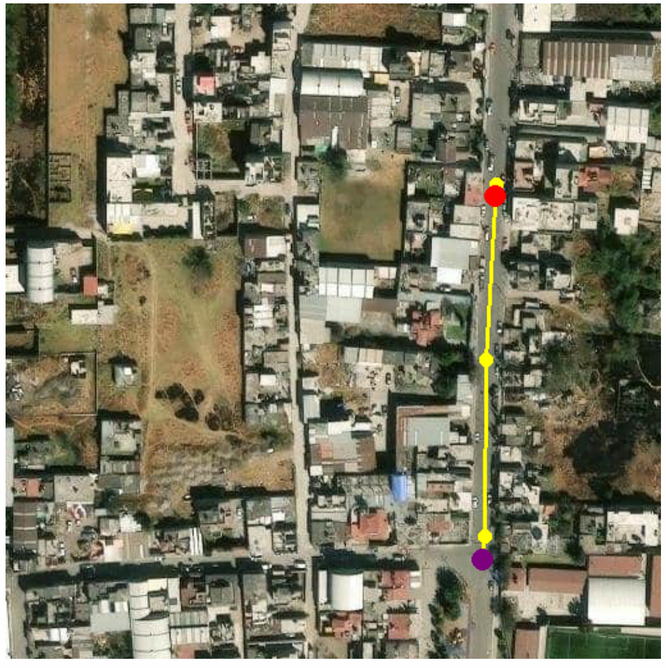
- Check for link presence
- Identify expected coordinate
- Compare actual vs expected distance
- Compare attributes
- Assign scenario + reason

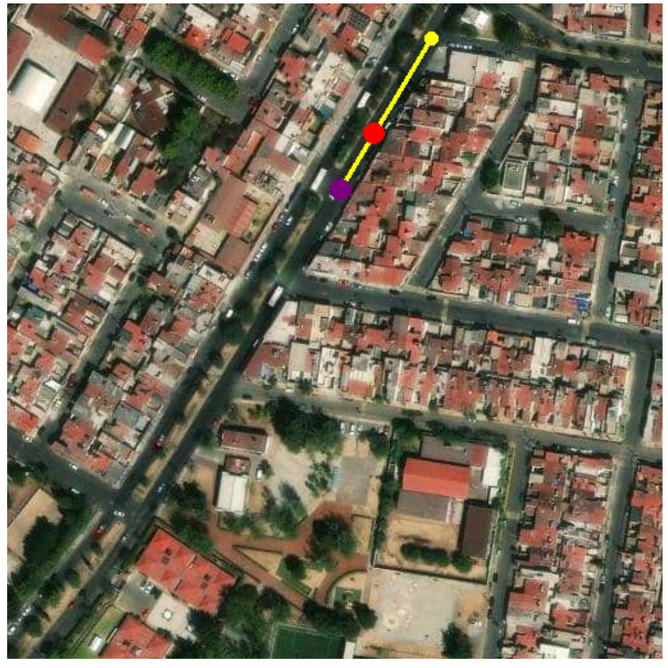
LINK_ID	POI_ID	POI_NAME	ST_NAME	link_id	_scenario	_reason
1346737015	1154356661	TACO SALSA	AVENIDA JUA	1346737015	3	Name mismatch (link: "AVENIDA BENITO JUÁREZ", POI: "AVENIDA JUAN PABLO II")
1346737015	1154356662	OXXO	AVENIDA JUA	1346737015	3	Name mismatch (link: "AVENIDA BENITO JUÁREZ", POI: "AVENIDA JUAN PABLO II")
702650117	1178940778	EMMANUEL	BOULEVARD S	702650117	3	Name mismatch (link: "BOULEVARD LÁZARO CÁRDENAS", POI: "BOULEVARD SOLIDARIDAD LAS TORRES")
721496780	1179042774	MISCELANEA	BOULEVARD S	721496780	3	Name mismatch (link: "BOULEVARD LÁZARO CÁRDENAS", POI: "BOULEVARD SOLIDARIDAD LAS TORRES")
848010952	1202700681	MISCELÁNEA	CALLE RÍO VIE	848010952	3	Name mismatch (link: "CALLE MARIO ORTEGA MONROY", POI: "CALLE RÍO VIEJO")
848010952	1202700682	TLAPALERÍA F	CALLE RÍO VIE	848010952	3	Name mismatch (link: "CALLE MARIO ORTEGA MONROY", POI: "CALLE RÍO VIEJO")
702719788	1202700660	TIENDITA DE	CALLE RÍO VIE	702719788	3	Name mismatch (link: "CALLE MARIO ORTEGA MONROY", POI: "CALLE RÍO VIEJO")
1119528348	1192852594	RÓTULOS EN	AVENIDA PRO	1119528348	3	Name mismatch (link: "CALLE ANTONIO J. TORRES", POI: "AVENIDA PROFESOR R. HERIBERTO ENRÍQUEZ")
1347025288	1048914837	FARMACIAS G	AVENIDA YUF	1347025288	3	Name mismatch (link: "AVENIDA EMILIANO ZAPATA", POI: "AVENIDA YURIRIA")

Visual Inspector (Satellite View)

- Satellite Raster Tile API
- Graphic Markers:
  - Street LineString
  - Reference Node
  - Point of Interest (POI)





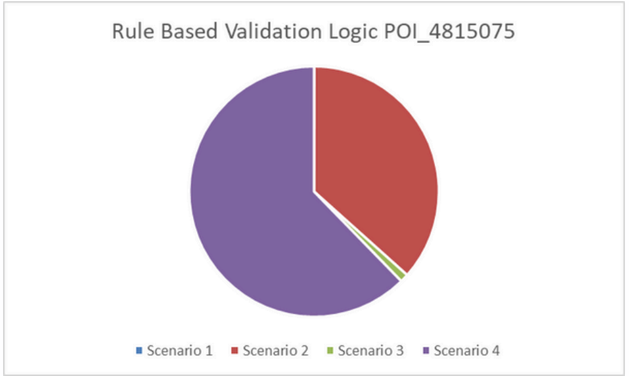


Machine Learning Integration

- Detection through color of the important points and lines
- Calculation of the right and left side of the road given the reference node
- ML integration for structures and buildings identification
- Comparation to data base location

Results & Insights

- Through the integration of a rule-based engine, a satellite viewer, and a machine learning model, we were able to automatically classify POIs into different scenarios.
- A large portion of POIs were flagged due to invalid atributes.
- Offset distance was consistently detected by both the rule-based engine and the ML model, showing strong alignment between logic-based and learned behavior.
- The model revealed inconsistencies in the data, often harder to catch manually.
- A significant number of POIs were validated as correct, helping isolate errors from clean data.



Future work: Our next steps

Improve ML accuracy with more data

- Collect a larger labeled dataset of POI–link associations (valid/invalid) across regions.
- Engineer richer features:
  - Distance to link
  - Percent along link (PERCFRREF)
  - Road type & POI category
  - Local POI density
- Use scalable models: Random Forest, LightGBM, or spatial transformers.
- Apply Active Learning: flag uncertain cases for human review and retrain iteratively.
- Optimize for big data with batch/cloud processing (e.g., Dask, Spark, AWS/GCP).

Building smarter geospatial systems starts with cleaner data, and scalable intelligence makes it sustainable.

Thank you!

See you again soon!