Annual Average Daily Traffic Estimation in Liverpool

Rishabh Malik – 220512619
r.malik3@ncl.ac.uk

Supervisor - Dr Tatiana Alvares-Sanches

School of Computing, Newcastle University, Newcastle, UK

Introduction

- Traffic estimation, particularly Annual Average Daily Traffic (AADT), is vital for urban planning, transportation management, and environmental studies.
- AADT represents the average number of vehicles passing a specific point on a road segment on a typical day throughout the year.
- Estimating AADT involves analyzing large data sets and considering multiple variables like road characteristics, land use, population density, and socioeconomic factors.
- The research aims to adapt and apply a novel methodology, combining clustering and regression modeling, to estimate AADT across the full road network, including both major and minor roads.
- Geographic Information Systems (GIS) and tools like QGIS and Geopandas are used for data analysis, visualization, and geospatial modeling.

Data - The data utilized in this study was the road traffic statistics collected by the Department for Transport (DfT) in Great Britain.

Department for Transport

Aim and Objectives

"Developing a precise traffic model for Liverpool using GIS and Python. Analyzing vehicle-specific regression models to reveal unique traffic patterns and improve urban planning."

OBJECTIVES

1. Collect, analyze spatial data using GIS & Python for Liverpool's road network & traffic dynamics.
2. Customize clustering to find similar traffic patterns, handle missing data & optimize centroids.
3. Use regression to estimate AADT, considering variables with low cluster overlap.
4. Evaluate model against existing methods for accuracy & transportation planning.
5. Provide insights & recommendations for transportation, infrastructure & environment in Liverpool.

Methodology and Visualizations

- Subject the collected data to profiling and EDA techniques to gain insights into its characteristics and identify patterns or trends.

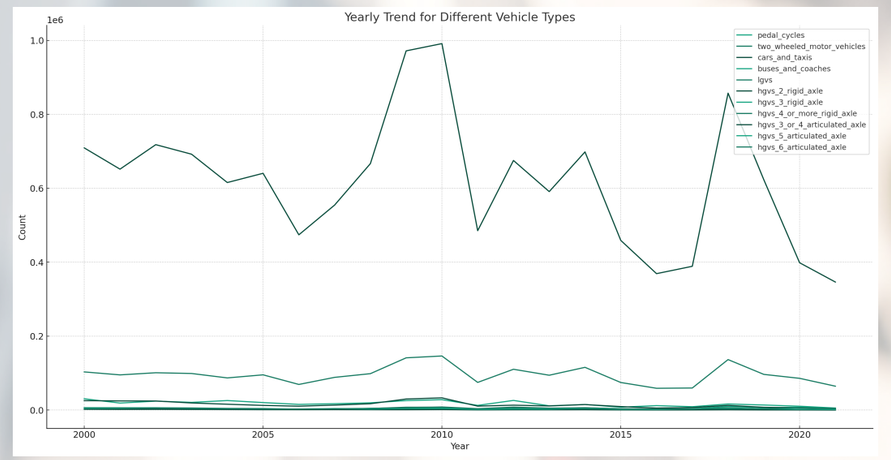
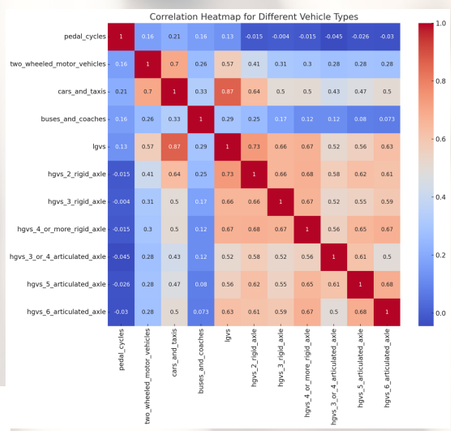
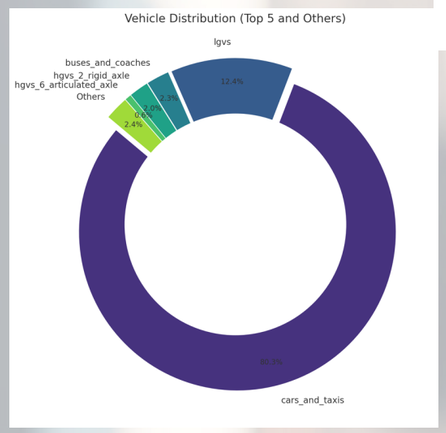


Fig1

- **Fig1:** Shows that number of cars and taxis has the highest count among all the vehicle types, and it seems to be increasing over time.

- **Fig2:** This heatmap shows the correlation between different types of vehicles. Darker colors represent stronger correlations.





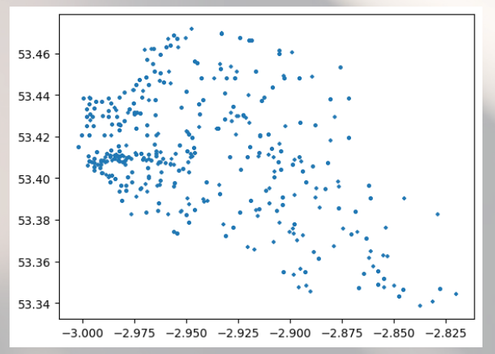
- **Fig3:** This pie chart shows the proportion of each type of vehicle in the total count. It provides a clear picture of which vehicle types make up the largest and smallest portions of the traffic.

Discussion

Year	Two-Wheeled Motor Vehicles	Cars and Taxis
2017	2639	389001
2018	5297	857242
2019	3328	623028
2020	2441	398597
2021	2191	346417

Fig4: Last 5 years aggregated data, year-wise, for Two-wheeler motors and Cars & Taxis

Fig5: Geographical plot of the Liverpool w.r.t. coordinates



Issues –

- Traffic measurements are usually undertaken only for a part of the road network, with minor roads often excluded. This creates a gap in the data, making it challenging to understand the full picture of traffic patterns.
- Existing methodologies for estimating Annual Average Daily Traffic (AADT) may not be comprehensive or accurate enough, particularly for minor roads. There is a need for a more robust and inclusive approach.

Future work –

- Pandemic Impact: Investigate COVID-19's effect on Liverpool's traffic.
- Model Improvement: Incorporate more variables for precise traffic estimates and pollution calculations.

References

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