Abstract:

Today’s computer aided design systems enable the creation of digital product definitions that are widely used throughout the design process, for example in analysis or manufacturing. Typically, such product definitions are created after the bulk of designing has been completed because their creation requires a detailed knowledge of the shape that is to be defined. Consequently, there is a gulf between the exploration processes that result in the selection of a design concept and the creation of its definition. In order to address this distinction, between design exploration and product definition, understanding of how designers create and manipulate shapes is necessary. The research outlined in this paper results from work concerned with addressing these issues, with the long term goal of informing a new generation of computer aided design systems which support design exploration as well as the production of product definitions. This research is based on the shape grammar formalism. Shape grammars have been applied in a range of domains, commonly to generate shapes or designs that conform to a given style. However, a key challenge that restricts the implementation of shape grammar systems lies in the detection of embedded parts, or sub-shapes, which are manipulated according to shape rules to create new shapes. The automatic detection of sub-shapes is an open research question within the shape grammar community and has been actively explored for over thirty years. The research reported in this paper explores the use of computer vision techniques to address this problem; the results achieved to date
show real promise. An early prototype is presented and demonstrated on design sketches of martini
glasses taken from a student research project.

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