

A DATA-DRIVEN ANALYSIS OF THE MOBILITY IMPACT DUE TO THE COVID-19 PANDEMIC IN DIFFERENT ECONOMIC ZONES

ELUCIDATA LAB BY SIRRIS MASTER THESIS PROPOSAL

CONTEXT

Traffic has become an integral part of our lives for several decades already. We actively participate to the traffic during our daily commute, when we need to e.g. visit a doctor, in the evening when going out, when going on holidays, etc. We take part in traffic by using several transportation modalities, such as public transport, private cars, bikes, etc. Subsequently, when there are problems on the way, such as accidents, road works and congestion, this has an impact on our lives.



But also vice versa, when something drastically changes in our lives (e.g. the Covid-19 pandemic) the traffic is drastically impacted. Due to the constantly evolving travel behavior and the growing population, we see many locations where traffic is saturated or the infrastructure is deprecated, causing traffic jams and unsafe conditions. Adapting traffic infrastructure to this evolving demand is very hard. **Road infrastructure administrators need in-depth insights** into how traffic behaves in order to be able to make the right decisions.

Traditionally, traffic management has been performed by monitoring road usage at **fixed locations**, via data provided by sensors installed at those locations (e.g. inductive loops, speed cameras, push buttons for pedestrians at intersections and automatic number-plate recognition (ANPR) cameras). Thanks to the evermore ubiquitous network connectivity, data sources that **move with the traffic** become possible (e.g. floating car data (FCD) and data from on-board diagnostic (ODB) systems). But also, data sources as events (e.g. school holidays), weather data, and more recently, social data such as traffic related tweets contain information which can be linked to traffic.

Each heterogenous data source of the previous paragraph contains only a piece of information about the traffic. **Integration of heterogenous data sources** will result in a more complete view on the traffic. E.g. ANPR cameras are a very interesting source of information, but not every corner of the street is equipped with an ANPR camera. Integrating this ANPR data with data of inductive loops in the same area or trajectory will result in a richer source of information. Such a good source of information is a requirement for a **good understanding of the traffic situation** (situational picture), which is the ultimate goal of this project.

OBJECTIVES

The aim of this thesis is to design a data-driven approach to study (and if possible, quantify) **the mobility impact during and after Covid-19 on different area's** (industry, shopping, residential, leisure, etc.). Next to the change in frequency (i.e., the number of people on the road), the Covid-19 restrictions also seems to have caused a (temporary?) modal shift. This thesis aims to capture these changes in mobility behaviour, based on the available data. For example, do people go more often by bike to work (transport from residential to industrial areas) to avoid public transport during these times, or is there an increased number of pedestrians in leisure zones at particular times during the day?

The following describes the main steps in the thesis:

1. Design a generic approach to automatically identify different types of (economically important) locations based on publicly available data sources
 - Data: OpenStreetMap, Google Maps, Crossroads Bank for Enterprises, etc.
 - To this end, the use of classification and clustering approaches can be explored.
2. Examine the impact of Covid-19 restrictions for each of the detected types of locations.
 - Data: Telraam, HERE, Flanders Motorways, etc. (for which we already have pre-processed datasets available from which you can start)
 - Research questions:
 - i. What is the impact on traffic per type of location over time? Can this impact be quantified by means of an indicator? Are these effects consistent per location type? Can possible differences be characterized?
 - ii. Is there a modal shift visible (ratio bike/bus/car) for people commuting to work? How does this evolve over time? Are there any lasting effects of Covid-19 in traffic? Is there a difference in particular regions (e.g., in the vicinity of a train station)?
3. Validate the resulting methodology in a selected number of locations.
 - For example, both for Brussels and Leuven, there is quite some mobility data available which could serve to validate the results.

INFORMATION

- Promotor: Dr. Nicolás González-Deleito
- Supervisor: Michiel Dhont (michiel.dhont@sirris.be)

Sirris is a non-profit and industry-driven knowledge center founded by Agoria, the federation of the Belgian technology industry. Sirris helps Belgian companies in the implementation of technological innovations, by providing companies with technological advice, by supporting companies in the definition and realization of innovation projects, and by setting up and participating in European R&D projects.