Smart Mobility Statistics PoC

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Introduction

Mobility is an important aspect of everyday city and country life. The goal of Smart mobility statistics PoC is to deliver relevant traffic and mobility information both in real-time and in batched modes at the right time to the right user.

Smart mobility PoC uses the available historical and real-time datasets of traffic data, aligns data sources, constructs models and obtains novel Smart mobility indicators, provides a system for delivering recommendations to users.
Policy areas and questions

The question of clean and sustainable mobility.

The question of efficient transportation.

The question of safe and secure transportation.

The question of journey planning.

The question of local infrastructure.

The question reflecting physical activity, active travel and health of citizens.
## Stakeholders and dataholders

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Data sources

**Historical and current traffic data (loop sensors) in Slovenia.**
The dataset contains information about average speed, number of cars, gap, status. Current and historical data since 2014 (~200GB) is available.

**Mobile-app sensors.**
Available features: timeline, time range: last month by default, analytics on user, group and global level, location, route and travel mode analysis. Travel mode detection is done automatically on accelerometer (sensor) data collected from mobile phones and performs well for walking, cycling and driving. Editing of travel modes is allowed from both web and mobile app (useful for retraining the models).

**Weather data**
Weather represents one of the key factors influencing road traffic. Could be accessible and collected at the micro level (micro locations) in real-time with historical records.

**Mobile operator data**
anonymized data from mobile operators that provide a possible source of user moving behavior. The data from mobile operators contain information about user equipment activity (that performs and receives calls) and a relevant base station.
Scenario 1: Sensor Causality

Reflects the dynamical aspects of traffic.

Traffic flow and traffic speed is slowing down at one traffic sensor - decreasing of traffic speed at the next neighboring sensor.

Scenario 2: Virtual Sensors

“Soft sensing” – sensing with analytical techniques.

Scenario 3: Mobility Personas

Typical user travel/transportation behaviours in a period of time.
PoC scenarios: Sensor causality

The Sensor Causality scenario suggests that sensors modeling should reflect the dynamical aspects of traffic.

Sensor Causality, Primorska area (Slovenia)
Sensor causality: Statistical outputs

TRAFFIC FLOW STATISTICS FOR SENSOR S (ON ROAD R) WITHIN HISTORY HOURS H

TRAFFIC FLOW STATISTICS FOR ROAD R WITHIN HISTORY HOURS H

TRAFFIC SPEED STATISTICS FOR SENSOR S (ON ROAD R) WITHIN HISTORY HOURS H

TRAFFIC SPEED STATISTICS FOR ROAD R WITHIN HISTORY HOURS H

TRAFFIC STATUS STATISTICS FOR SENSOR S (ON ROAD R) WITHIN HISTORY HOURS H

TRAFFIC STATUS STATISTICS FOR ROAD R WITHIN HISTORY HOURS H

REAL-TIME TRAFFIC FLOW PREDICTIONS FOR SENSOR S (ON ROAD R) WITHIN PREDICTION HOURS P

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REAL-TIME TRAFFIC SPEED PREDICTIONS FOR ROAD R WITHIN PREDICTION HOURS P
PoC scenarios: Virtual sensors

• Currently there are around **250 loop sensors** in Slovenia, stationed on main roads and highways.

• With traffic historical and current data available, with established causal relations between sensors and additional data available it could be possible to estimate and predict traffic for the location points with no physical traffic sensors.

• Virtual sensors can be used for **real-time traffic prediction** – speed, traffic flow and traffic status, for accidents prediction/notification (if data source is available), for anomalies detection.
Virtual sensors: Experimental results
Sensor causality, Virtual sensors: Demo

http://traffic.ijs.si
PoC scenarios: Mobility personas

The Mobility Personas scenario is closely related to the detection and using of travel (transportation) modes.

The mobility personas scenario is based on the mobile phone application data. GPS trajectories are collected from individual users and trajectories are split into:

- Staypoints: clusters of GPS points representing locations where user stayed for a while.
- Paths: trips between locations.

Travel mode detection is done automatically based on accelerometer (sensor) data collected from mobile phones.
Mobility personas: User path

Walking (10 minutes) → staypoint (8 hours) → driving (30 minutes) → walking (10 minutes) → staypoint (10 hours)

Cycling (20 minutes) → staypoint (8 hours) → cycling (30 minutes) → staypoint (2 hours) → walking (30 minutes) → cycling (30 minutes) → staypoint (8 hours)
Mobility personas: Statistical outputs

NUMBER OF MOBILITY PERSONAS GROUPS WITH RESPECT TO TRAVEL/TRANSPORTATION MODES

PERCENTAGE OF TRAVEL MODE T USAGE IN GROUP G
Mobility personas: Patterns

http://marquis.ijs.si:4040
Mobility personas: Demo

http://traffic.ijs.si/NextPin/?user=luka

http://traffic.ijs.si/NextPin/?user=LPP
QUESTIONS?