Personalized City Tours

An Extension of the OGC® OpenLocation Specification

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A business trip to London last month , a day visit in Cologne next Saturday and romantic weekend in Paris in autumn – this example exhibits one of the central characteristics of today's tourism. But Visitors of cities find themselves in a great dilemma: *What to choose in the wide range of opportunities a city offers given the usually quite limited time budget*.

Personalized City tours – which consider preferences and interests of individual visitors while taking context information and spatio-temporal constraints into account - can provide an answer to this dilemma.

Although many persons share this problem yet only few approaches aim to provide a solution. Rogers, et al. presented an Traveling Salesman approach that calculates edge cost as sum of the weighted attributes. These weights for the attributes like steepness were collected iteratively via explicit user feedback [Rogers, et al.(1999)]. Jöst and Stille introduce a branch and bound algorithm for the computation of pedestrian tours that considers edge as well as node costs corresponding to preference values [Jöst and Stille (2002)]. Cziferszky and Winter compute a set of feasible tours by giving an overall tour length in a hiking scenario. A later sequential selection process tries to identify the optimal route incorporating additional parameters attached again with a weighting factor while eliminating least optimal routes [Cziferszky and Winter (2002)]. Balke, et al. extends the concept of user defined weights that was introduced by Rogers , et al. (1999) with the mathematical concepts of strict partial orders to model general domain preferences (like prefer dry road over wet road) upfront [Balke, et al. (2003)]. An approach by Ten Hagen, et al. facilitates semantic matching of user preferences and constructed tour elements in a hierarchical order of node attributes like building type, etc., [ten Hagel, et al. (2005)].

Following the geographic tradition this paper takes an integrative approach in order to propose a methodology, architecture and standard specification for the provision of personalized city tours. To allow for an open, interoperable and flexible provision of personalized city tours an extension of the OpenLS specification[OGC OpenLS (2004)] is introduced.

This new OpenLS Tour Specification is founded on the OpenLS Route Service specification and extends it. Furthermore it specifies a range of additional OGC Web Processing Services [OGC WPS (2005)]and combines them to a generic Framework . Those OGC WPS are responsible for dedicated tasks during the generation of the personalized city tours like weighting of points of interests, verify the temporal feasibility of a potential tour destinations, generating a weighted digraph or reducing graph complexity.

Within this Tour Framework a context server and a user model server - including its corresponding service requests - provide means to incorporate context information and user preferences during the generation of the tour as such. A combination of those services has been presented by [Zipf and Jöst (2005)]. To transfer those context and user preferences onto the spatial graph structure methods on fusioning of heterogeneous data like analytical hierarchy process [Saaty and Vagas

(2001)] or multi-criteria decision analysis [Janssen and Rietveld (1990)] are discussed and a dedicated graph weighting algorithm is proposed.

Basic information elements used by OpenLS core services are xml-encoded abstract data types (ADT) that facilitate the data exchange between OGC compliant location-based services. The presented OpenLS Tour Specification introduces additional abstract data types like a Tour ADT, Graph ADT or a Destination ADT .

Additionally to the functional aspects for the provision of personalized city tours, the herein presented service framework focuses on openness and compatibility. The services – for example the WPS POI Weighter – can also be used in other usage scenarios like a spatial search. Different implementations can also compete for the best result.

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