

## DEVELOPMENT OF URBAN GREEN SPACE MONITORING TECHNIQUE WITH REMOTE SENSING AND ITS APPLICATION - COMPARATIVE STUDY TIMISOARA - ROMANIA AND BEIJING - CHINA

### Goal of the project

The project aims to study the techniques used for monitoring urban green space by means of high resolution remote sensing data to support the application of high remote sensing in urban mapping and feature extractions. Other objectives refer to build information model to convert spatial and spectral information from remote sensing data to useful information, to evaluate urban environment by the analysis of the spatial configuration of urban buildings and urban green space, to promote scientific understanding of the interaction among buildings, green space and human beings.

### Short description of the project

A city is the important area of earth's surface material, energy, and information exchanging; also it is the centre in national, regional political, economic, scientific and cultural aspects. Remote sensing imagery enables rapid and efficient quantification urban eco-environment and it gives a new insight for urban environmental research.

### Project implemented by

Politehnica University of Timisoara, Civil Engineering Faculty, Land Measurement and Cadastre Branch (UPT) and Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences.

### Implementation period

September 2016 – December 2017

### Main activities

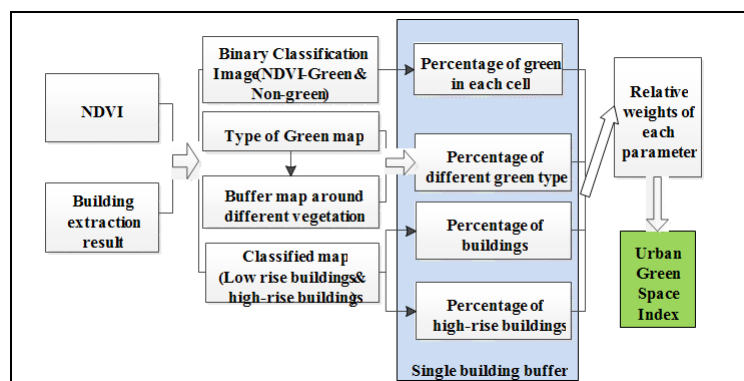
1. Propose image classification method and urban features extraction algorithm.

- Generation of the Normalized Height Model (NHM)
  - (1) Collection of LiDAR data on urban areas.

- (2) Collection of DEM (Digital Elevation Model) on urban areas.
- (3) Generation of DSM (Digital Surface Model) from LiDAR data
- (4) Generation of the Normalized Height Model by subtracting the DEM from the DSM

- Image segmentation algorithms
  - (1) Design of a robust segmentation algorithm for urban feature segmentation
  - (2) Segmentation accuracy assessment
- Extraction of Urban Buildings.
  - (1) Building mapping
  - (2) Generation of Building Height model
- 3D modeling of urban trees using LiDAR.
  - (1) Urban green mapping
  - (2) Tree detection and the 3D modeling of the urban trees.
- Urban green mapping using Multi-spectral images
  - (1) Machine learning techniques for classification of urban green
  - (2) Shadow detection and removal
  - (3) Accuracy assessment

2. Develop urban green space index to observe the urban green space at both horizontal and vertical dimensions.



## Results

The project is intended to contribute to the knowledge in remote sensing domain and make progress in using the following techniques:

1. Techniques for multi-source remotely sensed data fusion;
2. Development of new classification algorithms for urban mapping using high resolution remotely sensed data;
3. 3D modeling of urban features based on high resolution remotely sensed data;
4. Development of an urban green space evaluation model;
5. Studying the urban green space parameters quantitative retrieval technology.

## Applicability and transferability of the results

1. Develop an evaluating system for measuring the quality of the urban environment using remote sensing technology.
2. Probe the relations between green space and other environmental elements based on the space-time multi-scale urban green space model.
3. Demonstrate the urban green space monitoring technology among different cities.

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## Research Centre

Research Centre of Infrastructures for Construction and Transportation

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