Feature-Based CAD Interoperability

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Abstract
Accurate and efficient data exchange between computer-aided design (CAD) systems is an essential capability when working in a collaborative engineering environment. The goal of this research is to make two popular 3D CAD systems, PTC Pro/Engineer and DS SolidWorks, interoperable. By converting from each program’s native data representation to a generic XML representation, we hope to enable high-level data exchange between Pro/Engineer and SolidWorks. Thus far, 2D sketch data has been successfully mined from both CAD systems and converted to a generic XML representation. This data has been used to manually reconstruct various 2D sections in Pro/Engineer and SolidWorks in order to create algorithms for automation. Efforts towards converting between the generic XML representations of each system will complete the final step of this project and will result in full interoperability of files containing 2D sketches. Results from this work will establish foundations to extend to 3D interoperability.

Research Objectives
• Interpreting XML representations of Pro/E and SolidWorks part files while preserving higher-level information (e.g. features).
• Developing algorithms for converting high-level data between Pro/E and SolidWorks.
• Automatically reconstructing XML representation of 2D sketches.

Interdisciplinary Connection
This research topic is interdisciplinary in nature. It involves the close collaboration of computer scientists and mechanical engineers. When attempting to facilitate conversion between CAD systems, it is important to view the problem from different angles. Mechanical engineers offer the perspective of the user and tester in this scenario, while computer scientists write the code necessary for conversion.

Future Work
• Based off promising results, apply our approach to larger suite of features and CAD data.
• Extend our framework to involve a 3D feature set.
• Formalize CAD systems and the conversion process between them using techniques from programming languages.

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