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3D Object Retrieval Based on Similarity Calculation in 3D Computer Aided Design Systems

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Abstract : Nowadays, recent technological advances in the acquisition, modeling, and processing of three-dimensional (3D) objects data lead to the creation of models stored in huge databases, which are used in various domains such as computer vision, augmented reality, game industry, medicine, CAD (Computer-aided design), 3D printing etc. On the other hand, the industry is currently benefiting from powerful modeling tools enabling designers to easily and quickly produce 3D models. The great ease of acquisition and modeling of 3D objects make possible to create large 3D models databases, then, it becomes difficult to navigate them. Therefore, the indexing of 3D objects appears as a necessary and promising solution to manage this type of data, to extract model information, retrieve an existing model or calculate similarity between 3D objects. The objective of the proposed research is to develop a framework allowing easy and fast access to 3D objects in a CAD models database with specific indexing algorithm to find objects similar to a reference model. Our main objectives are to study existing methods of similarity calculation of 3D objects (essentially shape-based methods) by specifying the characteristics of each method as well as the difference between them, and then we will propose a new approach for indexing and comparing 3D models, which is suitable for our case study and which is based on some previously studied methods. Our proposed approach is finally illustrated by an implementation, and evaluated in a professional context.

Keywords : CAD, 3D object retrieval, shape based retrieval, similarity calculation
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