Evaluation and Selection of Assembly Sequences Using Artificial Intelligence

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ABSTRACT

The purpose of this research is to evaluate and select assembly sequences using Artificial Intelligence techniques. The choice of the sequence in which parts of subassemblies are put together in the mechanical assembly of a product can drastically affect the efficiency of the assembly process. First, the matrix representations of assembly products as well as the tree representations of assembly sequences are proposed. Then, five evaluation criteria such as directionality, fixture complexity, accessibility, direction change and tool change are presented along with a systematic classification. In addition, Analytical Hierarchy Process is applied to weigh the heuristic functions of the evaluation criteria. A* Search of AI Search Strategies is presented for deriving solution procedures for assembly sequences planning. Finally, assembly examples are adopted for illustrating and validating the performance of AI models for the evaluation and selection of assembly sequences.

Keywords : A*搜尋法則 ; Assembly Sequences Planning ; Artificial Intelligence ; A* Search ; Analytical Hierarchy Process

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