OBJECT DETECTION AND TRACKING

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UNDERSTANDING THE PROBLEM

What is Object Detection?

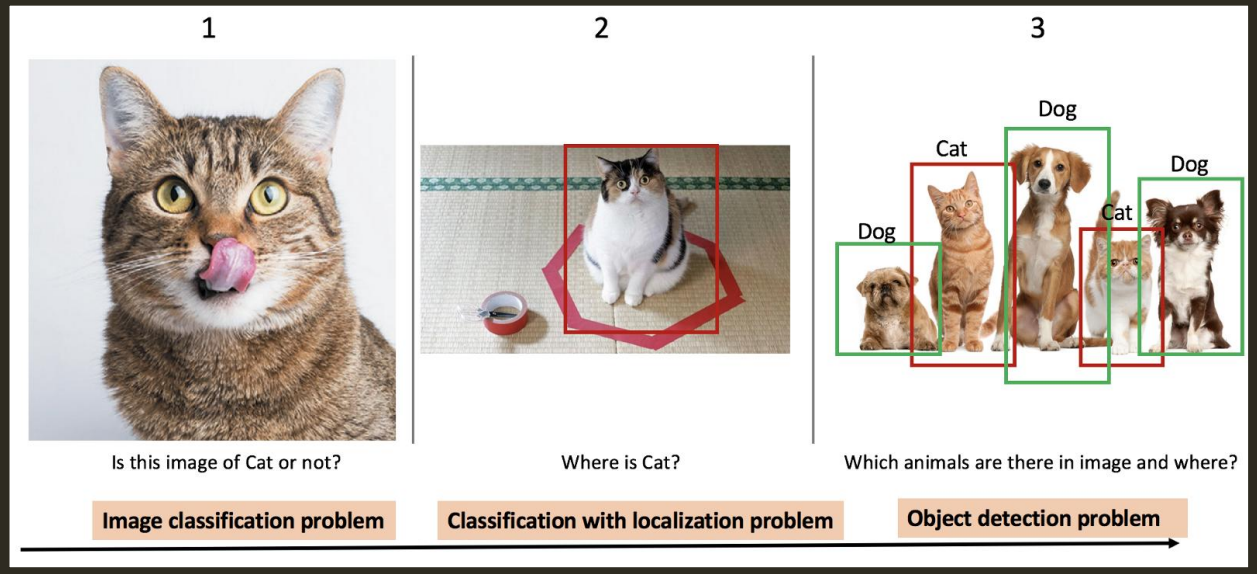
- A computer vision technology that identifies objects in images or videos.

Why is it Important?

- Powers applications in security, autonomous vehicles, and retail.

Challenges:

- High false positives/negatives.
- Poor performance in diverse environments.
- Difficulty tracking objects across video frames.
- Need for real-time results.



OUR SOLUTION

What Are We Offering?

A smart AI-based object detection system with:

- High precision and recall
- Real-time tracking capabilities
- Robust performance in diverse environments

Applications:

- Surveillance: Detect intruders or suspicious activities
- Autonomous Driving: Identify pedestrians, vehicles, and road signs
- Retail: Track inventory and analyze customer behavior

GitHub Repository: Link (Currently Working)

REAL-TIME OBJECT DETECTION & TRACKING (Inspired By Tesla & Architecture)

1. Learning from Tesla:

- Multi-camera systems for broader coverage.
- Sensor fusion (integrating visual and radar data).
- High-speed, real-time processing for autonomous vehicles.

2. Our Implementation:

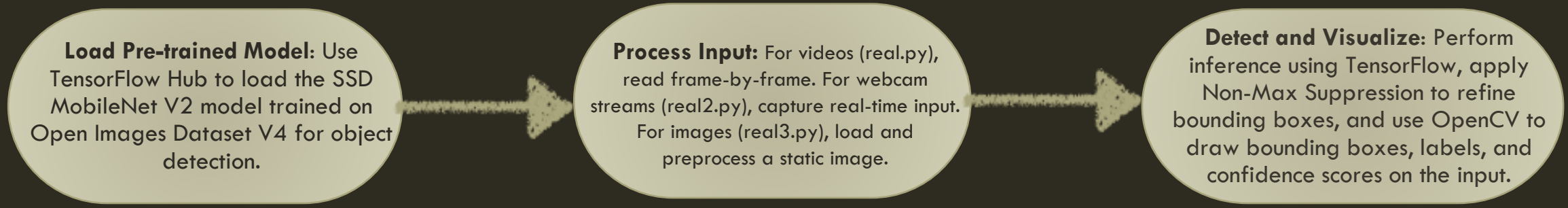
- Object tracking with bounding boxes using SORT/DeepSORT.
- Optimizations for real-time applications with hardware acceleration.

PIPELINE:

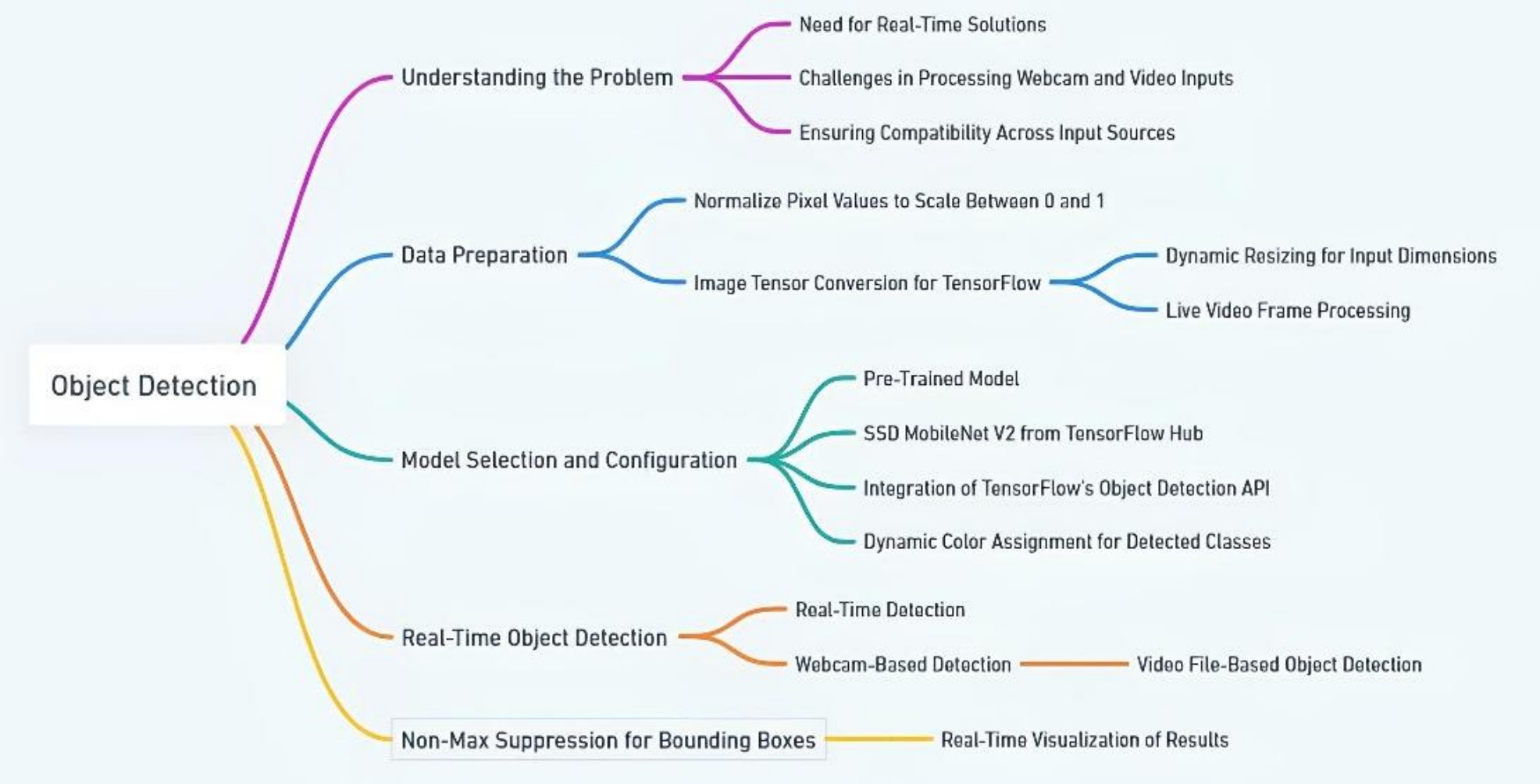
TECHNOLOGIES USED

- **Pre-trained Model:** SSD MobileNet V2 trained on Open Images Dataset V4.
- **Processing Framework:** TensorFlow Hub for model loading and TensorFlow for inference, with OpenCV handling image and video processing.
- **Post-Processing:** Non-Max Suppression (NMS) for bounding box refinement and confidence thresholding for accurate detections.

WORKFLOW:



COMPLETE ROADMAP



THE VALUE OF OUR SOLUTION

Key Benefits:

- Accurate Detection: High precision and recall
- Real-Time Performance: Practical for real-world use
- Versatile Applications: Security, transportation, retail
- Robustness: Works in difficult conditions

Use Cases:

- Surveillance: Enhanced monitoring
- Autonomous Vehicles: Safer navigation
- Retail: Efficient inventory tracking