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Geographic information — Portrayal

Information géographique — Présentation

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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 19117 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

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Introduction

This International Standard is an abstract document and is not intended for direct implementation. It gives general guidelines to the application developers about the mechanism to be used to portray the feature instances of a dataset. The portrayal mechanism described makes it possible to have general rules valid for the whole dataset, and at the same time rules valid for a specific value of a feature attribute only. Different computer graphics standards use different attributes to visualize geometric primitives. For example, a line can be distinguished by thickness, width, colour, stippling, anti-aliasing, etc. This International Standard therefore includes a mechanism for declaring portrayal attributes as part of the portrayal specification.

In some cases whole feature classes have to be referenced and portrayed in a specific way, e.g. as symbols on nautical charts. Several symbol standards exist, and without a portrayal standard the application would have to set up a separate interface to each of these standards. With this International Standard all the supported symbol standards can be handled in a uniform way.

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Geographic information — Portrayal

1   Scope

This International Standard defines a schema describing the portrayal of geographic information in a form understandable by humans. It includes the methodology for describing symbols and mapping of the schema to an application schema. It does not include standardization of cartographic symbols, and their geometric and functional description.

2   Conformance

Any portrayal catalogue and portrayal schema describing the portrayal of geographic information claiming conformance with this International Standard shall pass all the requirements of the abstract test suite presented in Annex A.

3   Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19101, *Geographic information — Reference model*

ISO/TS 19103:—[1]), *Geographic information — Conceptual schema language*

ISO 19107:2003, *Geographic information — Spatial schema*

ISO 19109:—[1]), *Geographic information — Rules for application schema*

ISO 19115:2003, *Geographic information — Metadata*

ISO/IEC 19501:2005, *Information technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2*

4   Terms and definitions

For the purposes of this document, the following terms and definitions apply.

4.1
annotation
any marking on illustrative material for the purpose of clarification

NOTE   Numbers, letters, symbols, and signs are examples of annotation.

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1)   To be published.

1

4.2
class
description of a set of objects that share the same attributes, operations, methods, relationships, and semantics

[ISO/TS 19103]

NOTE   A class may use a set of interfaces to specify collections of operations it provides to its environment.

4.3
curve
1-dimensional **geometric primitive**, representing the continuous image of a line

[ISO 19107]

NOTE   The boundary of a curve is the set of points at either end of the curve. The first point is called the start point, and the last is the end point.

4.4
dataset
identifiable collection of data

[ISO 19115]

NOTE   The principles which apply to datasets may also be applied to dataset series and reporting groups.

4.5
external function
function not part of the application schema

NOTE   The electronic map in a car navigation system has to be displayed so that the up-direction of the map is always in the direction the car is moving. To be able to specify the rotation of the map, the current position of the car must be retrieved continuously from an external position device using an external function.

4.6
feature
abstraction of real world phenomena

[ISO 19101]

NOTE   A feature may occur as a type or an instance. Feature type or feature instance should be used when only one is meant.

4.7
feature attribute
characteristic of a feature

[ISO 19101]

EXAMPLE 1   A feature attribute named 'colour' may have an attribute value 'green' which belongs to the data type 'text'.

EXAMPLE 2   A feature attribute named 'length' may have an attribute value '82.4' which belongs to the data type 'real'.

NOTE 1   A feature attribute has a name, a data type, and a value domain associated with it. A feature attribute for a feature instance also has an attribute value taken from the value domain.

NOTE 2   In a feature catalogue, a feature attribute may include a value domain but does not specify attribute values for feature instances.

2

4.8
feature portrayal rule set
collection of portrayal rules that apply to a feature instance

4.9
geographic information
information concerning phenomena implicitly or explicitly associated with a location relative to the Earth

[ISO 19101]

4.10
geometric primitive
geometric object representing a single, connected, homogenous element of space

[ISO 19107]

4.11
instance
object that realizes a class

[ISO 19107]

4.12
metadata
data about data

[ISO 19115]

4.13
point
0-dimensional geometric primitive, representing a position

[ISO 19107]

4.14
portrayal
presentation of information to humans

4.15
portrayal catalogue
collection of all defined portrayals

4.16
portrayal rule
rule that is applied to the feature to determine what portrayal specification to use

4.17
portrayal service
generic interface used to portray features

4.18
portrayal specification
collection of operations applied to the feature instance to portray it

4.19
spatial attribute
feature attribute describing the spatial representation of the feature by coordinates, mathematical functions and/or boundary topology relationships

4.20
surface
2-dimensional geometric primitive, locally representing a continuous image of a region of a plane

[ISO 19107]

5 Abbreviated terms

OCL   Object Constraint Language

UML   Unified Modeling Language

URL   Uniform Resource Locator (also called URI – Uniform Resource Identifier)

6 Unified Modeling Language (UML)

6.1 Notations

The diagrams that appear in this International Standard are presented using the UML static structure diagram with the basic types defined in ISO/TS 19103. The UML notations used in this International Standard are described in Figure 1.
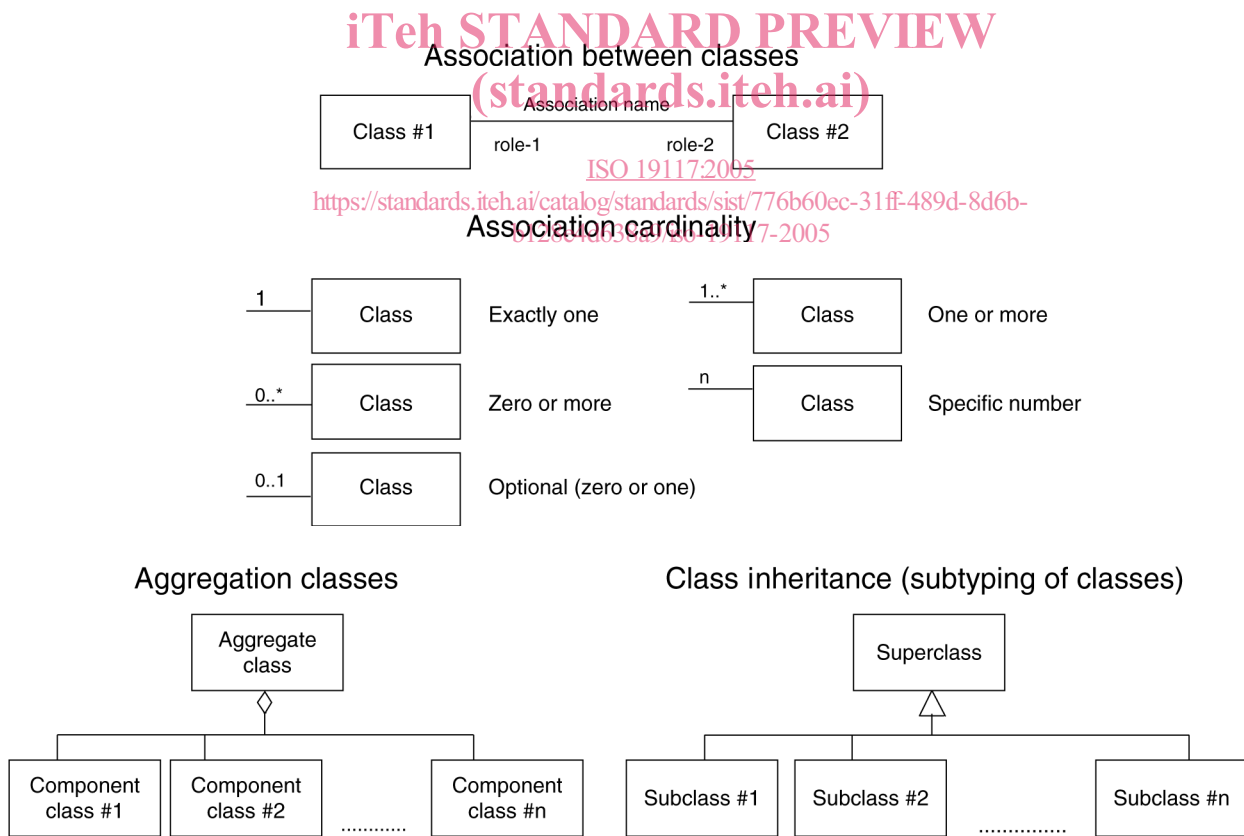

Figure 1 — UML notations used in this International Standard

6.2   UML model stereotypes

A UML stereotype is an extension mechanism for existing UML concepts. It is a model element that is used to classify (or mark) other UML elements so that they in some respect behave as if they were instances of new virtual or pseudo metamodel classes whose form is based on existing base metamodel classes. Stereotypes augment the classification mechanisms on the basis of the built-in UML metamodel class hierarchy. Below are brief descriptions of the stereotypes used in this International Standard; for more detailed descriptions consult ISO/TS 19103.

In this International Standard the following stereotypes are used.

— Interface – definition of a set of operations that is supported by objects having this interface.

— Type – stereotyped class used for specification of a domain of instances (objects), together with the operations applicable to the objects. A type may have attributes and associations.

— MetaClass – class whose instances are classes. Metaclasses are typically used in the construction of metamodels.

— Leaf – package that contains definitions, without any sub-packages.

7   Portrayal mechanism

7.1   Introduction

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This International Standard defines a feature-centred rule-based portrayal mechanism. Instances of features are portrayed based on rules, which make use of geometry and attribute information. The relationship between the feature instances, attributes and the underlying spatial geometry is specified in an application schema according to ISO 19109. Spatial geometry and associated topological relationships are defined in ISO 19107.

Portrayal information is needed to portray a dataset containing geographic data. The portrayal information is handled as portrayal specifications applied according to specific portrayal rules (see Clause 8). The portrayal mechanism makes it possible to portray the same dataset in different ways without altering the dataset itself. The portrayal mechanism is illustrated by Figure 2.
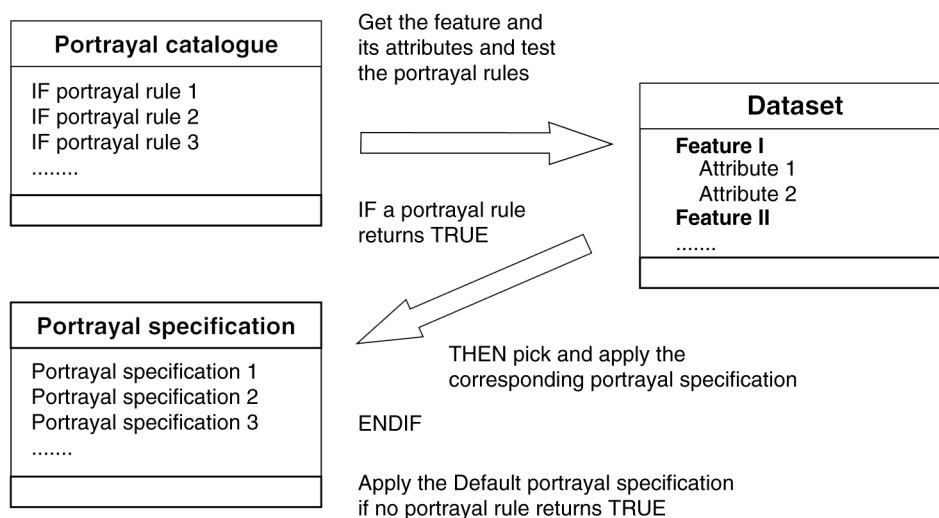

Figure 2 — Portrayal mechanism without priority attributes

The portrayal specifications and portrayal rules shall not be part of the dataset. The portrayal rules shall be stored in a portrayal catalogue. The portrayal specifications shall be stored separately from the dataset and referenced from the portrayal rules. The portrayal rules shall be specified for the feature class or feature instances they will be applied on. The portrayal specifications may be stored externally and referenced using a universal reference standard such as a network based URL.

Portrayal information may be specified either by sending a portrayal catalogue and portrayal specifications with the dataset, or by referencing an existing portrayal catalogue and portrayal specifications from Metadata. In addition, the user may want to apply a user defined portrayal catalogue and portrayal specification. The model in Figure 3 shows how the portrayal catalogue is referenced by the dataset metadata. Only the metadata reference is shown and not the contents of the portrayal catalogue (see ISO 19115).
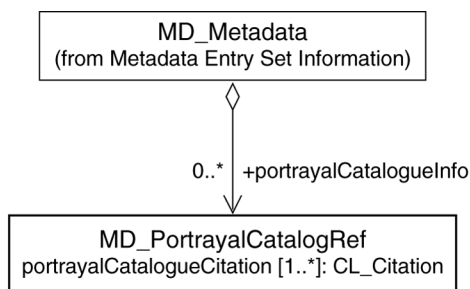

Figure 3 — UML model of the portrayal part of ISO 19115

The portrayal rules shall be expressed using UML, as defined in ISO/IEC 19501. The portrayal rule mechanism may be used to handle portrayal issues that have to be solved as they happen, such as how to automatically place text on maps, and special representations of the feature instances according to, for example, time of day or scale. The value of external functions (see 8.3.5), such as time of day or scale, may be included in the portrayal rules.

The portrayal rules in the portrayal catalogue shall be tested on the attributes of the feature instances in the dataset. The portrayal rule shall be applied as a query statement that returns TRUE or FALSE. The portrayal specification associated with that particular portrayal rule shall then be applied. If no portrayal rule returns TRUE then the default portrayal specification shall be used.

A portrayal service is used to portray a feature instance or instances. The portrayal service applies operations using the parameters defined in a portrayal specification (see 8.4.2).

7.2   Priority attribute

An optional priority attribute may be added to the portrayal rules. The attribute gives an integer value deciding in which order portrayal rules shall be applied if more than one returns TRUE for one feature instance. A portrayal rule with a high priority number takes precedence over one with a lower number. If two portrayal rules returning TRUE have the same priority value, then the application shall decide which one takes precedence. If priority attributes are used, all the portrayal rules shall have a priority attribute.

7.3   Portray nothing

For a feature instance that is not to be portrayed, a portrayal rule shall return TRUE with an associated portrayal specification that is empty when tested on the attributes of the feature instance (see 8.3.4). If no portrayal rule returns TRUE then the default portrayal specification shall be applied.

7.4   Default portrayal specification

The default portrayal specification shall be applied according to at least one of the spatial attributes of the feature instance, and shall only be applied when no portrayal rule returns TRUE for a feature instance.

A default portrayal specification shall be present to ensure that no feature instance is left unportrayed by mistake, and the provider of the dataset shall specify its values. External functions shall not be used in the default portrayal specification.

If the application fails to portray the data for some reason, the failure shall be handled by the application.

7.5 Annotation

The information that is to be portrayed shall be defined in an application schema. Typically there are two types of information included in a dataset: geographic information and annotation. Annotation includes text, grids, legends and special features such as a compass rose.

7.6 Overview of portrayal

Portrayal is illustrated by Figure 4. The diagram is not part of the portrayal schema and not for implementation. It is intended as an explanatory aid only.
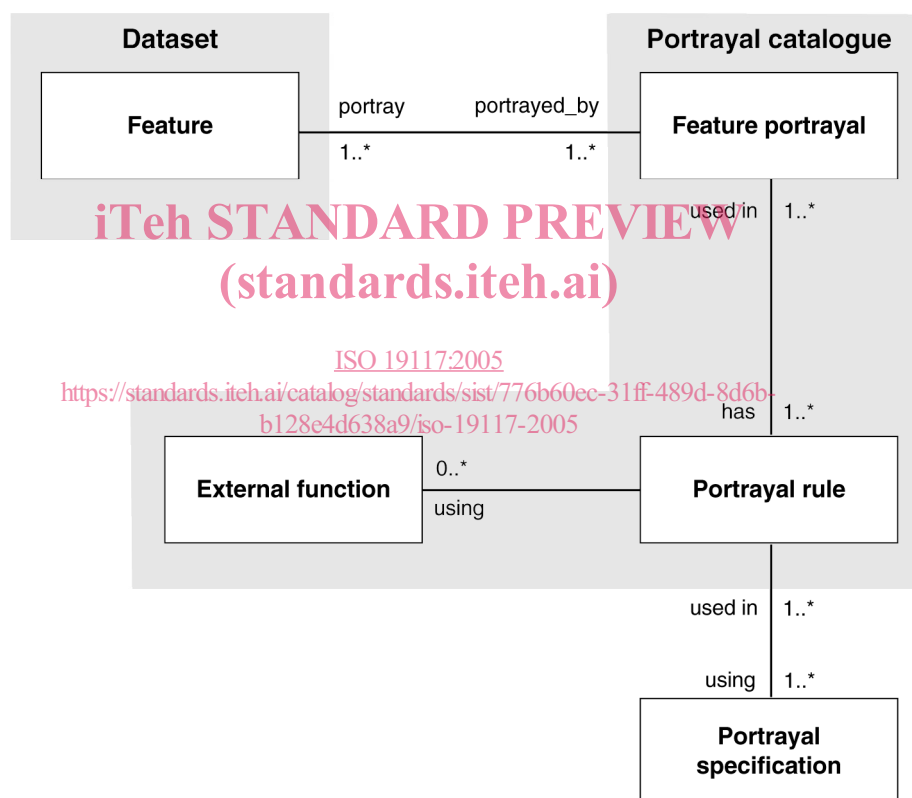

Figure 4 — Overview of portrayal

The portrayal catalogue consists of the feature portrayal, portrayal rule and external function, as shown in Figure 4. To produce different products, several portrayal catalogues may exist, portraying one or more datasets. Dataset is explained in ISO 19109. The portrayal catalogue relates to one or more portrayal specifications, and one portrayal specification may be used in one or more portrayal catalogues. A portrayal rule consists of two parts: a query statement that can use one or more external functions, and one or more action statements.