Nº #1 Micromobility

Name: Evaluation and prediction of patterns and behaviours of micro mobility

Problem: Micro mobility poses great challenges in the city environment, as nowadays micro mobility is changing how citizens commute in cities. In this sense there is the need to understand and anticipate which are the spatial and temporal patterns of micro mobility commute in the city, along with parking, storage and operations of micro mobility vehicles

Expected outcome: Predictive model of micro mobility demand in a docked bike sharing service by bike station according with the weather predicted in the day before, proximity to schools, public services, public transportation network. The model will provide a probability of starting and ending a trip in each bike station. Besides the predicted commute pattern, the model results will be also useful for micro mobility vehicles operation (e.g. reinforce the number of available bikes in a certain station, that in a certain hour have a higher probability of being registered the start of a trip).

Nº #2 Waste management

Name: Identification of patterns/profiles and solid waste production prediction

Problem: Solid waste production and collection, is nowadays a huge challenge for the municipalities. Indeed, waste collection costs range between 40 to 60% of waste management costs and is responsible for the production of 4,2 to 12 kg of CO_2 per tonne of waste. Predicting and understanding the relations between the socio-demographic characteristics and the waste production, will lead to an improvement in the operations efficiency of waste collection and transportation by the municipalities.

Expected outcome: Identify patterns to support the prediction of the production of solid waste in regular and big events days. The predictive model of waste production will be based, according with the socio-demographic profile of the spatial units, the presence of population and services (e.g. schools, local accommodation). The predictive model will be deployed in PGIL, allowing the creation of a service to predict solid waste production a week before, to optimize waste collection in Lisbon.

Nº #3 Parking

Name: Identification of patterns, explanatory factors and prediction of abusive parking

Problem: As population that lives, works and visits cities are increasing, parking capability is under pressure, namely due to unattractive or insufficient public transportation, inadequate drivers' education and insufficient regulation. Predicting abusive parking can aid the municipality services to optimize parking inspection and dissuade possible drivers' irregular behaviour.

Expected outcome: Identification of patterns and prediction of illegal and abusive parking in the city of Lisbon, at street level and time of day. The model will be based on the car tows registered by the Municipality Police of Lisbon. The proximity to services will also be included in the model, namely the proximity to schools, health services or the proximity to cultural events.

Nº #4 Pollution

Name: Elaboration of propagation models for the prediction of atmospheric and liquid pollutants behaviour

Problem: As there is an increase in people living in cities, is growing an increase concern regarding atmospheric and liquid pollution. Indeed, there is lack of information about propagation of liquid and atmospheric pollutants so civil protection and sanitation services could understand pollutants propagation and optimize their services in case of an environmental accident. There is the need to model atmospheric and liquid pollutants propagation in the city, to assess pollution impacts in the city environment.

Expected outcome: Models of atmospheric and liquid pollutants (nitrobenzene and methane) propagation at city region level, with a 1-hour temporal resolution. The model will be developed using buildings 3D geometry, climate data and the terrain characteristics.

Nº #5 Emergency

Name: Identification of patterns and predictive modelling of traffic accidents

Problem: The recent and future increase in cities population will input a big pressure in cities infrastructures, namely in roads, increasing the probability of the occurrence of traffic accidents, carrying significant challenges in cities mobility, transportation systems and the more important in human safety. In this sense is of extreme importance understand the infrastructural and environmental characteristics when traffic accidents occur along predicting them, to allow for city emergency services an optimized response to emergency, and for city managers plan road traffic, taking into account the risk of traffic accidents.

Expected outcome: Prediction of traffic accidents at street level. This prediction model will be deployed in PGIL, where it will provide a day earlier, the streets and periods of the day in which is expected the occurrence of traffic accidents. This service will be used by the municipality and emergency services to optimize their operations.