Portrayal Capability in the Geospatial Information Technology Tool Kit (gittok)

Morishige Ota

Kokusai Kogyo Co., Ltd., Japan

Abstract. Cartography includes knowledge of visualization concerning semiology and the psychological nature of mankind such as visual variables and eye movements, geodetic knowledge such as map projection and coordinate reference system, knowledge of spatial analysis. Today, we can find enormous records about these subjects (Morita, 1991), (Robinson, et.al. 1995), (MacEachren, 1995), (Moellering, 2000), (DiBiase, 2006), etc.

Meanwhile, International Organization for Standardization (ISO) developed the international standard for portrayal as 'ISO 19117 – Geographic Information- Portrayal' in 2005 and revised it in 2012. International Hydrographic Organization (IHO) is developing 'S-100 part 9 Portrayal' as a profile of ISO 19117. The construction of these standards is not possible without research progresses of Cartography and Information Technology. However, the discussions on an architecture of the portrayal based on these standards are quite few, at least by the Internet research.

Geospatial Information Technology Tool Kit (gittok: pronounced 'jee-tock') is all-in-one open source software developed for the higher education on the introduction to Geospatial Information technology (GIT). It comprises six knowledge areas: modeling, acquisition, management, analysis, exchange and representation. Especially, the software architecture of the representation was designed by reference to Geospatial Standards.

A name of the software module for the representation is called 'Cartographer'. It consists of four parts. They are symbol style design, label style design, portrayal design and map editing. Symbol and label style are designed in compliance with the symbol and label style schema. Portrayal schema is designed by following the portrayal meta-schema. And the map schema represents the structure of maps. Students can produce maps by following the sequence: symbol and label design → portrayal schema definition → map editing.

Portrayal schema specifies rules of mapping. It enables the design of a general-purpose map, a thematic map, or an interactive map. It specifies (1) which attributes of features are visualized on a map, (2) which symbol style and label style are assigned to attributes, (3) how to assign colors in each grade of choropleth representation, and (4) which multimedia attributes are visualized on a map.

Presentation of an interactive map is not specified in the standards even they are commonly available on the Web today. In case of Cartographer in gittok, user may zoom-in, zoom-out, and slide a map, and may visualize multimedia attributes such as photos, movies, sounds, texts, web sites, and an address of a feature. Portrayal schema definition makes possible to visualize such attributes.

Portrayal schema can be thought as a function to transform geospatial data into a map. In the context of Analytical Cartography, geospatial data is a Virtual Map Type 3 and a map displayed on a screen is a Virtual Map Type 1. Meanwhile, a Virtual Map 3 associates with the deep structure and a Virtual Map 1 associates with the surface structure. It means a portrayal schema is an interface between the deep and the surface structures. Students can study how to produce original interactive maps by the definition of portrayal schemata in order to realize their purpose.

Keywords. education assistance tool, geospatial standards, geospatial information technology

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