Construction

May 2024

Project Title:
Measuring Non-Recurrent Traffic Congestion

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Smart Highway Construction Site Monitoring Using Artificial Intelligence

Caltrans would like to detect, monitor, and track the trajectory of various construction elements by machine vision analysis of videos captured on construction and maintenance sites, and use the data for inventory, resource allocation and improving work zone safety and productivity.

WHAT IS THE NEED?

The California Department of Transportation (Caltrans) is focusing on improving the work zone safety measures as well as extending the life of transportation infrastructure by ensuring high quality construction, maintenance, and rehabilitation. Access to the data-driven performance monitoring and safety enhancement measures are among the key elements at highway construction and maintenance sites. There is need for a smart construction site monitoring tool that can provide performance metrics and enhance the process productivity while reducing the safety risks.

WHAT ARE WE DOING?

The proposed research project aims to develop and deploy a robust algorithm that can identify, detect, classify and track different objects in the videos and images captured from the construction and rehabilitation sites, which will be collected from actual construction and rehabilitation projects in collaboration with Caltrans.

The second part of the project will focus on training the deep learning models and improving the accuracy of the classification and detection algorithms.

WHAT IS OUR GOAL?

The main goal of this project is to develop a method to detect, classify, monitor, and track the equipment, workforce, and other surrounding objects during construction, maintenance, and rehabilitation of transportation infrastructure by using artificial intelligence and a deep learning approach. The project goal is in alignment with one of the Senate Bill 1 (SB1) (California Road Repair and Accountability Act of 2017 (SB1, Beall, 2017)

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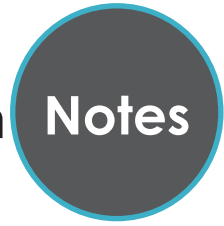
high priority research areas related to the maintenance/rehabilitation of road and bridge infrastructure.

WHAT IS THE BENEFIT?

The applications of the developed algorithms in this study include, but are not limited to, improving construction efficiency, advancing the construction monitoring process, and improving work zone safety measures. The outcomes of this project can be integrated into other construction monitoring systems such as Building Information Modeling (BIM) for transportation infrastructure projects.

WHAT IS THE PROGRESS TO DATE?

The kickoff meeting was held between the research team and Caltrans project panel on April 22, 2024. The background information collection and review of the literature is in progress. The research team, in collaboration with the project panel, is in the process of identifying project sites to collect field data.