

Semestral work: Checkpoint 0

Ontologies and Semantic Web

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1 Motivation

Public transportation system plays an important role in regular city life. According to the DPP¹ more than 1,2 million passengers use Prague metro per day² so the total number of passengers of Prague public transportation system after including also all kinds of surface transportation is much higher. And all these people may be unpleasantly affected by any incident which cause delays because they may miss a meeting, miss their next connection or just stay longer time during a hot day in an overheated bus.

There are many possible causalities which may cause an irregularity of public transportation system, starting with a broken engine or a driver who overslept. But the main reasons are, in general, related to some traffic accidents, traffic jams or road closures. Out of the last mentioned, you cannot easily predict such situation, but is it possible to study them and to learn from them.

It is possible to find many source of information which are related to particular public transportation system of a city. For this semestral work we decided to focus at Prague and in section 2 are listed data sources which contain useful information related to this topic. Then in section 3 we describe like such combined information can be used to study Prague transportation system or how it can be useful to regular passengers. The last section ?? is dedicated to the state of the art of ontologies related to public transportation and research which has been done in this field.

2 Data sources

In this section, there are listed data sources of information related to Prague public transportation system. Every source has a short description and also information content description, which for spacing reason placed to appendix A.

¹Dopravní podnik hlavního města Prahy - <http://www.dpp.cz/>

²<http://www.dpp.cz/prazske-metro-v-den-prepravniho-pruzkumu-prepravilo-1-272-143-cestujicich/>

All data sources may be combined using common fields as timestamp and location of an event/incident/update. Out of these common features each of them contains more information which are highlighted in related subsections.

2.1 Dopravniinfo.cz³

This is a project of Czech Department of transportation⁴ to inform about problems related to any kind of transportation in the Czech Republic. It has user friendly web application and also mobile application which is convenient to users. But, more importantly, there is a machine readable feed⁵ for purposes of CTU students which contains the same information as the applications. Every feed has a pre-defined structure in xml format (schema descriptions⁶).

Each record contains only general information about a limitation on Czech roads. Useful information is clear classification of such situations 18 different classes (e.g. accidents, road closure, oversize-load transportations, ...).

2.2 Policie ČR - dopravní nehody⁷

Police of the Czech Republic provides information about every incident that happened on our roads. There is a poor form to filter events which does not show any incidents if the result list is longer then 100 records and also records are in form of pdf so special mining technique is needed. But every pdf contains a lot of information related to traffic incidents. Such information can be used for incidents classifications and severity estimation.

2.3 Prague Open Data⁸

Prague is publishing a lot of data related to daily life. One of such data sources is rss feed related to public transportation system and its singularity⁹. From this feed it is possible online found out which bus or tram lines adjusted due to an unknown situation.

There are also other feeds which contain information about DPP like overall status and changes, but they do not contain useful information in machine readable form.

³<http://www.dopravniinfo.cz>

⁴<http://www.rsd.cz/>

⁵<http://kbss.felk.cvut.cz/dopravni-info.zip>

⁶[http://registr.dopravniinfo.cz/docs/x-format/cz-ndic-ddr-common-v3.2.](http://registr.dopravniinfo.cz/docs/x-format/cz-ndic-ddr-common-v3.2.5-en-html/format.html)

⁵[-en-html/format.html](http://registr.dopravniinfo.cz/docs/x-format/cz-ndic-ddr-common-v3.2.5-en-html/format.html)

⁷<http://pcr.jdvm.cz/pcr/>

⁸<http://opendata.praha.eu/>

⁹<http://opendata.praha.eu/dataset/dpp-mimoradne-udalosti>

3 Use cases

3.1 Research about reasons of public transportation adjustments

As is shown in section 2 we know if a bus or tram line had to change, but there is no way to find out why from the same resource. Knowledge about what are the reasons for such changes can be useful, but for such research we would need data. Then an ontology which combines multiple data sources is needed.

3.2 Delay reasoning

Everybody hates when a public transportation in which he is or which he wants to take has a delay. Mostly we do not know why it faces such complications but for many people it would be easier to accept such a situation if they know more information and the reason behind that. There may be a mobile application which after searching for a connection can return a reason why it was delayed.

4 State of the art

There is a lot of potential for ontologies in the field of transportation. We can point out a solution from [2] which aims to help users with their travel planning by giving them information about special offers, possible combinations of different transport modes and potential advantages on their path. There is also [1] which is focused on an ontology to generate personalized user interfaces for transportation interactive systems. But we were not able to find any research paper which deals with an ontology related to public transportation and accidents.

A Data source content

A.1 Dopravniinfo.cz

- Timing
 - Time of the message generation
 - Start of the event
 - End of the event
- Location
 - Country name
 - Region name, region code
 - Town ship name, town ship code
 - Town name, town code
 - Town district name, town district code
 - Street name, street code
 - Road number, Road class
 - Coordinate system (Altitude, Latitude)
- Description
 - Full text description
 - Free text description
- Event related data (list)
 - Textual description of the Event and its code
 - Textual description of the Update Class of the Event and its code

A.2 Policie ČR - dopravní nehody

- Timing
 - Date of an incident
 - Time of an incident
- Location
 - Road class, road number
 - Road type
- Incident related data
 - Type of collision

- Incident foreplay (cause, alcohol, road surface, visibility, road conditions, wind, other inputs, ...)
- Incident aftermath (deaths, injury, damage in money, leakage of fuel, ...)
- Description (Number of vehicles, driver conditions, driver info, vehicle types, vehicle info, ...)

A.3 Prague Open Data

- Timing
 - Date of publishing
 - Start time
 - End time
 - Final end time
- Location
 - Location (part of title)
- Description
 - Affected type of transportation
 - Affected lines
 - Integrated rescue system flag
 - Effect

References

- [1] KáThia MarçAl De Oliveira et al. “Transportation ontology definition and application for the content personalization of user interfaces”. In: *Expert Systems with Applications* 40.8 (2013), pp. 3145–3159.
- [2] Mnasser Houda et al. “A public transportation ontology to support user travel planning”. In: *Research Challenges in Information Science (RCIS), 2010 Fourth International Conference on*. IEEE. 2010, pp. 127–136.