



INNOVATION / TECHNOLOGY DEPLOYMENT SUMMARY

Using AI and Machine Learning to Assess Pavement Markings

CHALLENGE

Deteriorating lane markings reduce roadway safety. Actively monitoring the lane markings on almost 90,000 centerline miles of the Texas roadway network managed by TxDOT is labor- and time-intensive. It is impossible to actively survey the entire road network. In some cases, as road markings deteriorate, the poor markings go unnoticed.

SOLUTION

This project sought to develop a proof of concept for lane marking assessment using a combination of machine vision (MV) algorithms and artificial intelligence (AI); collect lane marking images from the existing PathWeb archive using GoPro cameras mounted on agency vehicles (Figures 1 and 2); and use AI to detect lane marking locations and MV to identify deterioration in lane markings (see Figures 3 and 4).



Figure 1. PathWeb image.

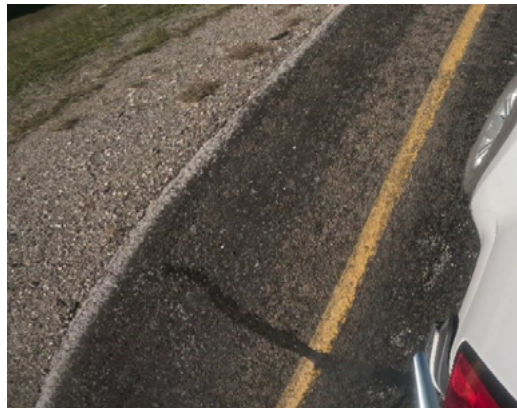


Figure 2. Vehicle with mounted GoPro camera.

PROACTIVE APPROACH

The proposed framework can detect lane marking deterioration over a wider network more quickly. The concept can supplement existing lane marking assessment surveys, providing timely lane marking deterioration detection.

TxDOT GOALS



Deliver the right projects



Focus on the customer



Foster stewardship



Optimize system performance



Preserve our assets



Promote safety



Value our employees



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BENEFITS

TxDOT maintenance and field staff can utilize tools based on the proposed proof of concept to supplement the existing manual, survey-based framework for identifying deteriorating lane markings. Staff can detect deteriorating lane markings faster and over a wider road network, which increases safety, lowers costs, and improves coverage.

KEY TASKS

- Identify methods for obtaining lane marking images.
- Review the literature to find frameworks to detect lane marking deterioration.
- Identify the best solution across a combination of image data sets and frameworks for detecting lane marking deterioration, specifically for daytime use.
- Evaluate the selected methodology.

DATA SOURCES

Data sources include PathWeb, an off-the-shelf data source for lane marking images that is available to TxDOT and agencies with access to the TxDOTCONNECT portal. PathWeb provides images of the road network that can be connected to GPS locations. Other sources include images with embedded GPS information collected using a GoPro camera mounted on a Texas A&M Transportation Institute (TTI) vehicle configured to mimic the image collection capabilities of cameras mounted on TxDOT maintenance vehicles.

Resources

[Yoakum District \(txdot.gov\)](https://www.txdot.gov/yoakum-district)

[TxDOTCONNECT \(txdot.gov\)](https://www.txdot.gov/txdotconnect)

[Roadway Lane Markings - System Reliability \(tamu.edu\)](https://www.tamu.edu/roadway-lane-markings)

Contact

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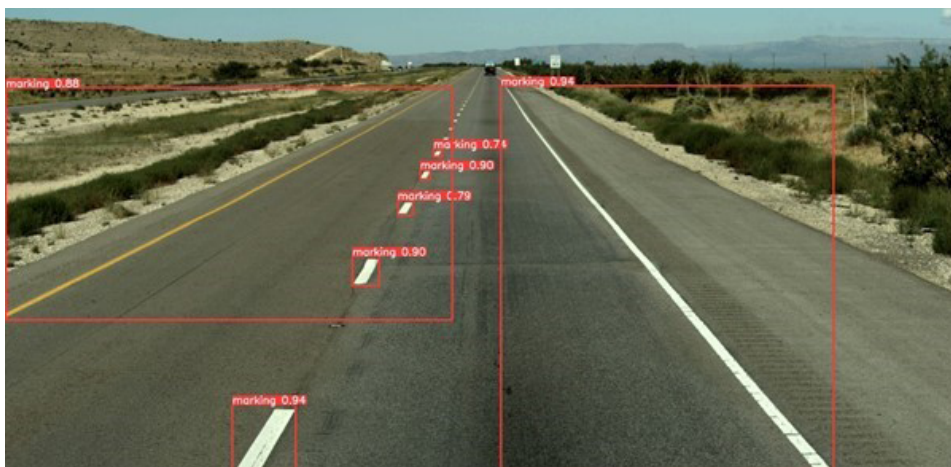


Figure 3. AI-detected lane markings from model trained with PathWeb images.

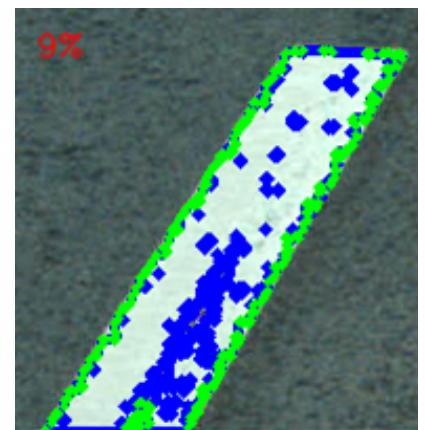


Figure 4. Classified and assessed lane marking with deterioration noted.