Surveying Goal Extraction from Dense 3D Point Clouds to Support Bridge Inspection

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Introduction and Motivation

- State-of-art geometric data collection technologies, such as 3D imaging systems, enable bridge inspectors to collect large amounts of 3D point clouds capturing detailed geometries of constructed bridges for detailed geometric assessments.

- While dense 3D point clouds contain rich geometric information regarding the conditions of bridges, they also bring unique challenges related to geometric information retrieval.

- Manually taking measurements on 3D point clouds for answering queries such as "minimum vertical underclearance of the bridge", "cross section losses of all columns", is time consuming due to repetitive manual operations as well as calculations.

- This research aim at eliminating repetitive manual operations for extracting bridge surveying goals.

Overview of the Approach

- Computer interpretable representation of surveying goal extraction workflow
- Operator library: recognize components, extract geometric primitives, extract geometric attributes of geometric primitives, extract spatial relationships between geometric primitives, accuracy analysis, etc.
- Two stages: compose work flows → execute work flows on 3D point clouds

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Current Status

- Developing and testing a prototype system for automated work flow composition and execution.

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