Xue Yang

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EDUCATION BACKGROUND

PhD. in Civil Engineering @ Oklahoma State University.   08/2019-05/2024
- *Dissertation Topic: Statistical Modeling and Deep Learning for Enhanced Safety At Highway Rail Grade Crossings*

Business Analytics and Data Science @ Oklahoma State University.   08/2022-12/2023

M.S. in Highway and Railway Engineering @ Chang'an University, China.   09/2016-06/2019
- *Thesis Topic: A Convolutional Neural Network for Predicting Pavement Skid Resistance*

B.E. in Road Bridge and River-crossing Engineering (Bilingual Program) @ Chang'an University, China.   09/2012-06/2016

SKILLS

- Programming: Python, SAS, R., Spark, JMP
- Statistics: ANOVA, descriptive statistics, distribution, hypothesis testing, model fit and diagnostic statistics, time series.
- Machine Learning and Data Mining: Multivariate regression, PCA, decision tree, random forest, gradient boosting, LDA, hierarchical clustering, K-mean clustering, ANN, CNN, RNN, YOLO.
- Platform and Database: SQL Server, Dataiku
- Tools: JMP, SAS Enterprise Guide, Windows PowerShell, Git Hub.

WORK EXPERIENCE

Screening Tools for Considering Grade Separation of Rail-Highway Crossings in Oklahoma, ODOT project   09/2019-12/2020

The objective of this task order is to develop a data-driven evaluation process for ODOT to identify, evaluate, and prioritize potential road-rail crossings as candidates for grade separations in the state of Oklahoma. In this project, the following tasks are done:
- Performed literature review: review recent domestic and international literature and models that evolved to assist in selecting sites for grade separation.
- Prioritized crossings for grade separation using a multi-criteria approach: This step investigates and assesses criteria available to prioritize initial screened crossings for grade separation.
- Developed grade separation screening tool for ODOT: The tool could consist of a safety model, a formula for estimating the economic loss due to vehicle delays at a crossing, and a qualification model for screening.

LTPP Data Analysis: Guidelines to Improve Use of FWD and Longitudinal Profile Measurements, NCHRP project   03/2022-07/2022

The purpose of this project is to assess the impact of environmental factors on pavement performance, quantify material properties and IRI over an extended period of time to develop guidelines for improving the use of FWD and longitudinal profile measurements data. In this project, the following tasks are done:
- Used SQL to query FWD data, temperature data and moisture data and combined these three data together.
- Designed a procedure for temperature and moisture adjustment of FWD.
- Used R to deal with data and do regression.

Real-time Railroad trespassing violation detection and tracking using YOLO and Deep SORT Algorithm   01/2021-02/2022

The purpose of this research is to evaluate the effectiveness of countermeasures that have been implemented for enhanced safety in terms of reducing the number of trespassing incidents. The method is using the deep learning algorithms of YOLOv4 and Deep Sort to detect and track trespassing violation at highway-rail at-grade crossing HRGC. Also, the detection results can be used for the real-time trespassing alert system to remind trespassers to keep away from the railroad and the trespassing information will be sent to the railroad safety official. In addition, the data of the detected trespassers can help agencies and the rail industry better understand trespassers' behavior and identify effective mitigation efforts to prevent such occurrences.
- Used YOLO and Region of Interest (ROI) to detect trespassing behaviors in specific area.
- Applied Low confidence track filtering to improve the tracking accuracy of Deep Sort algorithm.
- Applied the deep learning algorithm to the collected video data for trespassing violation detection and tracking.
- Established real time trespassing violation alert system.

Assessing Safety Effectiveness of Treatments and Technologies at Highway-Rail Grade Crossings, NCHRP Project 17-99, 07/2022-present

The objective of this research is to develop a framework for assessing safety effectiveness, in terms of predicted incident severity and frequency, of different treatments and technologies at HRGCs. The framework shall include associated processes and electronic-based tools. Accomplishment of the project objectives will require at least the following tasks.
- Collect and review relevant domestic and foreign literature, research findings, and information relative to safety effectiveness of treatments and technologies at HRGCs.
- Identify and evaluate the factors required for developing a framework for assessing the safety effectiveness of different treatments and technologies at HRGCs.
- Develop a rational framework for assessing the safety effectiveness of treatments and technologies at HRGCs.

PUBLICATION

- Xue Yang, Joshua Q. Li, Wenyao Liu, Kelvin CP Wang, Jim Hatt, and Jared Schwennesen. "Selection of at-grade highway-rail crossings for grade separation." International Journal of Rail Transportation (2022): 1-21.
- 11 published and accepted in total. A full list of publications can be found here.