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"Geospatial Information for a Smarter Life and Environmental Resilience"
Importance of Image and Point Cloud Matching for road Infrastructure Feature Extraction

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Importance of road infrastructure extraction
Surveying - Traditional approach

- Classic measurements
- GNSS
- Total stations
- Topographic maps
Surveying - Modern approach

- Terrestrial scanning
- Airborne LiDAR scanning
- Mobile mapping
Mobile mapping

- Multi-component system
- Point cloud
- Application
- MLS advantages
Mobile mapping systems
Problem definition

- Point cloud and Imagery matching
- Control points
- Known problems
- Commercial softwares
- Automatic procedures
- Procedures based on AI (artificial intelligence)
Point cloud and Image matching
Image blurring - Basic information

- Automatic procedures
- Convolutional Neural Networks (CNNs / ConvNets)
Image blurring - Basic information

- reliability methodology
- fully automatic procedures
- plug and play solution
- user friendly environment
Image blurring statistics

- City → 1300km of roads
- panorama images capturing every 3m
- result: 450,000 images
- 1 Image → 1s → one machine
- processing time for whole project: 450,000s → 125h → 5 days
Data publishing
Feature extraction

- Previous steps: point cloud and Imagery matching
- Control points
- Known problems
- Commercial softwares
- Automatic procedures
- Procedures based on AI (artificial intelligence)
Feature extraction

FEATURE EXTRACTION PROCESS

DATA PREPARATION

POINT CLOUD MATCHING

POINT CLOUD FEATURE EXTRACTION

STANDARD PROCEDURES
- STANDARD FEATURE EXTRACTION -

NEW PROCEDURES
- AUTOMATIC FEATURE EXTRACTION -

STREET MARKINGS
- CURBS
- EDGE OF ROAD
- ELECTRIC PILLARS
- STREET LIGHTINGS
- TREES
- TRAFFIC SIGNS
- TRAFFIC LIGHTS
- MANHOLES
- DRAINAGE

AUTOMATIC DETECTION OF LINE STRUCTURES:
- STREET MARKINGS
- CURBS
- EDGE OF ROAD

AUTOMATIC DETECTION OF VERTICAL STRUCTURES:
- ELECTRIC PILLARS
- STREET LIGHTINGS
- TREES

AUTOMATIC DETECTION OF VERTICAL STRUCTURES:
- TRAFFIC SIGNS
- TRAFFIC LIGHTS
Feature extraction
Feature extraction
Feature extraction
Feature extraction

- Feature extraction process
  - Data preparation
  - Point cloud matching
  - Point cloud feature extraction

  Standard procedures:
  - Standard feature extraction

  New procedures:
  - Automatic feature extraction

Automatic detection of:
- Line structures:
  - Street markings
  - Curbs
  - Edge of road

- Vertical structures:
  - Electric pillars
  - Street lightings
  - Trees
  - Traffic signs
  - Traffic lights
  - Manholes
  - Drainage
Conclusion:
Importance of road infrastructure extraction

- Mapping of urban and rural areas
- Corridors mapping
- Power lines mapping
- Highway mapping
- Clearance measurements
- Mapping with combination with other techniques
- Creating of various applications
Feature extraction - application
Feature extraction - application
Feature extraction - application
Thank you for your attention!

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