

Detection of Road Traffic Anomalies Based on Computational Data Science

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Discussion



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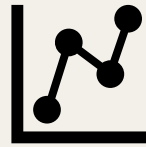
Motivation



Autonomous Vehicles (AVs)



Since the development of 5G, AVs can now have full control over all functions.



To operate on its own, AVs collect travel data using various smart devices...



...but the huge amount of data is often polluted by many sources that lead to incomplete or misleading information!


Traffic Anomalies



Anomalies and unreliable traffic data can impact safety and traffic flow, causing slower speeds, longer travel times, and interruption in AV communication.



To detect these anomalies, AVs need to know what normal traffic looks like. It can then flag any observation it thinks does not fit with the pattern.



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The Study



Research

Goal

The research aimed to find a more efficient way to detect and classify traffic anomalies.

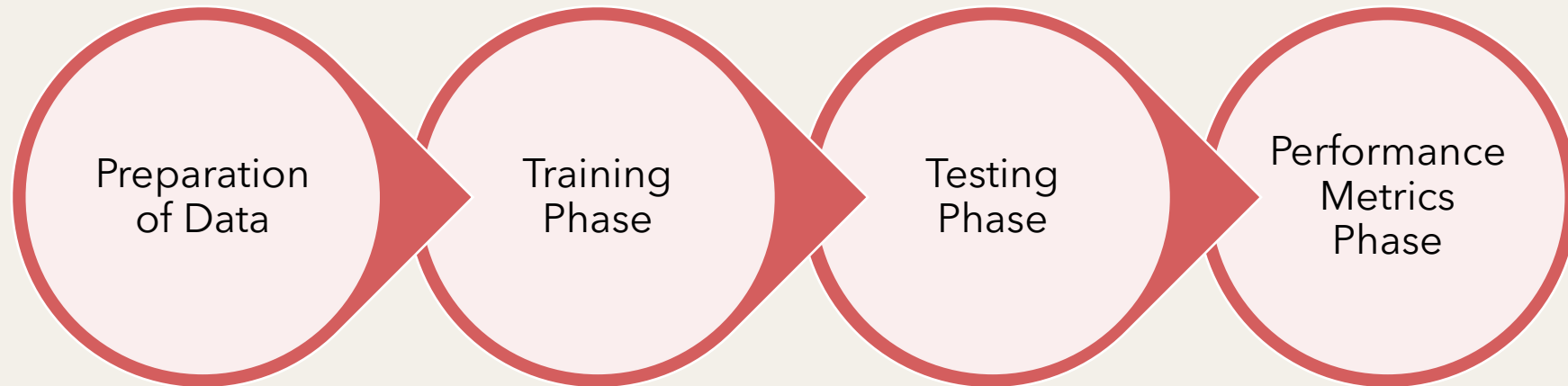
Data Collection

Vehicle positioning data was collected from Ublox devices and smartphones. Other travel data was collected using a variety of different smart devices.

Computational Data Science (CDS)

On average, the CDS approach proved to be more useful in the detection of data anomalies.

Deep Learning (DL)



Neural Network (NN)

Input Layer


Receives the input data for processing in the hidden layer.

Hidden Layers

Each layer processes the input data based on its focus.

Output Layer

The neural network makes a decision and produces an output.



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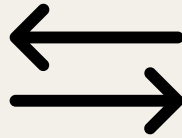
Results



Types of Anomalies



On average, the speed decreasing by at least 30 km/h highly suggests an anomaly.



Inefficient or frequent lane-changing can result in anomalies and increase congestion.



Traffic accidents can cause delays that last for extended periods of time.

Other Issues



Noisy data was common, either due to environmental factors or signal transmission delays.

Signals were frequently disturbed by buildings and other objects. This caused some of the largest data anomalies.



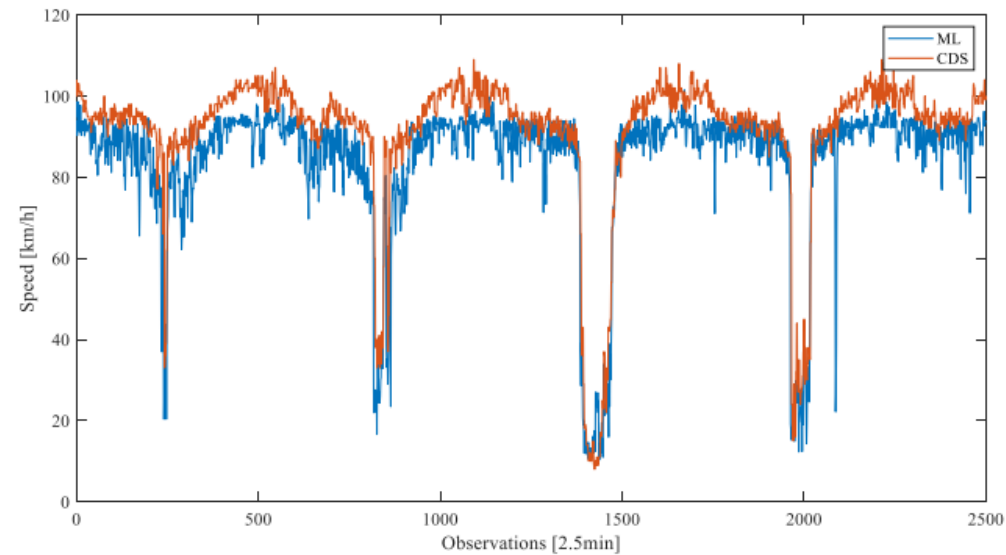
Some datasets were incomplete in certain areas due to noise and other factors.

Incomplete data sets were filled in by extrapolation.

Achievements

The Computational Data Science approach in the paper resulted in earlier detection of anomalies than previous methods.

Figure 13: Positioning Data Anomaly Detection Based on DL





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Critique



My Problems With the Paper

- The paper was poorly written in some areas. Some areas were difficult to understand, and the paper had many grammatical errors.
- Some sections were not very clear and lacked direction.
- The processes of the CDS, DL, statistical analysis, and anomaly detection were unclear, and barely stated.
- Based on the data collection techniques, the authenticity of data could be unreliable.



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Questions





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Open Discussion



Thank You!

