Abstract

This paper presents a novel hole-filling algorithm in reverse engineering (RE) domain that can fill holes directly from the point clouds—a hybrid PSO-BP approach: Firstly, boundary of the hole is detected and feature points on the boundary are extracted. Secondly, a hole filling method based on the commercial reverse engineering software (Gemagic and Imageware) is employed to cover the hole with a rough mesh. Finally, a hybrid PSO-BP algorithm is exploited to refine the original mesh. The performance of the approach proposed has been evaluated by applying it to two different scattered point clouds from real-world scanned objects—a bucket of an excavator and a gear. The experimental results show that the suggested approach performs quite well, it is able to deal with highly accurate and extremely complicated data points. Besides, it can handle shapes with delicate details as well, the favorable fidelity and efficiency make it a promising candidate for many practical applications.

References
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**Index Terms**

Computer Science  
Algorithms
Keywords

Reverse Engineering, Point clouds, Hole filling, BP algorithm, PSO-BP algorithm.