Kanishk Chaturvedi
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Minutes of Meeting
CityGML 3.0 WP06 Ninth Meeting

Participants

- Thomas H. Kolbe, TU Munich
- Gilles Gesquière, LIRIS
- Steve Smyth, OpenSitePlan
- Tatjana Kutzner, TU Munich
- Kanishk Chaturvedi, TU Munich

Agenda of the meeting

- Presentation by Kanishk on the modified approach for a dynamic data schema and related use cases.
- Presentation by Tatjana on the standard ISO 19141 – Schema for moving features and its relevance with our work package.
- Finalization of dates for the next meeting.

Presentation by Kanishk

- Kanishk presented the modified approach of a dynamic schema for supporting dynamic/time-varying attributes within CityGML. This presentation is the continuation of the approach discussed in the previous presentation (https://github.com/opengeospatial/CityGML-3.0/blob/master/WP%2006%20Resources/Meetings/8th/CityGML3_WP6_Dynamic_Data_Schema.pdf).
- The approach has close relation to the GML Coverage schema that contains three components: Domain Set, Range Set and Coverage Function. Spatial or temporal values in the domain set are mapped to specific values in the range set by a rule defined in the coverage function. It allows all GML time objects (time instants or periods) to be included in the domain set and hence, will allow mapping values in the range set to the specific time values in the domain set.
- Further, a modifier feature, which is a type of gml:Coverage, allows replacing or overriding the dynamic or time-varying attribute values of CityGML objects with the help of the XPath mechanism. The existing GML application schema for Coverages also allows Sensor Web Enablement (SWE) Data Records to be integrated in the coverages. Using the same approach, sensor data from various sources can also be included in the data records and mapped with time values.

- Three use cases (solar irradiation analysis, energy demand variations and texture temporalization) were presented which can handle dynamic attributes using a similar approach.

Discussions:

- Slides 7 and 8: In the modifier class, three attributes are defined: selector (to select the spatial or temporal values in the domain set), value (to select the associated attribute values from the range set) and replacer (to replace the values of the CityGML objects with the range values for a given domain by using XPath. However, it should also be possible to use selector and values directly from the domain and range sets. In this way, the modifier class should contain only the replacer attribute. The attributes selector and value make sense in particular when the range set can have multiple ranges of time.
- Slide 10: The solar irradiation values, in this example, are calculated for the entire month and not just one timestamp. In the domain set, instead of gml:timeInstant, gml:timePeriod for the complete month should be used.
- Slide 12: Using gml:rangeParameters, it is possible to model different composite values within the range set. It would allow managing composite values for appearances, textures and geometries. For example, it would be possible to handle modification of geometries. Especially regarding geometries it is important, that not only the use of scalar values is possible, but also the use of XML-encoded values. Using gml:File, it is also possible to refer to the external files (binary files, tables, or image files) at remote locations. However, an open question is, 'Is it possible to retrieve information only from the specific columns in a table stored at a remote location?'. Kanishk will investigate it further.
- An important question is, 'Is it possible to add periodic/cyclic patterns in the coverage domain set?'. In the coverages, the association between domain and range is 1:1. In order to handle periods/cycles, the association between domain and range should be 1: n.

Presentation by Tatjana

- Tatjana presented the standard ISO 19141 – Schema for moving features for representing features whose locations change over time. It defines a method to describe the geometry of a feature that moves as a rigid body.
- The schema specifies mechanisms to describe motion consisting of translation and/or rotation of the feature, but not including deformation of the feature. The schema is based on the concept of a one parameter set of geometries that may be viewed as a set of leaves or a set of trajectories. Here, a leaf represents the geometry of the moving feature at a particular value of the parameter (e.g., a point in time) and a trajectory is a curve that represents the path of a point in the geometry of the moving feature as it moves with respect to the parameter.
- Prism is a set of points in the union of the geometries (or the union of the trajectories) of a one parameter set of geometries. Foliation is a one parameter set of geometries such that each point in the prism of the set is in one and only one trajectory and in one and only one leaf.
- An example of XML/GML encoding was presented representing moving geometries within the foliation element.

Discussion:

- Slide 5 – The one parameter geometry is a type of GM_Object, which means it is possible to support 3D geometries within this type.

- Slide 7 – The foliation element contains the LinearTrajectory element which consists of a single segment with linear interpolation. It would be good to explore the possibility to describe periodic motion in the moving features schema.

Next steps

- Kanishk will prepare a presentation for the next meeting about extension of the dynamic data schema approach towards following open questions:
    - How can we express interpolation values within the proposed approach of dynamic data schema? We can begin with a simple linear interpolation.
    - How can we add periodic/cyclic patterns in the coverage domain set?
    - How can we reference an OGC Web Sensor Observation Service using temporal coverage or any other approach in GML?
    - The XML syntax of the modifier as presented by Kanishk is a first draft. Kanishk will check the syntax again and improve it.
- After the next teleconference Gilles and Steve will try to apply Kanishk's approach to their domains.

Next meeting

- The next teleconference will take place on May 11, 2015 (5pm-7pm CET).