SHUNMUGA PRIYA R

UTILIZING DRONE IMAGERY FOR ROAD DAMAGE DETECTION

AGENDA

- Project Introduction
- Survey of Existing Literature
- Deep Dive into Deep Learning and YOLO Algorithm
- Exploration of UAV Image Processing Methods
- Assessment of Available Datasets
- Implementation and Experimental Phases
- Performance Evaluation and Analytical Review

PROBLEM STATEMENT

Collecting data on road damage manually is time-consuming and risky, posing challenges to infrastructure upkeep. To address these hurdles, we propose an automated solution that leverages UAV imagery and deep learning. Our project aims to evaluate the effectiveness of YOLOv4, YOLOv5, and YOLOv7 algorithms in accurately detecting damage types and locations. By testing on RDD2022 and Spanish datasets, we aim to assess the system's performance across various scenarios. Ultimately, this approach aims to provide transportation authorities with a reliable method for swiftly identifying and addressing maintenance needs, thereby enhancing the safety and longevity of transportation networks.

PROJECT OVERVIEW

- Fusion of UAV Imagery with Deep Learning Integration
- Mitigation of Manual Inspection Challenges: Labor-Intensive and Unsafe Conditions
- Deployment of YOLOv4/5/7 Algorithms for Detection Precision
- Leveraging Combined Chinese and Spanish Datasets for Holistic Analysis
- Evaluation of Accuracy via Mean Average Precision (mAP) in Training and Testing Phases
- Enhancement of Infrastructure Maintenance Effectiveness
- Advocacy for Sustainable Transportation Infrastructure
- Ongoing Refinement and Advancements:
- User Interface Refinement and Enhanced Accessibility
- Deployment Streamlining and Scalability Optimization

WHO ARE THE END USERS?

- Merging UAV Imagery with Deep Learning for Advanced Integration
- Overcoming Manual Inspection Challenges: Laborious and Hazardous Conditions
- Applying YOLOv4/5/7 Algorithms for Fine-Tuned Detection
- Harnessing Combined Chinese and Spanish Datasets for Comprehensive Examination
- Evaluating Accuracy via Mean Average Precision (mAP) across Training and Testing Phases
- Enhancing Infrastructure Maintenance for Greater Efficiency

SOLUTION AND ITS VALUE PROPOSITION

- **AUTOMATED ROAD DAMAGE DETECTION:**
- Utilizes UAV imagery and advanced deep learning algorithms for accurate detection.
- **VALUE PROPOSITION:**
- Improves infrastructure maintenance through timely identification and intervention for road damages.
- Boosts road safety by promptly addressing potential hazards, reducing accident risks.
- Optimizes resource allocation, cutting costs associated with manual inspections and reactive maintenance.
- Provides actionable insights to transportation authorities and stakeholders, enabling informed decision-making and prioritization of maintenance efforts.

THE WOW IN YOUR SOLUTION

- Integration of advanced UAV imagery and deep learning algorithms.
- Accurate identification and precise localization of road damages.
- Substantial reduction in labor-intensive efforts, prioritizing inspector safety.
- Utilization of YOLOv4, YOLOv5, and YOLOv7 algorithms to heighten accuracy.
- Validation across diverse geographical contexts via RDD2022 and Spanish datasets.
- Setting a revolutionary standard in automated road infrastructure management.
- Spearheading the evolution of transportation maintenance and safety practices.


Automated Road Damage Detection using UAV Images and Deep Learning Techniques
• Efficient and accurate detection for safe and sustainable transportation.
• Impressive results: 59.9% mAP@.5 for YOLOv5, 65.70% for YOLOv5 with Transformer, and 73.20% for YOLOv7.

MODELLING

RESULTS

- Precision Detection at Scale
- Cross-Validation in Varied Geographical Settings
- Elevated Efficiency and Precision
- Augmented Safety and Longevity
- Practical Real-world Utility
- Prospective Avenues for Further Research