NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT

A. PROJECT NUMBER AND TITLE:
NETC 20-2 Current Status of Transportation Data Analytics and A Pilot Case Study Using Artificial Intelligence (AI)

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):
Yuanchang Xie, PhD, PE, University of Massachusetts Lowell

C. WEB SITE ADDRESS (*If one exists*):
None

D. START DATE (*Per NETC Agreement*):
5/5/2021

E. END DATE (*Per NETC Agreement*):
12/31/2023

F. ANTICIPATED COMPLETION DATE:
12/31/2023

G. PROJECT OBJECTIVES:
(1) Provide clear and comprehensive picture to the six New England state DOTs regarding their data assets, data needs and emerging data sources, modeling and workforce needs, and data collection, analysis, utilization, storage, and sharing practices related to traffic operations;
(2) Provide strategic and practical recommendations to prepare New England DOTs for future data-driven transportation system analytics; and
(3) Conduct a pilot case study of using AI techniques to analyze existing multi-source data for improving traffic operations and safety.

H. REPORT PERIOD:
3rd Quarter, 2023

I. ACCOMPLISHMENTS THIS PERIOD:

- A draft final project report has been prepared and is submitted along with this quarterly report.
- This final report features the following main components:
    - Results and findings from Phase I.
    - Our efforts to collect radar and thermal video data.
    - Results of case study one, which focused on driver behavior on horizontal curves using radar and camera data. The collected radar data was compared with the TomTom speed data. AI algorithms were developed to detect risky driving events and identify merging points. Vehicle speed distributions and speed profiles were generated.

- Results of case study two, which focused on driver behavior when approaching a highway work zone with lane closure. We used radar and camera data to show how drivers adjusted their speeds when approaching a work zone and how they merged. Such information is important for studying work zone safety.
- Results of case study three, which focused on using TomTom data for modeling vehicle speeding behavior at horizontal curves. The previous two studies used data collected at limited locations. This case study used network-wise data to study speeding activities on a network.

J. PROBLEMS ENCOUNTERED (If any):
None

K. TECHNOLOGY TRANSFER ACTIVITIES:
Submitted one paper to the 2024 Transportation Research Board Annual Meeting based on the results of case study #3. We should know the decision on this paper in the next few days.

Presented two papers at the well-known KDD conference in computer science. The support of this project was acknowledged in these two papers.

- Liu, Q., & Ge, T. (2022, August). RL2: A Call for Simultaneous Representation Learning and Rule Learning for Graph Streams. In Proceedings of the 28th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (pp. 1109-1119).
- Liu, R., Liu, Q., & Ge, T. (2023, August). Fairness-Aware Continuous Predictions of Multiple Analytics Targets in Dynamic Networks. In Proceedings of the 29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (pp. 1512-1523).

L. STATUS BY TASK:

Task	Description	% Complete
Task 1	Review of Current Data Collection and Utilization Practices	100%
Task 2	Assessment of Data Needs, Emerging Data Sources, and Data Processing and Analytics	100%
Task 3	Recommendations	100%
Task 4	Case Study	95%
Task 5	Draft Final Report	85%
Task 6	Final Report	75%

M. PERCENT COMPLETION OF TOTAL PROJECT:
90%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:
The team will finalize the data analysis and report.

O. FINANCIAL STATUS:
As of: *October 10, 2023*
Total Project Budget: $200,000.00
Total Expenditures (including encumbrance): $175,653.61

Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.