New Generation of 3D GIS in Smart Cities

Xiaoyu Zhang
New technology Empower Smart City Construction

- UAV
- GNSS
- BIM
- Oblique Photogrammetry
- IoT
- Cloud
- Big Data
- AI
- Docker
- Microservice
- Blockchain
- Database
New Generation of 3D GIS

Applications of New Generation of 3D GIS

New Technologies of 3D Interactive and Output

1. Data Models Integration
2. Multi-source Data
3. IT Technology Experience

2D&3D Integration

- Data Models Integration
- Symbolic 3D Scene
- Analysis

- Oblique Photogrammetry
- BIM
- Point Cloud
- 3D Field Data
- 3D Data of Underground Pipelines
- 3D Terrain Data
- Manual Model
- Symbolic 3D Scene
- 3D Field Data
- Multisource 3D data fusion technology
Big Data Analysis and Cloud Storage
Cloud Storage

Unified Standard Spatial Big Data management engine

- **PostgreSQL**
  - Vector Big Data Storage

- **mongoDB**
  - 2D Cache Big Data Storage

- **elasticsearch**
  - Stream Data Storage

- **hadoop HDFS**
  - Unstructured big data storage
3D visualization of honeycomb grid aggregation (off taxi point at peak)
Big Data Analysis Capabilities

Dynamic Trajectory: Taxi in Chongqing
Big Data Analysis of Population
Heat Map of Population flow
2D & 3D Integration System
Smart City: Support Multi-source 3D Data

Road + BIM
Terrain + BIM
3D Model
Video + BIM
Street View

Spatial 3D Model (S3M)

Field Data
Oblique photogrammetry
Terrain
BIM
Point Cloud
Pipeline
Water Surface
Connect Real-time Data from Cameras and Sensors
Connect Real-time Data from the Camera (Video)
Above Ground and Underground Integration Display
2D & 3D Integration Display

- 2D Floor Map
- Information Query
- Check each room
- 3D thematic map
Urban Planning and Urban Design

City Map -> Planning model -> BIM Model

3D Map of Urban Planning and Design
3D Analysis Capability
Dashboard System
Dashboard - City Comprehensive Information Statistics

- Resource Sharing Departments
  - Total: 51
  - Shared: 44
  - Actual: 15

- Total Resources: 1,508
  - Shared: 493
  - Actual: 247

- Total Users: 10,219
  - Action: 12,255,027
  - Total: 117,187

- Users Today: 24
  - Action: 1,667
  - Total: 11

- Shared Data Statistics

<table>
<thead>
<tr>
<th>Type</th>
<th>This Month</th>
<th>Last Year</th>
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<tbody>
<tr>
<td>Data Files (个)</td>
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<tr>
<td>Databases (个)</td>
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<tr>
<td>Total (个)</td>
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</table>

- Data Access Rank
  - Total Access: 1134
  - Monthly Access:
    - City Government: 11
    - Municipal Planning: 12
    - Education: 11
    - Economy: 11
    - Culture: 11
    - Health: 11
    - Social Security: 11
    - Environment: 11
    - Safety: 11
BIM+GIS Service Smart City Management Application

Road and bridge construction

City Design

Engineering Management

Construction Operation and Maintenance
Network Topology Management Based on GIS

- Integrated Management of Equipment, Systems and Space
- Real-time Monitoring of Operating Status
- Device Topology Configuration Management
- Concealed Equipment Visual Operation and Maintenance
- Real-time Environmental Awareness
- Fine Management of Equipment Systems
BIM-based Visual Management

- Video Positioning and Monitoring
- Video Linkage
- Personnel Positioning
- Monitoring of Parking Lot
- Monitoring Visual Field
- Intrusion Alarm
- Elevator Management
# Integrated Business Management

<table>
<thead>
<tr>
<th>Business and Revenue Management</th>
<th>Real-time Alarm Management</th>
<th>Dynamic Energy Management</th>
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<tbody>
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<td><img src="image1.png" alt="Business and Revenue Management" /></td>
<td><img src="image2.png" alt="Real-time Alarm Management" /></td>
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<th>Remote Device Control</th>
<th>Comprehensive Inspection Management</th>
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<td><img src="image4.png" alt="Store Analysis" /></td>
<td><img src="image5.png" alt="Remote Device Control" /></td>
<td><img src="image6.png" alt="Comprehensive Inspection Management" /></td>
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3. AI-based Analysis Capabilities
Reflecting Urban Changes Based on Big Data and Artificial Intelligence Technologies

Urban Range Change Trend

Urban Green Space Change Trend

Urban Road Change Trend

Urban Water Change Trend
AI+GIS -- Image Target Detection based on Deep Learning (Pool)
AI+GIS -- Ground Extraction of Oblique Photogrammetry Buildings Based on Deep Learning
Comparative Analysis of Urban Architecture
Mobile Application
Front-end and Back-end Integrated Construction

Front-end

- Law Enforcement, Inspection
- Task Management
- Statistical Analysis
- Track Record

Back-end

- Business Management
- Scheduling and Command
- Strategic Analysis
- Assessment

Data and Information Transmission
Data Insight

The System Analyzes the Task Data and Conducts Data Mining Through Density Charts, Heat Maps, Relationship Diagrams, Aggregation Diagrams, and Statistical Charts Such As Histograms, Pie Charts, and Line Charts to Achieve Data Insight.
Application in Communication Industry
Grid to Voxel Grid

3D expression for signal strength
The Signal Expression Based on Voxel Grid
Simulate the coverage index from different height of buildings.
Signal Field Strength
Demonstration

SuperMap iDesktop

SuperMap iDesktop .NET
Welcome to our booth
Thank you!