A study on 3D cadastral geographical modeling

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Introduction

Research background

3D data model components

3D representation methods

Conclusions
**Definition of 3D Cadastre**

A cadastre that registers and gives insight into right and restrictions not only on parcel but 3D property unites

Surveying, drawing and registration methods for underground and space facility in 3D cadastre

Representation real world including surface, underground and air space

Stoter, Valstad, Y. H. Won
Prior Research 3D Cadastre

Limited Land → Underground, surface, air space

3D Right management
3D DB Building
3D Application
Background of 3D Cadastre

- Limited representation by current 2D concept
- Increasing land value and land development
- Increasing interest of a right view and a right to enjoy sunshine

Support of future cadastral administration

2D
- Accuracy
- Define of a title

3D
- 3D Boundary representation
- 3D right representation
Components of data model

- 3D Data Model Components
- 3D spatial data acquisition and management
- Designing 3D DB Schema
- Plane space and solid space unique ID: PN
Components of data model

- 3D Cadastral Spatial Information
  - Cadastral Application Data set
    - Land/Building Identification (Parcel Number)
  - 3D Cadastral Data model
    - Right DM
      - Spatial DM
      - Topology DM
    - Geometry DM
    - Ownership Leasehold etc. DM
    - Data Specification
- Geography/Feature DM
3D data modeling procedure

Data creation
- 1D or 2D line and feature data extraction

Data update
- Updating height data in 2D data
- Updating 3D data when it changes

Data visualization
- Visualization: Data visualization and LOD
- Data representation: image matching, tiling

Data query
- Fast data query and data integrity
- Spatial and attribute data computational process
3D representation methods

Representing the distance with symbol, with the center of two objects connected together

- Vary far
- far
- medium
- near
Positional relationship between objects

Azimuth representation

9DLT representation

Angle representation

3D representation methods
3D representation methods

- Topological relationship between two objects
- 4-Intersection method
  - Boundary and internal space representation
- 8-Intersection method
  - Boundary, internal space also external space representation
- Topology relationship is not changed by alteration factor such as transformation, Scaling, Rotation
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3D Spatial relationship Algorithm

- Represents objects on geometry X, Y, Z axis
- Reducing geometry dimensions
- Real world representation by combination of coordinate axis objects
3D Spatial relationship Algorithm

- Extracting remainder as spatial relationship not to select among the selected main ones
- Saving data storage volume and time

- $P \perp A \times B$
- $P \perp A \ left_{of} \ B$
3D cadastral spatial primary key is unique PN

Designing of meta data in consideration of interoperability with NSDI

Designing 3D spatial objects and 3D rights

3D cadastral spatial algorithm should be designed in the consideration of further extension
Thank you very much for your attention!