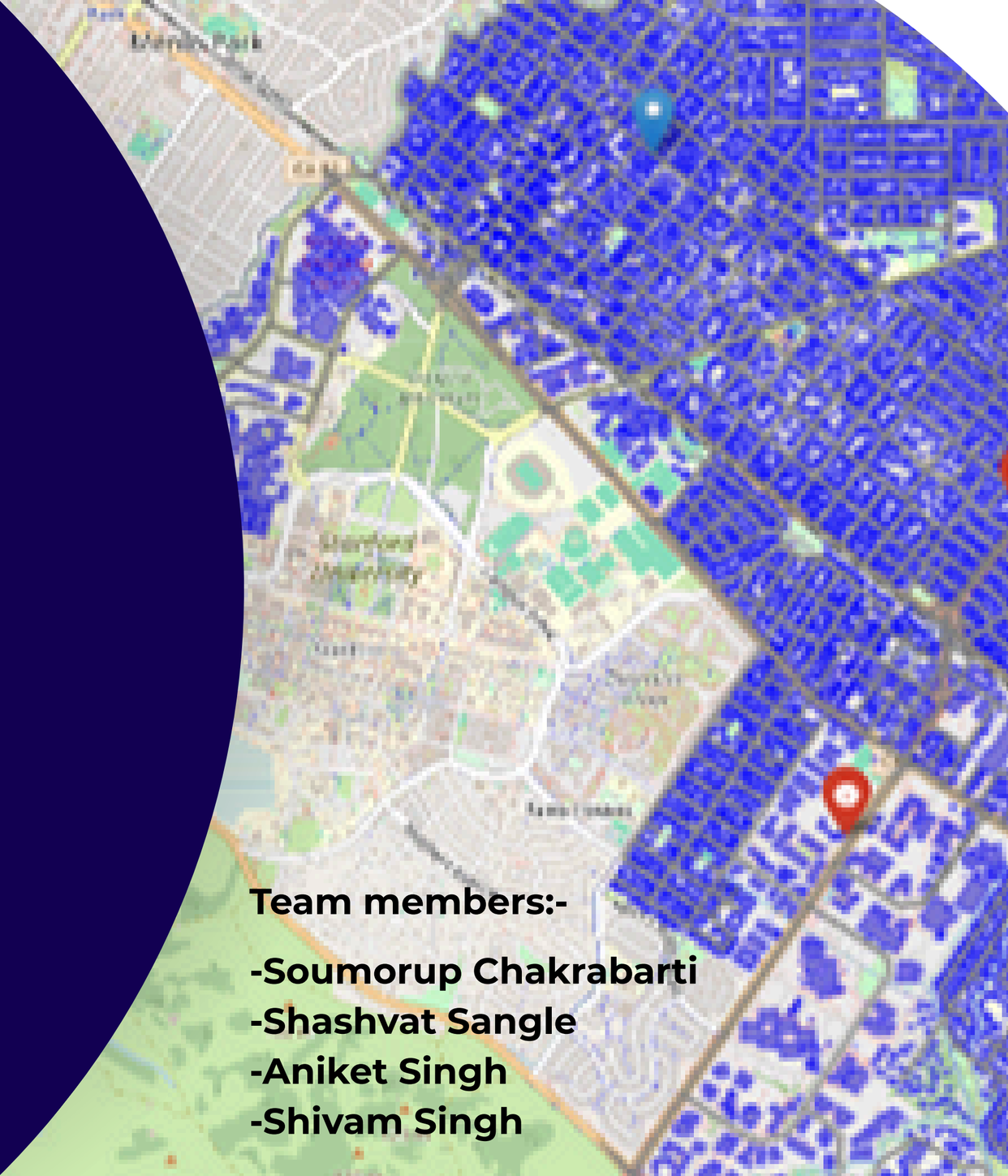
Problem Statement 6:

AI-Driven Map Updates from Crowdsourced Data

Presented by Team Bundesliga



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Problem Statement

AI-Driven Map Update from Crowd-Sourced Data
Creating and maintaining a real-world digital map is challenging due to constant changes in the environment. The goal is to develop an AI-first system that can automatically process raw geospatial data—like satellite images, GPS logs, and sensor data—to generate accurate, semantically rich, and up-to-date digital maps.
Manual map curation lacks scalability. With AI, there is a unique opportunity to transform map generation and updating into an intelligent, autonomous process.

Introduction

- Digital maps are built using complex pipelines: ingestion, extraction, enrichment, and rendering
- Traditional methods rely heavily on manual effort and rule-based systems
- These approaches limit scalability and speed of updates
- AI advancements (foundation models, computer vision, NLP) enable automation of the entire pipeline
- Our project uses generative AI and real-world data to create an intelligent map update prototype

Objectives

- To automate the process of updating digital maps using AI.
- To extract key map features (roads, buildings, signs) from raw data.
- To enrich map components with semantic information.
- To detect and correct inconsistencies or outdated information.
- To build a scalable and adaptable map-update pipeline.
- To demonstrate a working prototype using real-world APIs and models.

Our Approach

Data Acquisition

We use Google Maps APIs for map rendering and Google Street View imagery.

Feature Detection

YOLO (You Only Look Once) object detection model is used to identify elements such as vehicles, signboards, and buildings from street images.

Edge Detection

Using Python (Google Colab), we analyze and identify edges of components (e.g., road boundaries, infrastructure edges) for spatial structuring.

Integration

Combining data layers (API + AI models) into a unified representation for map updates.

Technologies Used

Google Colab (Python)

End-to-end implementation, integration, and visualization.

YOLO (Object Detection)

Real-time detection of map objects like traffic signs, cars, pedestrians, etc

Google Maps API & Street View API

Used for map integration, street-level imagery, and positional context.

OpenCV & Edge Detection Algorithms

For identifying edges and spatial boundaries in map elements.

Web App

MapInsight AI

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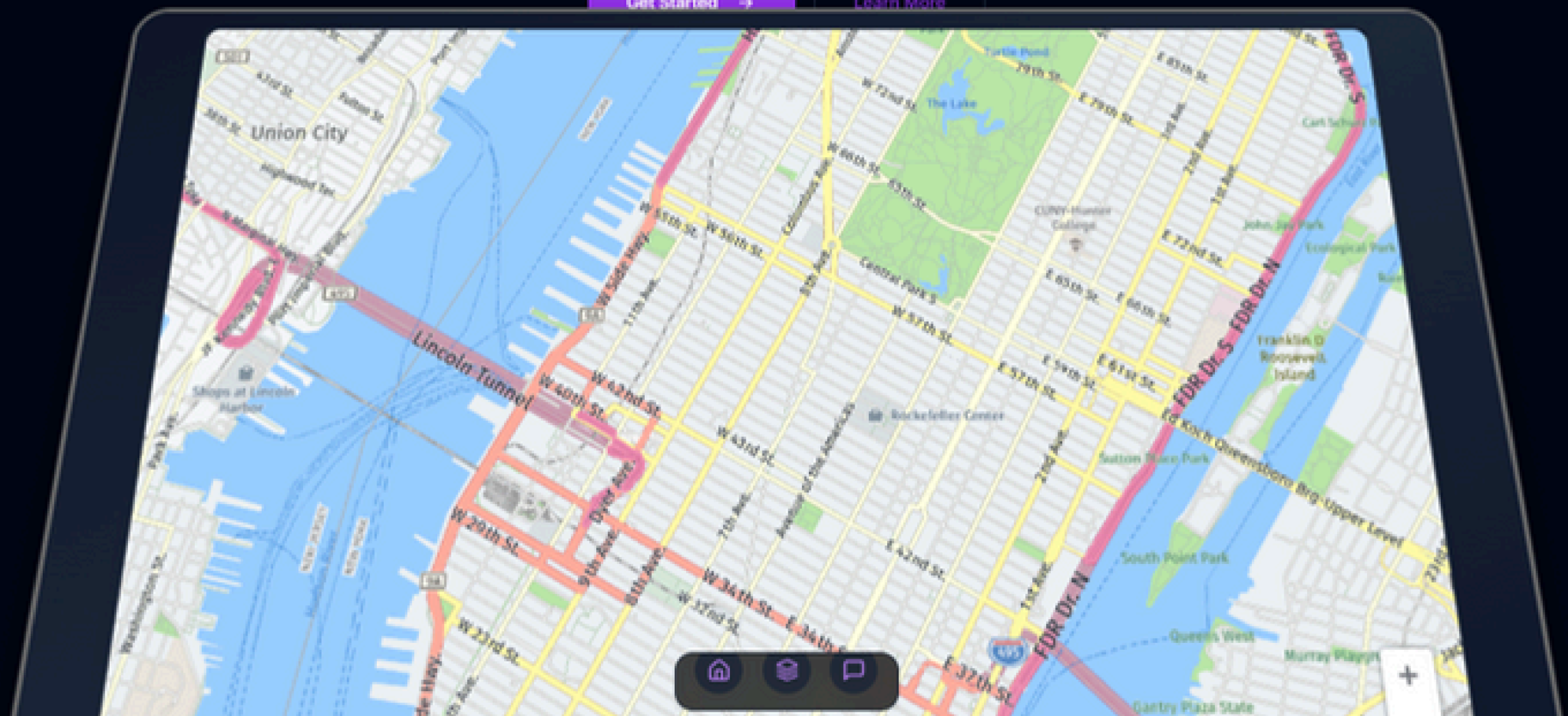
Analyze Locations with

AI-Powered Precision

Get comprehensive insights on any location with satellite imagery, construction mapping, population data, air quality metrics, and road development analysis.

Get Started →

Learn More



Web App

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Create an account

Enter your email below to create your account

Email

name@example.com

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Sign Up

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MapInsight AI

Dashboard History Settings

Location Analysis

Enter a location to generate an AI-powered analysis with satellite imagery, street view, construction mapping, and environmental data.

andheri,mumbai

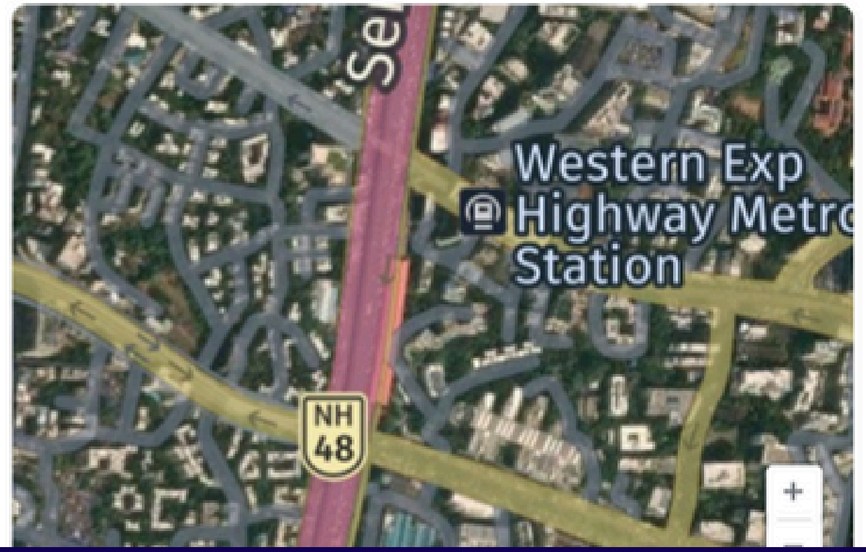
Analyze Location

Aerial View Street View

Andheri Flyover, Bima NGR-Margdarshan, Andheri East, Mumbai 400069, India

HERE Maps AI Enhanced

Live Map Satellite AI Analysis Data



Analysis Report

Population Air Quality Road Development

Population Statistics

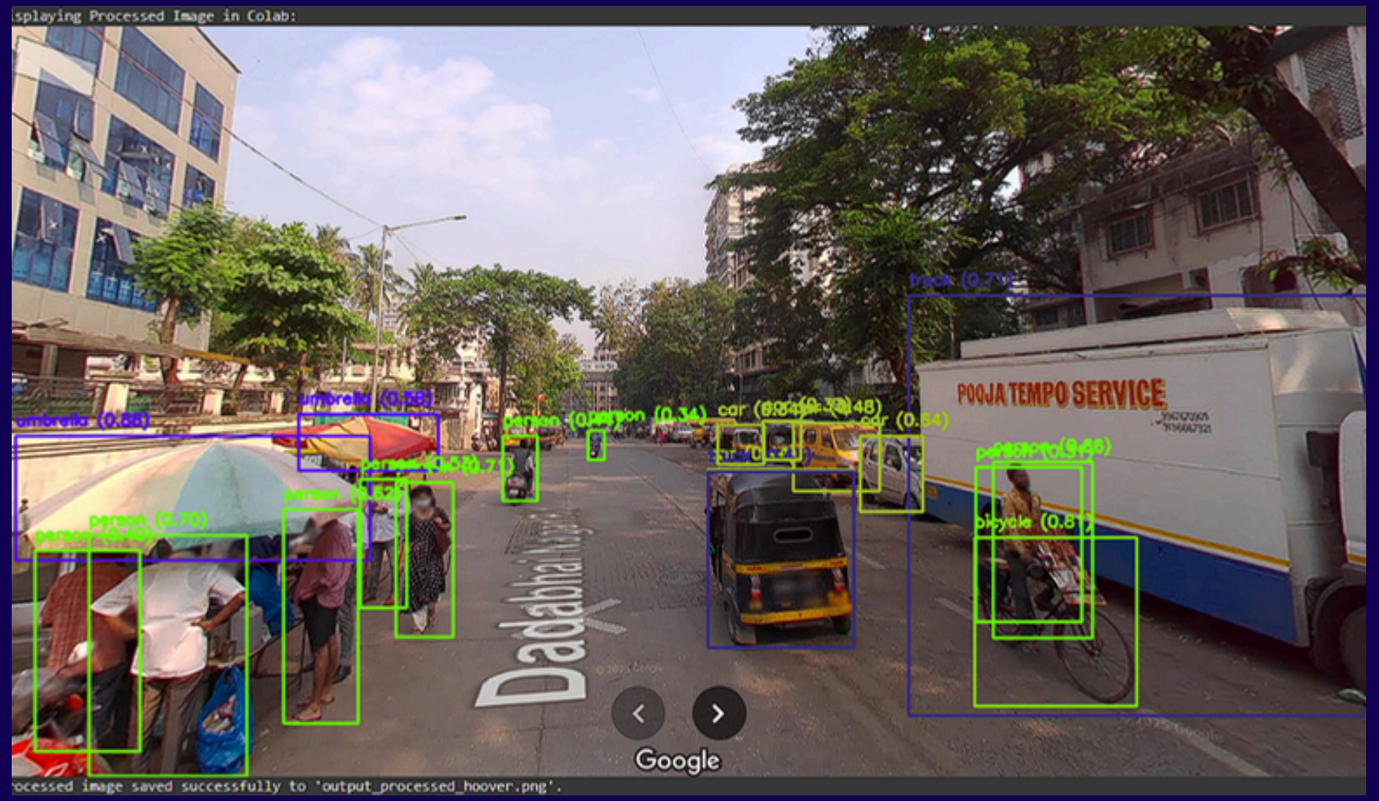
Demographic data for Andheri Flyover, Bima NGR-Margdarshan, Andheri East, Mumbai 400069, India

Total Population	Population Density	Annual Growth
295,424	4,142 /km²	1.5%

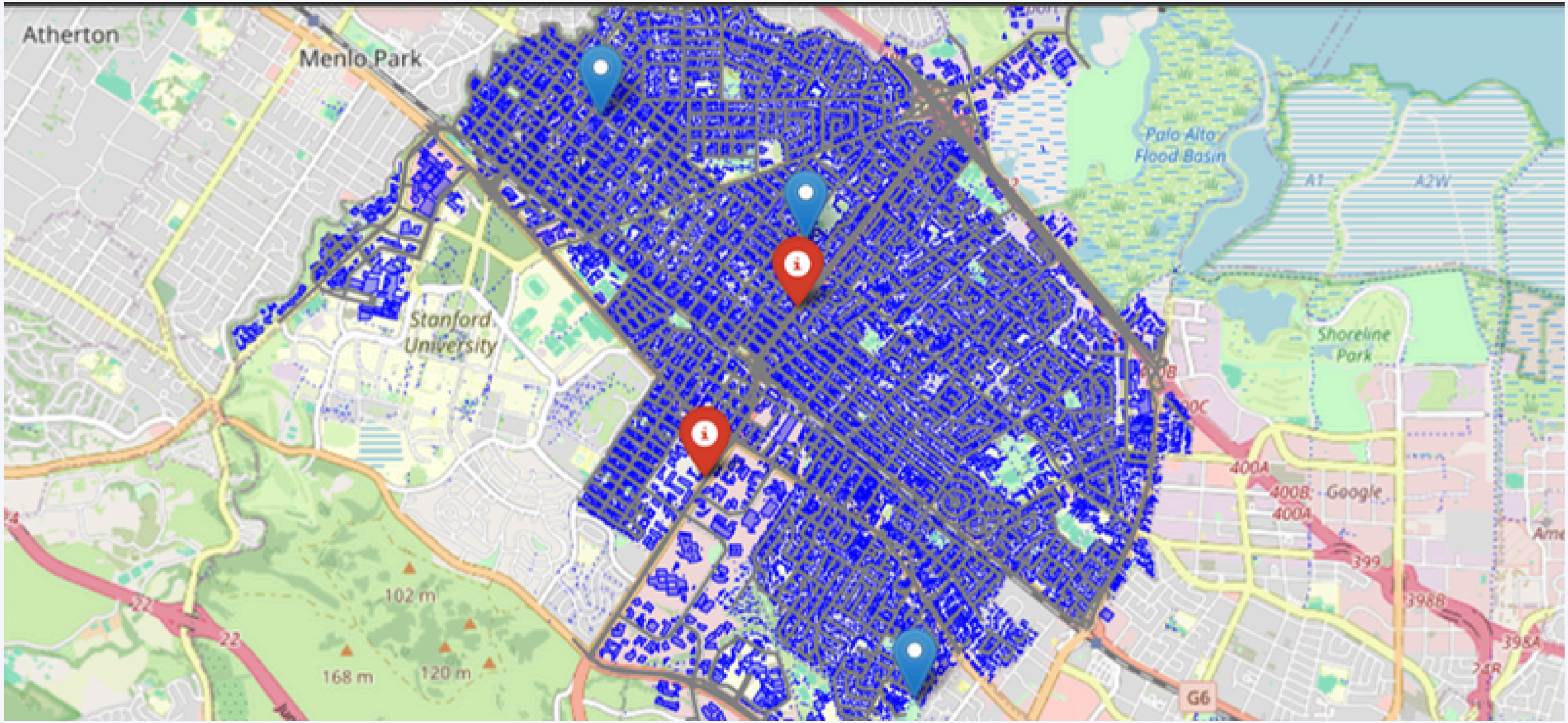
Population Insights

This area has a high population density with a steady growth rate. The demographic distribution suggests a younger population profile.

YOLO INTEGRATION



RESULTS AND MAP OUTCOMES



RESULTS AND MAP OUTCOMES

Results

- Successfully detected and labeled objects on real-world maps.
- Detected spatial boundaries for various map components.
- Demonstrated potential for real-time updates using crowd-sourced visuals.

Future Enhancements

- Integrate Lidar and GPS traces for higher spatial accuracy
- Expand YOLO object classes for richer feature detection
- Use NLP for place name tagging and POI classification
- Employ Generative AI to simulate new map data and fill in missing features
- Build a user feedback loop to validate and refine updates

Thank you