Spatial Data Support for Building Monitoring

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Knowing to manage the territory, protect the environment,
evaluate the cultural heritage
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Introduction

• Base datasets
• Methods
• OBIA
  (Object-Based Image Analysis)
• OBIA + DSM
• Results
• Data service
• WMS
Aerial photography

Aerial photo coverage of Hungary
DSM-DEM

DSM-DEM and Orthophoto
Cadastral Map Database

Image analysis problems

- Detect buildings on remote sensed data
- Problems
  - there is no typical definition for buildings
  - shades, hidden parts
  - need an automatic method for the whole country
- Solution: Object based image analysis (OBIA)
  - main goal: to model human visualization (textural and geometrical contexts)
  - creating meaningful image-objects by segmentation
Meaningful objects

Objects – geometric measures

- Using geometric measures
  - spatial density:
    - filament-like objects has a lower density value
Methods

1. Parallel pixel- and object-based analysis
   - without height information
   - intersection of the results: good result but causes non-systematic errors
   - need height informations for a better result

2. DSM-supported OBIA analysis
   - CIR orthophoto and the DSM-DEM difference
   - NDVI, height and geometric features
   - better result but
     DEM’s lower resolution causes some mistakes

Results

Without height information

With height data
Results

- Evaluation
  - Visual interpretation as reference data
  - Pixel-wise accuracy by the Kappa-measure:
    - Without height: 68%
    - With height: 88.3%

Visual interpretation  
DSM-supported automatic detection

Data services
Conclusion

- Digital Image Processing, Image Analysis and GIS functions are very useful techniques for building monitoring

- Successful execution of pilot project for 19 settlements of Hungary showed, that FÖMI and Hungarian Land Administration have a lot of opportunities for increasing of spatial data services

- Nation-wide extension of Building Monitoring project requires more human and financial sources, but the technology has been developed
Thank you for your attention

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