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Annex. Outline of standard

Geographic information - Imagery Reference Model

Contents

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which, a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

Introduction

This Technical Specification provides an reference model for geographic imagery. The following are the motivating themes addressed in this reference model:

- Imagery and gridded data is the dominant form of geographic information in terms of volume.
  - The total of all stored geographic imagery will grow to the order of an exabyte
  - National imagery archives are approaching petabyte size; ingesting a terabyte per day
  - Individual application data centers are archiving 10's of terabytes of imagery
  - Tens of thousands of datasets have been catalogued but are not yet on-line.
- Most of geographic imagery will never be directly accessed by humans
  - Human attention is the scarce resource, insufficient to view petabytes of data.
  - Semantic processing will be required: auto-summarization, information communities, mining based on geographic concepts
- Information technology allows the creation of geographic information products through processing of geographic imagery. Standards facilitate use of a wide variety of products by a wide variety of users, increasing the user community available to a producer; an incentive to the producer to generate more products.
- A number of existing standards are used for the exchange of geographic imagery.
- Challenges to moving imagery online are technical, legal, business
  - Geographic accessibility - geocoding, geographic access standards
  - Network accessibility – bandwidth, compression.
  - Intellectual property will be stolen.
  - Security and privacy
- Governments have been the predominant suppliers of remote sensed data in the past. This is changing with the commercialization of remotely sensed data acquisition.

Currently the processing of imagery across multiple organizations and information technologies is hampered by lack of a common reference model.

The ultimate challenge is to enable the geographic imagery collected from different sources to become an integrated digital representation of the Earth widely accessible for humanity's critical decisions.

Geographic information — Imagery Reference Model

1. Scope

This Technical Specification defines the reference model for geographic imagery.

2. Conformance

TBD

3. Normative references

TBD

4. Terms and definitions

TBD

5. Symbols and abbreviated terms

TBD

6. Framework For Geographic Imagery

This Technical Specification provides a reference model for geographic imagery using the architectural viewpoints defined in ISO 19101. This Technical Specification and ISO 19101 are based on the Reference Model of Open Distributed Processing [ISO/IEC 10746]. As in ISO 19101, only the informational and computation viewpoints of RM-ODP are relevant in this reference model.

Standards pertaining to this geographic imagery reference model already exist, e.g., existing standards in the ISO 19100 series. In the future, additional standards will be needed to carry out the reference model.

The geographic infrastructure enabled by this Technical Specification will have multiple users, developers, operators, and reviewers. Each group will view the system from its own perspective. A purpose of the reference model is to enable descriptions of systems from multiple viewpoints. Furthermore, a reference model helps to ensure that each view will be consistent with the requirements and with the other views.

Interoperability is the ability of a system or system component to provide information sharing and inter-application co-operative process control. Standardization of geographic information can best be served by a set of standards that integrates a detailed description of geographic information concepts with the concepts of information technology. A goal of the ISO 19100 series standardization effort is to facilitate interoperability of geographic information systems, including interoperability in distributed computing environments. Interoperability provides the freedom to mix and match information system components without compromising overall success.

7. Computational Viewpoint

As defined by RM-ODP, the computational viewpoint on a system and its environment enables distribution through functional decomposition of the system into objects that interact at interfaces [ISO/IEC 10746-2]. For geographic imagery, the computational viewpoint will identify abstract components and their interaction patterns in categories similar to the following:

- Imagery Acquisition
- Imagery Storage
- Imagery Accessibility
- Imagery Processing
- Imagery Applications

8. Information Viewpoint

The information viewpoint defines a framework and terms for describing how geographic imagery progresses from data to higher semantic content information and to knowledge that can be used by decision makers.

RM-ODP defines that an information viewpoint is a viewpoint on an ODP system and its environment that focuses on the semantics of information and information processing.

A geographic imagery information viewpoint identifies the various types of geographic imagery and shows the process of moving from raw sensed data to higher semantic content information leading for example to polygonal coverages. Support of decision making is a prime application of geographic imagery.

The information viewpoint will be built around the following definitions:

- **Data** is a "representation subject to interpretation or to which meaning may be assigned. This is data as collected, measured or observed."
- **Information** is "the meaning that is currently assigned to data by means of the conventions applied to these data."
- **Knowledge** is "an organized, integrated collection of facts and generalizations."
- **Decisions** are supported by the application of knowledge and information to address the goals of multiple stakeholders.

The following bullets indicate the potential topics to be addressed in this viewpoint:

- Geographic Imagery Data
  - Data acquisition methods
  - Observations and Measurements
  - Data Policy

- Information from Geographic Imagery
  - Imagery General Feature Model
  - Imagery Content Model
  - Spatial properties for imagery, e.g., geolocation, registration
  - Attribute properties for imagery
  - Classification schema for gridded data

- Knowledge from Geographic Imagery
  - Data Fusion
  - Data Assimilation
  - Models

- Decisions using Geographic Imagery
  - Interactive system to help decision makers select options

- Group decision making methods

9. Engineering viewpoint

The engineering viewpoint focuses on the mechanisms and functions required to support distributed interaction between objects in the system.

For geospatial imagery, the engineering viewpoint will address:

- Interaction with sensors on variety of platforms; mobile, fixed.
- Variety of communications: satellite, wireless, phone, internet, media.
- Efficiency of communications, e.g., data compression.

10. Components of the Reference Model

This clause provides details on the components that were identified in the earlier clauses.