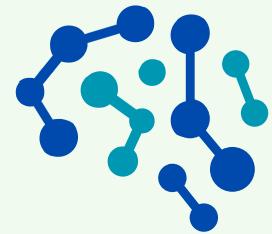


AI-Powered Pothole Detection

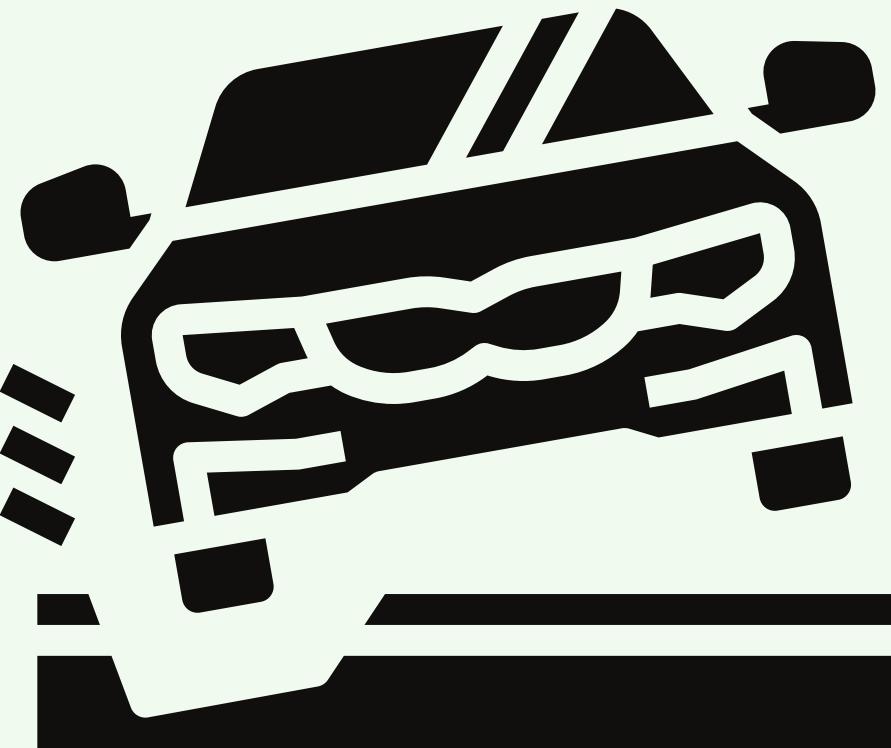
For Safer Roads in Jordan

PRESENTED BY:

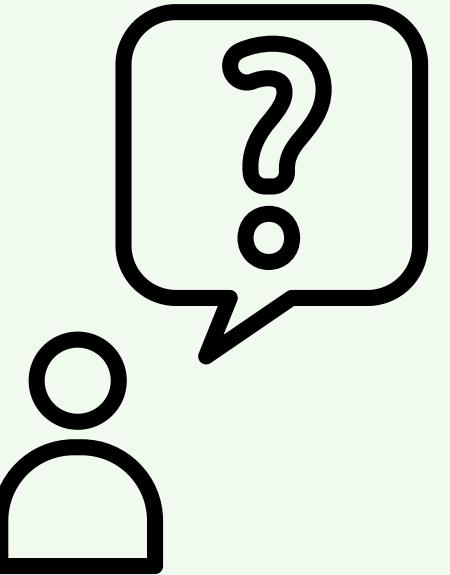


DataCraft

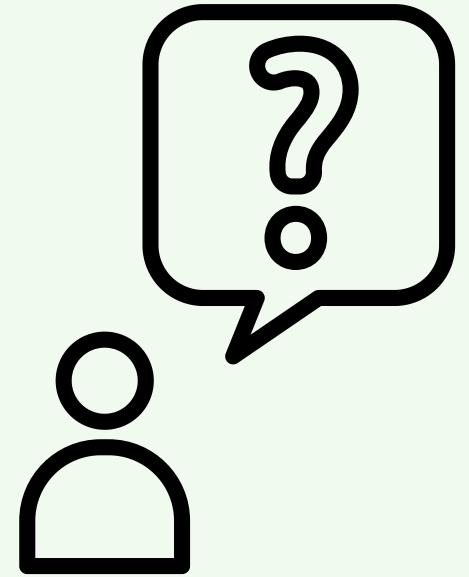
AI
SOLUTIONS



Problem Statement



Problem Statement



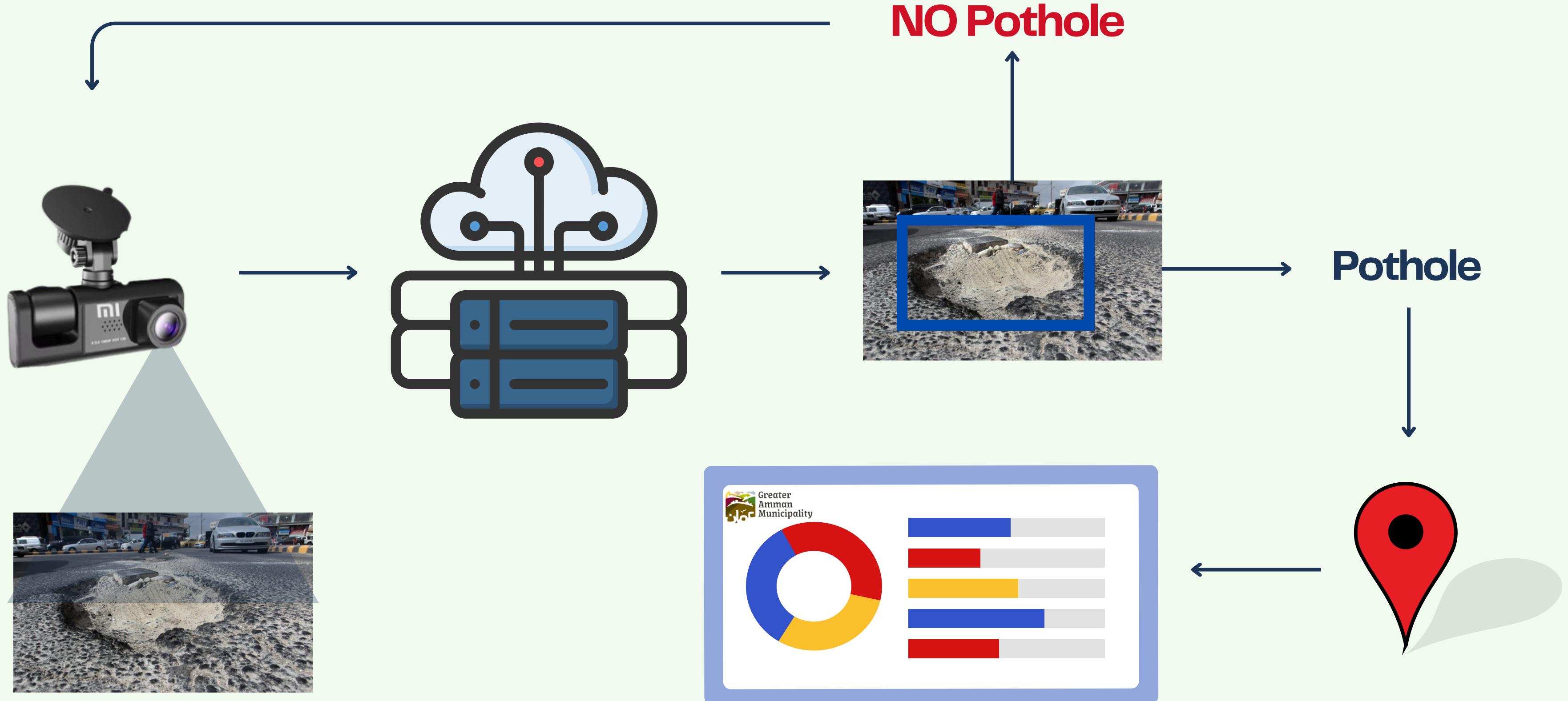
Potholes in Jordan pose safety risks and increase vehicle maintenance costs. Current detection methods are slow and inefficient, leading to delayed repairs.

Dataset Details ↴

Source:

**GitHub dataset
containing road images
with YOLOv8
annotations and from
Jordan streets**

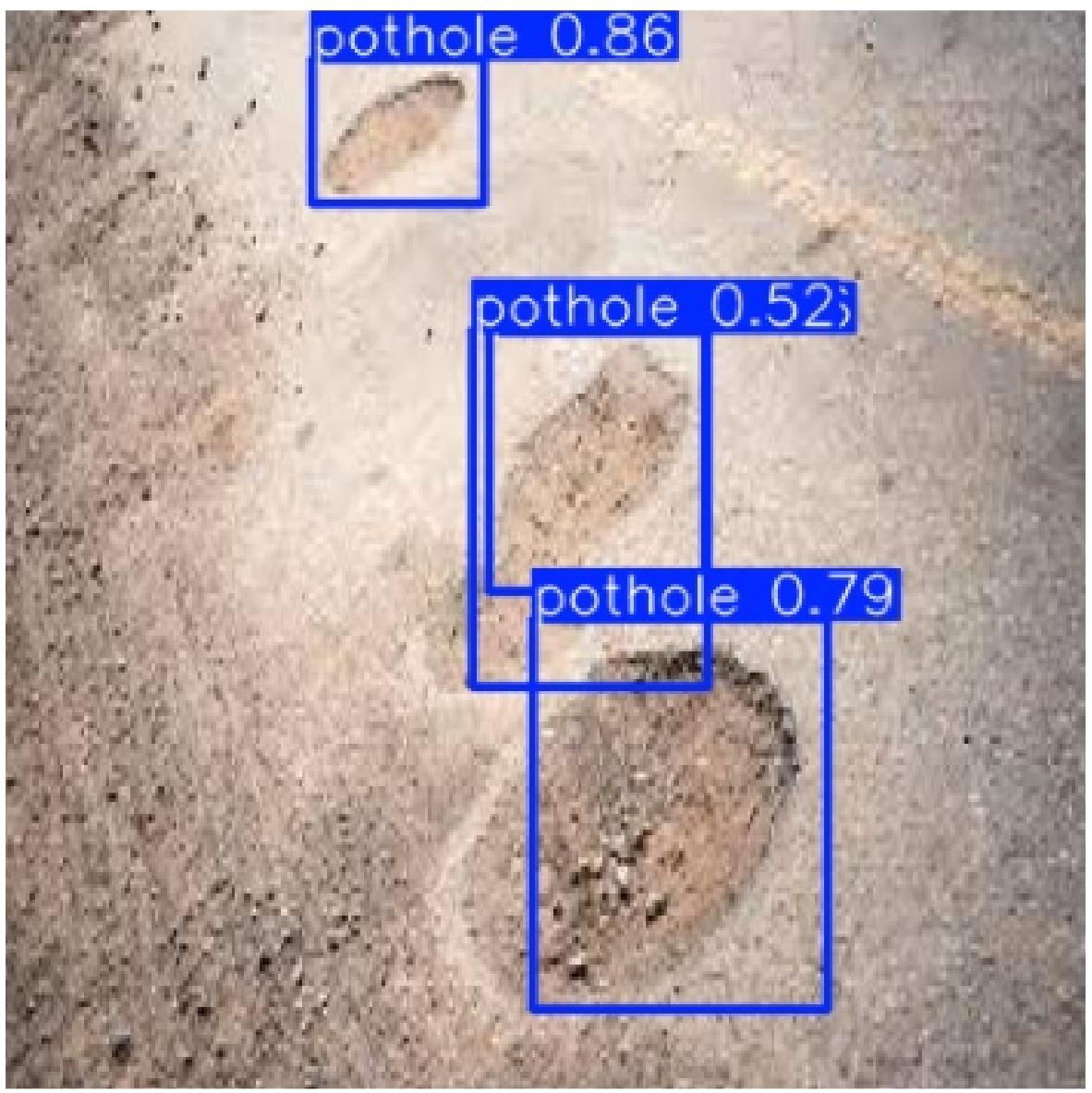




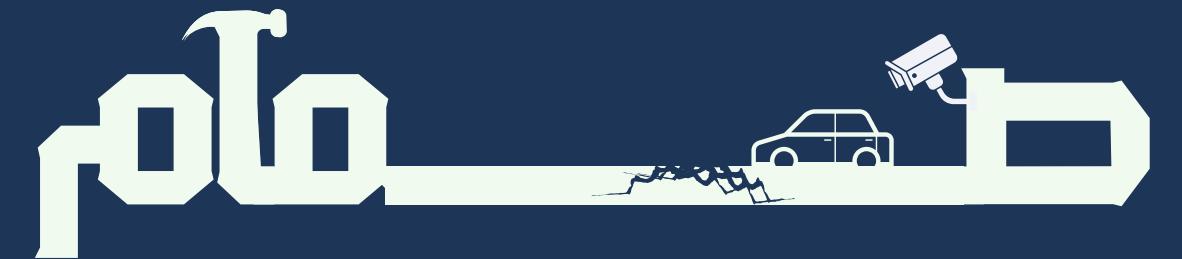
Our AI-Powered Solution:

To solve this issue, we developed an AI-based pothole detection system using **YOLOv8**.

Our model analyzes images of roads and identifies potholes, drawing **Bounding Boxes** around them in real time.



Proposed Solution



Why YOLOv8 ? ↘

Real-Time Detection: Essential for fast identification of potholes on roads.



Versatility: Can handle diverse datasets with varying lighting and road conditions.



YOLOv8 Model Overview ↴

What is YOLOv8 ?

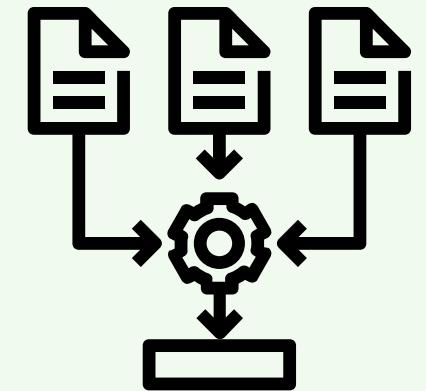
- “You Only Look Once,” a state-of-the-art object detection model.
- Version 8 introduces improvements in speed, accuracy, and flexibility for real-world applications.

Key Features of YOLOv8:

- Real-Time Performance: Detects objects in milliseconds, making it suitable for live applications.
- High Accuracy: Achieves precise localization of objects with minimal false detections.
- Efficiency: Optimized for GPU and CPU usage, reducing computational costs.



Training Process:

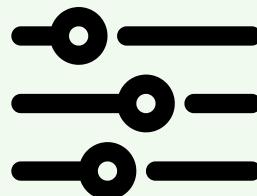


Steps Taken:



- Dataset split: 70% train, 20% validation, 10% test.
- Data augmentation for better generalization.

HyperParameters



- Epochs: 50
- Batch size: 16
- Learning rate: 0.001

Our Demo



Load YOLO Model

Upload Image

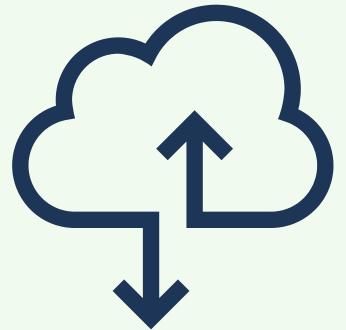
Run Detection

Dash Cam Technology for Pothole Detection

Dash cams are portable, cost-effective cameras that record high-resolution videos while mounted on vehicles. Unlike CCTV, they capture road-level details during movement and can transmit footage via Wi-Fi for real-time processing. Their compatibility with cloud-based AI systems makes them ideal for efficient pothole detection.



Cloud Computing for Pothole Detection



Why Cloud Computing?

- Handles large-scale data from multiple dash cams.
- Supports computationally intensive AI models that local devices cannot process efficiently.



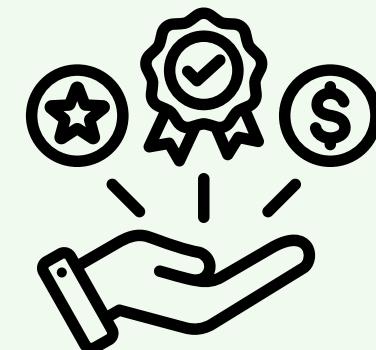
Cloud Storage Options

- AWS S3: Pay-as-you-go, scalable, and reliable.
- Microsoft Azure Blob Storage: Pay-as-you-go, flexible storage solution.



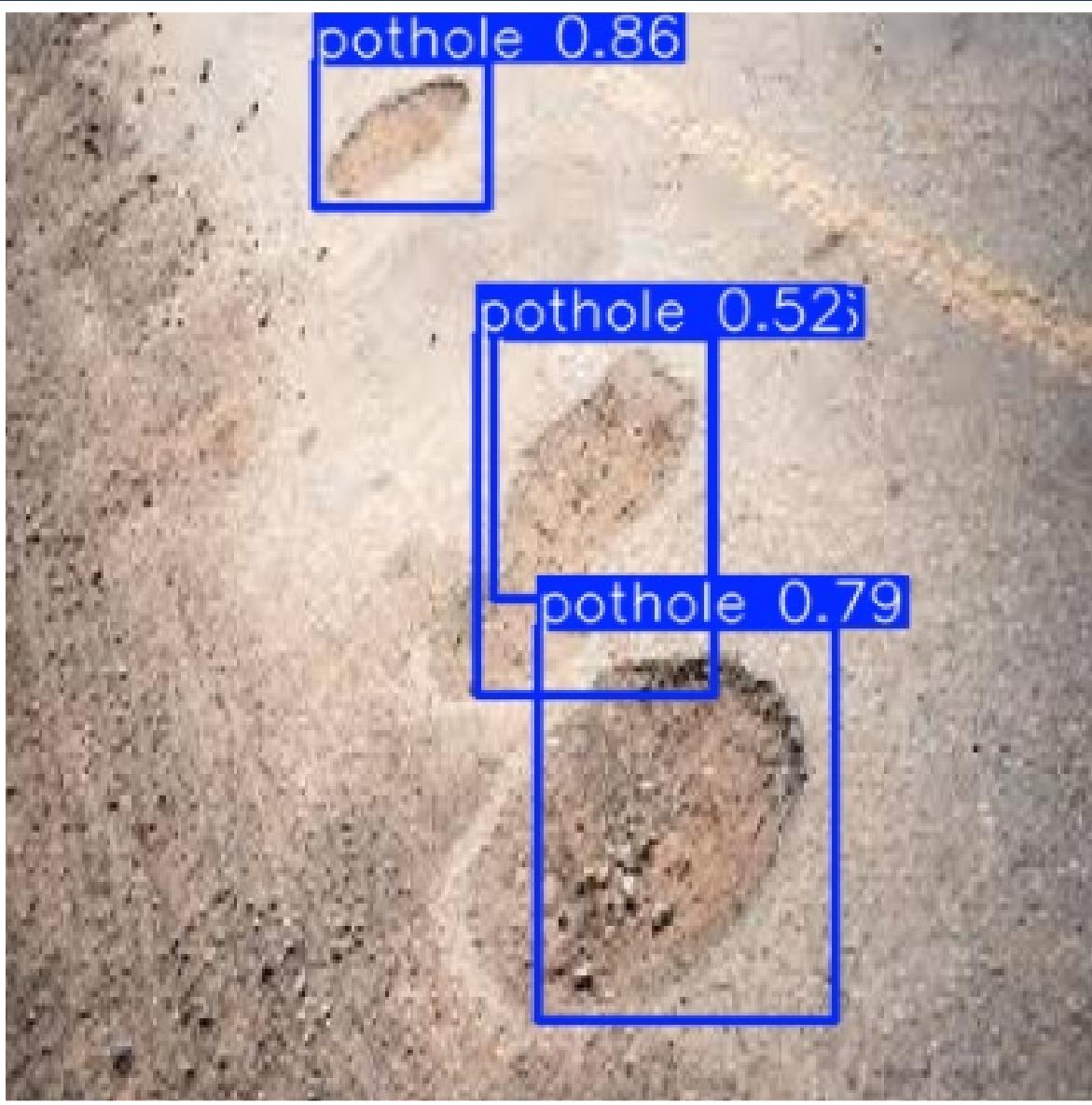
Key Benefits

- Scalable to support increasing camera deployments.
- Provides storage and computational power required for AI model inference.



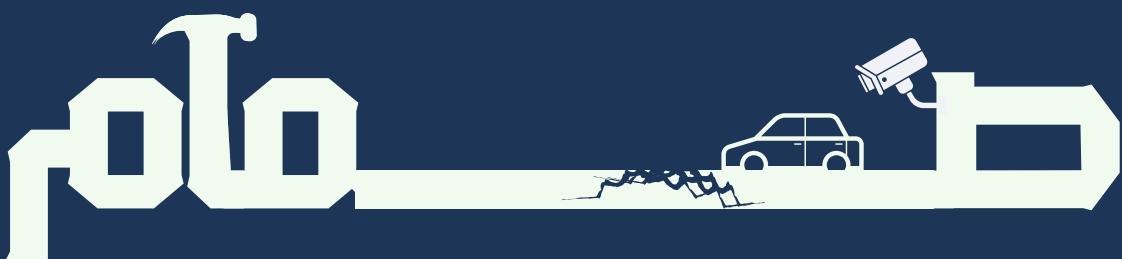
Pothole Detection Threshold

- To ensure the model only detects and reports significant potholes that require attention.
- Helps minimize false positives (small cracks or shadows misclassified as potholes).



How the Threshold Works:

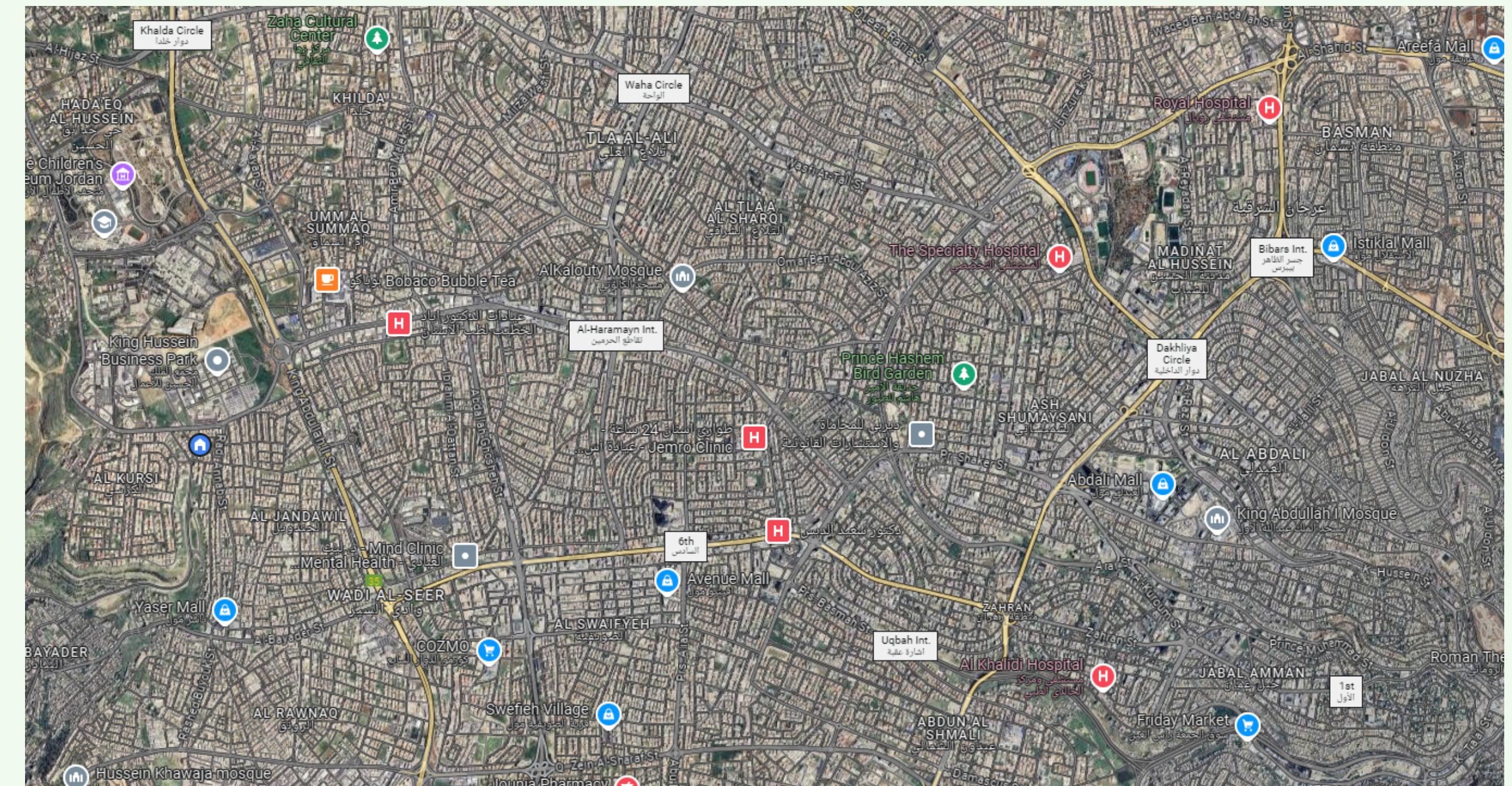
- Confidence Score: Each detection is assigned a confidence score (e.g., 0 to 1).
- Threshold Level: Only potholes with a confidence score above a set threshold (e.g., 0.7) are accepted.



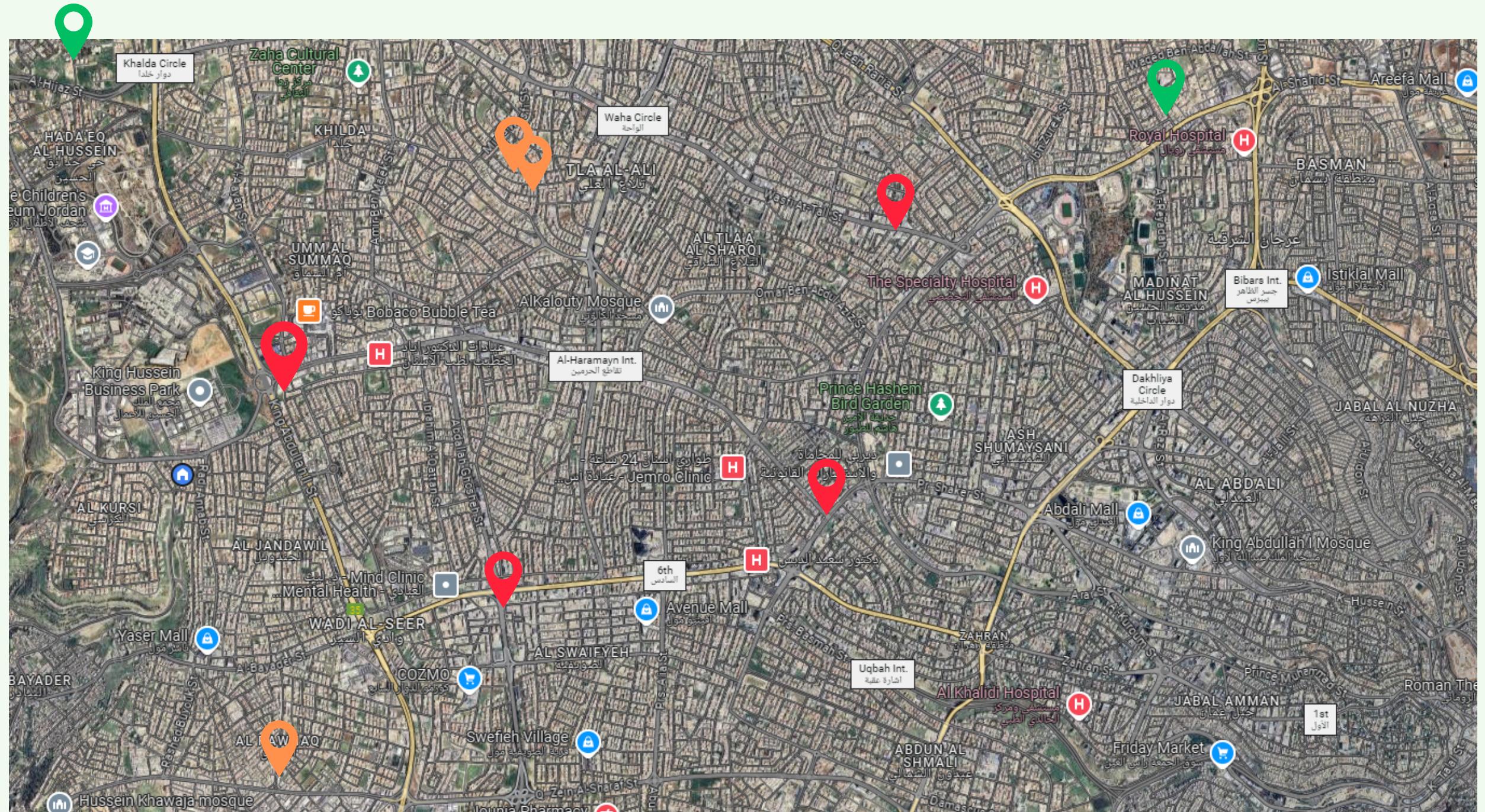
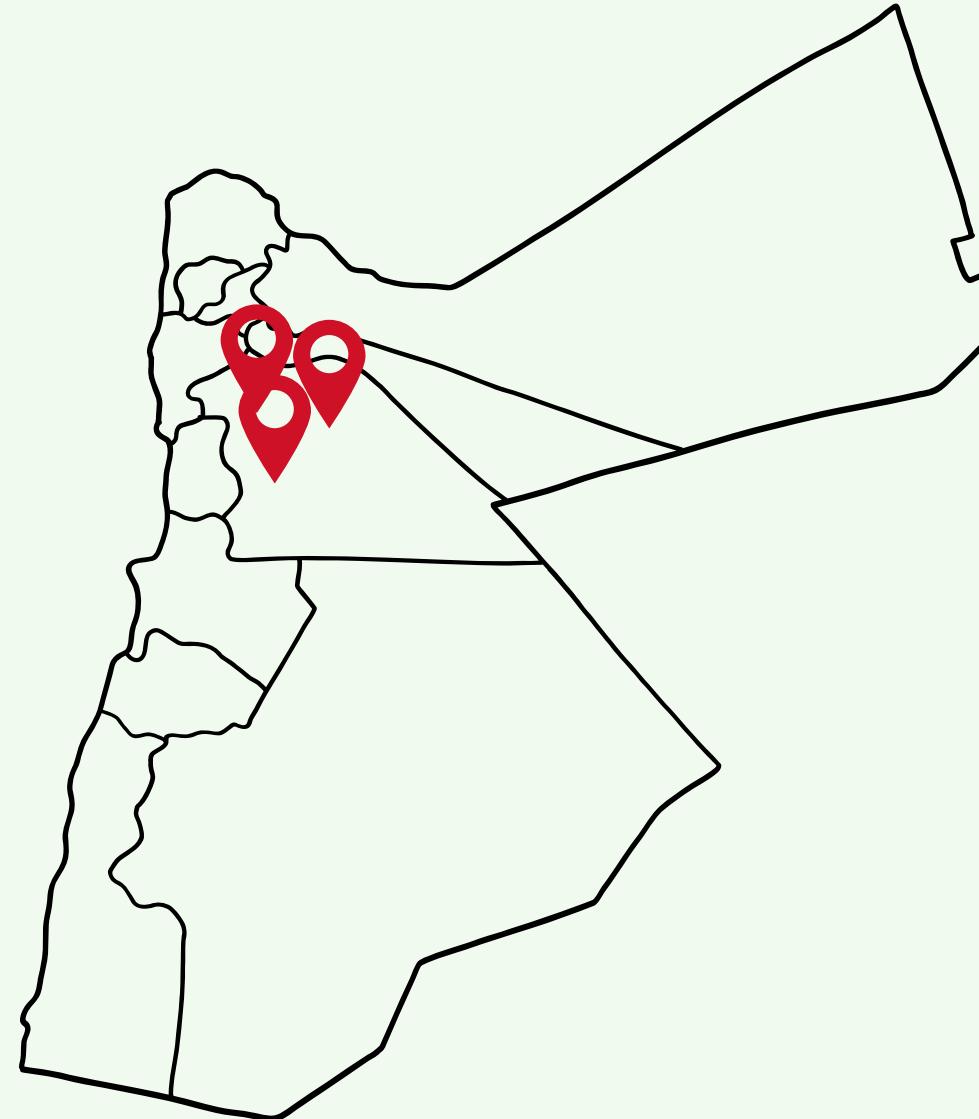
↙ DashBoard



DashBoard



↓ DashBoard



Need for Localized Data

Why We Need More Data:

- Current dataset is sourced from global or generic datasets, which might not represent Jordanian roads accurately.
- Local data ensures the model learns the unique characteristics of roads in Jordan, such as:
- Variations in road quality.

Importance of Night and Day Data:

- Daytime Images: Provide better visibility and clarity of potholes.
- Nighttime Images: Challenge the model to detect potholes in low-light conditions.
- Real-world application demands a model capable of handling both scenarios effectively.

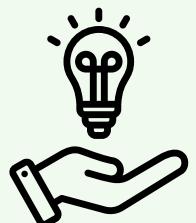
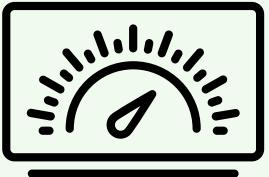
Advantages of the System:



- **High-Quality Videos:** Accurate detection due to superior video clarity. 
- **Ease of Deployment:** Portable dash cams are simple to install. 
- **Scalability:** System grows with additional dash cams and data. 
- **Cost-Effectiveness:** Reduces manual labor and inspection costs. 
- **Real-Time Detection:** Provides instant alerts for quicker pothole repair. 

Challenges of the System:

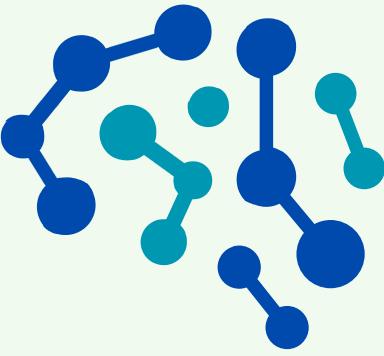
- **High Bandwidth Requirements:** Large video files need significant network capacity for transmission.
- **Weather and Lighting Conditions:** Poor visibility at night or during bad weather can affect detection accuracy.
- **Possible Solutions:** Optimize video compression for transmission, train the AI model with diverse datasets covering various conditions.



Project Team



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Team Lead



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AI
SOLUTIONS



Diaa Al-Dweikat
Research

↘ THANKS!

ANY QUESTIONS?