CLOI: An Automated Benchmark Framework for Generating Geometric Digital Twins of Industrial Facilities

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ABSTRACT

This paper devises, implements and benchmarks a novel framework, named *CLOI*, that can accurately generate individual labelled point clusters of the most important shapes of existing industrial facilities with minimal manual effort in a generic point-level format. *CLOI* employs a combination of deep learning and geometric methods to segment the points into classes and individual instances. The current geometric digital twin generation from point cloud data in commercial software is a tedious, manual process. Experiments with our *CLOI* framework reveal that the method can reliably segment complex and incomplete point clouds of industrial facilities, yielding 82% class segmentation accuracy. Compared to the current state-of-practice, the proposed framework can realize estimated time-savings of 30% on average. *CLOI* is the first framework to have achieved geometric digital twinning for the most important objects of industrial factories and provides the foundation for the generation of semantically enriched industrial digital twins.