From: Daniel.Alvarez-Coello@bmwgroup.com
Subject: [Moderator Action] Position statement - W3C workshop on graph data
Date: 21 January 2019 at 14:14
To: group-data-ws-pc@w3.org

Dear W3C,

I have registered for the W3C workshop on graph data, here I send you the corresponding position statement:

At the BMW department of Research, New Technologies, and Innovation we are exploring the topic of Semantic Technologies in the context of automotive sensor data. Our recent contributions on a Vehicle Signal Ontology (VSSo) [1-2] illustrate the general interest of both academia and industry to standardize automotive data. Data relationships derived from an ontology facilitate the understanding of the vehicle's context compared to just sequences of sensor values. The use of standards would enable smoother compatibility between connected cars and other connected Things (i.e., from the automotive infrastructure to the IoT). The benefits of such interoperability extend to more than just the vehicle industry because it would facilitate a way to interact with data about the driving context [3-4].

Nowadays application developers in the automotive domain have to deal with thousands of different signals, represented in highly heterogeneous formats, and coming from various car architectures. This situation hardens the development and connectivity of modern applications. Through the standardization in form of high-level data (e.g., through APIs), it would be possible for other domains' applications to increase their scope and functionality.

We want to discuss the challenges we face in the automotive domain with graph data based on VSSo and give an idea of the ongoing direction of our research. Data coming from a moving vehicle represents some extra challenges than static data sources, including (and not limited to):

(1) Time-series data
Sequences are critical as they show how the vehicle behaves over time. When the raw sensor data have not been processed and analyzed, the storage of this kind of data appears to be more practical in a table-style data model than in a graph.
Questions:

- How to handle incoming data streams and how to decide what to store to prevent an ever-growing graph?
- Which data model should we use for the automotive time-series data, and how to keep it interoperable with data from other domains (e.g. weather, smart city, etc.)?

(2) Spatial data
Vehicles are moving entities with changing spatial situations that require adapted modeling.
Assuming that a graph data model is used,
Questions

- Which graph model fit best (e.g. Label Property Graphs, Hyper Graphs

- Which graph model fit best (e.g., Label Property Graphs, Hyper Graphs, RDF Triples, etc.)?
- How to handle different standards and methods for spatial information?

(3) Live data
Vehicles are producing massive amounts of data, that data need to be processed in soft real-time for reactive applications. Most graph data focus on static datasets on the Web.
Questions:

- How to extend the solutions to problems in (1) and (2) in a real-time scenario?
- How to do real-time reasoning and derive conclusions on incoming data streams?

(4) Tooling and acceptance
On the LPG side the tools seem more intuitive and allow better end-user experience. The way RDFs handle properties is too formal and inflexible to encourage developers to use and understand it, which is one of the most important aspects of a data centric approach.
Questions:

- Which set of tools should be used or developed to provide a smooth experience for app developers and data consumers?

References
[1] http://automotive.eurecom.fr/vsso

[2] B. Klotz, R. Troncy, D. Wilms, and C. Bonnet. VSSo - A vehicle signal and attribute ontology. In SSN 2018, 9th International Semantic Sensor Networks Workshop, 9 October 2018, Monterey, CA, USA, Oct 2018.

[3] http://automotive.eurecom.fr/vdc

[4] B. Klotz, R. Troncy, D. Wilms, and C. Bonnet. A driving context ontology for making sense of cross-domain driving data. In BMW Summer school, Raitenhaslach, Germany, July-August 2018.

Best regards,

BMW Group
Daniel Alvarez
Forschung, Neue Technologien, Innovationen
E/E Architektur, Technologien (LT-3)
Parkring 19
85748 Garching

Postanschrift:

80788 München

Tel: +49-89-382-66111
Mail: daniel.alvarez-coello@bmwgroup.com
Web: http://www.bmwgroup.com/
