Evolutionary grammars based design framework for product innovation

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Abstract

Innovation and creativity are the key successful factors and a global priority in engineering industries. This paper describes the development of an evolutionary grammars based design framework for product innovation. A new genetic representation of shape grammars is developed in an evolutionary computing environment. The results generated by the genetic algorithm define a new combination of shape features for alternative designs. In this way, traditional shape grammar is extended to an interactive context in which generative and evolutionary computing methods are combined. Both product component design as well as product configuration are supported in this framework. Two important design issues are addressed in this research, 1) Product form exploration, and 2) Product design strategies. To tackle the issues, this research demonstrates the efficient use of evolutionary grammars to support the exploration of innovative product form designs.

Keywords*:* Evolutionary Grammars; Shape Grammars; Evolutionary Computing; Product Innovation; Product Design Strategies

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