

A study on reconstructing a 3D model from orthographic views using a satisfiability solver

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Abstract

In the fields of manufacturing, production and design, demand for 3D models has been grown as computer performance has improved, and 3D Computer Aided Design (CAD) systems have been widely used since 1990s. On the other hand, 2D drawings still play an important role as documents that guide product manufacturing and assembly process. Although a lot of software systems including 3D reconstruction function from 2D images have been released on the market, in actual situation, the process of building 3D models is often conducted manually. This is because such tools require many user interactions and only slightly reduces the time of the 3D reconstruction process. Since 1970s, many studies have been conducted for a reconstruction problem, a problem of constructing a 3D model from 2D engineering drawings. However, the reconstruction problem has not been completely solved [1].

Therefore, in this study, the authors propose a 3D reconstruction method that converts the problem to a SAT problem. The proposed method realizes GPU-free and efficient 3D reconstruction by using SAT solver for reconstruction from pseudo wire frame model to surface model. The advantage of the proposed method is easiness of rule addition; it is only necessary to describe a rule as Boolean formula; it does not necessary to design an algorithm that satisfies the rule. In addition, recent SAT solvers have sufficient performance to solve large-scale problems. Experiments with some problem instances demonstrates the effectiveness of the proposed method.

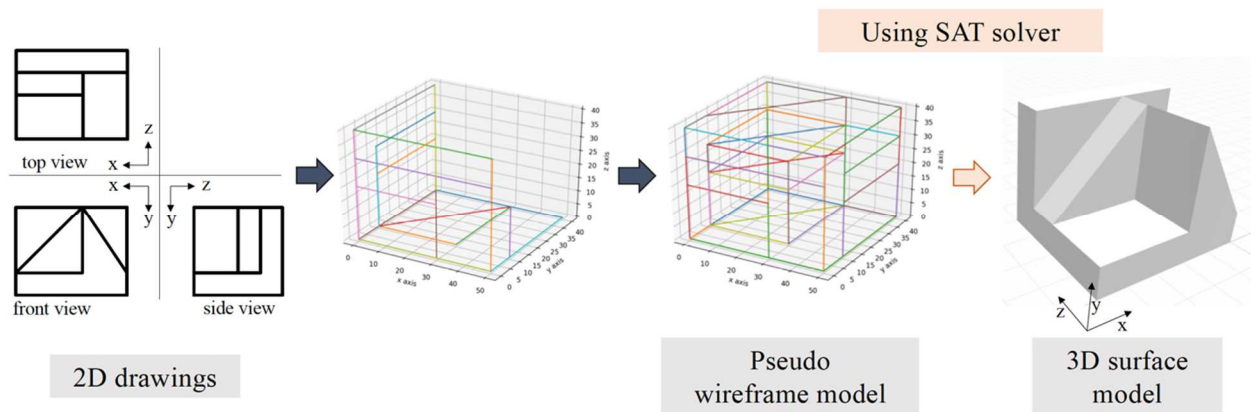


Figure. Overview of the proposed method

References

1. P. Company, A. Piquer, M. Contero, et al. A survey on geometrical reconstruction as a core technology to sketch-based modeling. *Computers & Graphics*, 2005.

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