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Sub-part correspondence by structural descriptors of 3D shapes

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Abstract: To fully exploit the valuable knowledge embedded in repositories of digital models, it is crucial to devise search engines capable of expressing high-level and advanced queries, which can effectively support the re-use of CAD models. The retrieval mechanism should be able to return not only global similarity measures among objects, but it should also be coupled with methods for the automatic identification of similar sub-parts in the query and retrieved models, possibly highlighting automatically the object differences.

This paper describes a method for partial shape-matching able to recognize similar sub-parts of objects represented as 3D polygonal meshes. The geometry and the structure of the shapes are coupled in a descriptor that provides a flexible coding, grounded on solid mathematical theories, and that can be adapted to the user's needs and to the context of applications. The matching framework for sub-part correspondence is achieved through a graph-matching technique, which builds the common sub-graphs between the two shapes and highlights the maximal sub-parts having similar structure and similar space distribution. (C) 2006 Elsevier Ltd. All rights reserved.

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