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Affiliation

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About the authors:

Dr Mathias Baur, Florian Schimandl and Matthew Fullerton worked at the Chair of Traffic Engineering and Control at the TU München for a combined total of almost 20 years during which they gained detailed expertise in traffic detection and control and relevant analyses.

Type of presentation proposed:

In-use contribution

Title:

Taking data cataloging and federation to the next level by facilitating powerful reuse, analysis and visualization in the cloud

Summary of the presentation:

The presentation will describe the need to go beyond describing, federating and cataloging data as a (public) service. Modern needs are to use all the collected data in an institution or enterprise easily regardless of source format or destination tool. Although approaches such as Hadoop have made great progress in providing general access to large amounts of heterogeneous data, the data are still not exposed in an easily explorable and usable way for the end user. SMARTLANE tackles this problem especially for the traffic and mobility market, where huge amounts of data are collected but potential of these data rarely exploited. SMARTLANE takes data analytics and exchanges to the next level by coupling a typical data cataloging user interface with a powerful backend for data analysis, exchange and reporting.

Extended Abstract

Two of the biggest trends in ICT are *big data* and *cloud computing*. Although some of the excitement about these trends may be dismissed as 'hype', the trends are real, resulting from fundamental developments in available software and hardware approaches, and transforming the way data is handled and used. Current market studies show that there is enormous potential when these technologies are harnessed to transform traditional approaches in data handling and analysis.

Transportation has traditionally been an area with expensive challenges: the building of new infrastructure, the cost of resolving or enduring traffic jams and crowded trains. It is also an area with a tremendous growth in the volume of data generated and saved: vehicles are counted at regular intervals, traffic lights adapt to traffic flows, haulage companies optimize their routes, and train tickets are sold by tracking customers journeys instead of asking them to plan them in advance. This development is intricately linked with the advances in *intelligent transportation systems* (ITS), whereby the monitoring and control of infrastructure and the assistance given to drivers and passengers is increasingly ICT-driven. The transmission, storage and processing of a diverse range of data is core to the success of these systems. Although great progress has been made in the day-to-day use of these systems, observations and interviews have shown that there are immense challenges in dealing with the volumes of data in use and immense potential to generate information of added value from the data that is available in the transportation field.

SMARTLANE

SMARTLANE brings efficient, secure and straightforward cloud-based, large-scale data handling and analysis to the transportation arena for the first time. The visual, web-based approach taken puts the user 'in charge' of their data and their workflow in a new way. This is necessary in the target market but also a fresh approach for other, more typical cloud-computing customers. Especially attractive in the transportation field is the offer of scalability: SMARTLANE allows massive-scale data analysis when needed (perhaps only a few days a year for some customers) without an expensive investment in IT-infrastructure, software licenses or subcontractors. SMARTLANE is built with a modular structure: a standard user interface for managing diverse data types, extended analyses relevant for traffic systems and advanced visualization and reporting capabilities. SMARTLANE allows complete workflows from data acquisition to report or 3D video presentation to be recorded, reused and automated. Web services ensure that a users' data can be offered to partners when needed and that data from other systems, including online services, can be imported for analysis and reporting. Best-practice technical and legal considerations ensure data security and data protection throughout. Overall, SMARTLANE allows users to more quickly and easily arrive at valuable conclusions and recommendations for their organization, their customers or the public from their data, saving time in addition to the monetary factors already described over existing approaches. In addition, the ability to flexibly combine diverse data sources with live analyses will enable new data-based products for users that in turn offer added-value for their customers: for example the integration of lengthened travel times due to traffic jams into the display of estimated arrival times for buses.

User Stories and Benefits

The following is just one detailed example surrounding a potential use for SMARTLANE in an everyday situation in the transportation field and the benefits gained:

The road authority (for example the Highways Agency in the UK or the Autobahndirektion in a German state) wants to make a recommendation to the government for or against the widening of a motorway. The data from the current traffic levels need to be combined with a general, geographically differentiated prognosis of traffic levels in the future and then a capacity analysis performed according to local standardized analytical methods (including the number of traffic jams per year based on capacity limits derived from the road network). With SMARTLANE:

- the road network geometry is automatically sourced from a database,
- the current traffic flow data can be easily uploaded and checked for completeness and processed to reflect the future scenario prognosis
- the analysis can be performed offline with an email message sent once complete,
- the completed work has been automatically documented internally and the basis for the external report complete with understandable and annotated diagrams is available for import in Microsoft Word.

Without going into the same detail, other uses for SMARTLANE include:

- Automatic extraction of alerts concerning transportation problems from social media
- The effect of an autonomous vehicle on the traffic situation in the surrounding area
- 3D-visualization of traffic situations, both real and hypothetical, for planning, public-communication, information or advertising
- As a platform for facilitating exchange of data with a customer or project-partner