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AI EDAM Special Issue, August 2017, Vol. 31, No. 3
Function Modeling: Benchmark Models, Problems, and Approaches

Guest Editors: Joshua D. Summers, Claudia Eckert, Chiradeep Sen, Srinivasan Venkataraman, & Matt Bohm

This Special Issue provides justification and a proposed research direction for establishing a common benchmarking scheme for function representations that are developed and deployed throughout academia and practice with the ultimate goal of providing industry with practically usable functional modeling tools and concepts. It is based on work presented at the International Conference on Engineering Design in 2013. Despite decades of research into functional descriptions, industry does not appear to have incorporated functional modeling in practice while still proclaiming a need to express product information beyond form. Possible reasons contributing to this resistance might be that there is not yet a canonical definition of function, each approach being grounded in different conceptualizations, or that there might be multiple distinct concepts with shared terminology. Researchers and practitioners have proposed many different views of function in engineering design. These views have resulted in many different approaches to model information about a product's functionality. For example, several design textbooks talk about using function–flow networks to capture the sequence and dependencies for the desired functionality of a product or system. Rather than develop a single, unified definition of function, we assert that each approach has its own strengths and weaknesses: each approach is useful and particularly well suited for different reasoning applications and domains, yet the transference across these is difficult at best. Therefore, we are proposing a different approach to function research; by developing a set of comparative benchmarks that can be explored with the different modeling approaches, the community can start to discern which approaches are more useful for different needs, and perhaps to discover which elements of the representations and vocabularies are most conducive for different elements of functional thinking.

To this end, we invite special contributions in three specific areas that in combination will help provide a framework and justification for a systematic benchmarking process:

- We seek papers that present (1) a function model created within the author's representation of choice, (2) a detailed critique of a function model for a given problem (reverse engineering of a glue gun) from past function benchmarking workshops, and (3) an explanation of the limitations of the modeling approach within this given problem. These should be used to demonstrate how a single problem can be utilized to compare multiple different modeling approaches.
- We are interested in benchmark challenge problems. The problems should be fully detailed in terms of scope, size, reasoning, domain, and other criteria identified by the researchers.
- We are also looking for papers that present experimental studies exploring a benchmark dimension in function modeling. The experimental studies could explore the interpretability of a representation, the support of a representation for innovative ideation, or perhaps the support of the representation for physics based reasoning.

All submissions will be anonymously reviewed by at least three reviewers. The selection for publication will be made on the basis of these reviews. High quality papers not selected for this Special Issue may be considered for standard publication in *AI EDAM*.

Information about the format and style required for *AI EDAM* papers can be found at http://aiedam.usc.edu/index.php/Authors/ForAuthors

Note that all inquiries and submissions for Special Issues go to the Guest Editors, **not** to the Editor in Chief.

Important Dates

Intent to submit (Abstract & Title):	As soon as possible
Submission deadline for full papers:	September 1, 2016
Reviews due:	November 1, 2016
Notification and reviews due to authors:	December 1, 2016
Revised papers due from authors:	February 1, 2017
Second reviews due:	March 1, 2017

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