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RECONSTRUCTION OF CONSISTENT 3D CAD MODELS FROM POINT CLOUD DATA USING *A PRIORI* CAD MODELS

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Abstract. We address the reconstruction of 3D CAD models from point cloud data acquired in industrial environments, using a pre-existing 3D model as an initial estimate of the scene to be processed. Indeed, this prior knowledge can be used to drive the reconstruction so as to generate an accurate 3D model matching the point cloud. We more particularly focus our work on the cylindrical parts of the 3D models. We propose to state the problem in a probabilistic framework: we have to search for the 3D model which maximizes some probability taking several constraints into account, such as the relevancy with respect to the point cloud and the *a priori* 3D model, and the consistency of the reconstructed model. The resulting optimization problem can then be handled using a stochastic exploration of the solution space, based on the random insertion of elements in the configuration under construction, coupled with a greedy management of the conflicts which efficiently improves the configuration at each step. We show that this approach provides reliable reconstructed 3D models by presenting some results on industrial data sets.

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