Automatically changing modules in modular ontology development and management

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ABSTRACT:

Modularity has been proposed as a solution to deal with large ontologies. This requires, various module management tasks, such as swapping an outdated module for a new one or a computationally costly one for a leaner fragment. No mechanism exists to exchange an arbitrary module automatically. To solve this manual task, we modify the SUGOI algorithm into SUGOI-Gen; with SUGOI-Gen, one can swap any module within a modular system, implemented it, and wrapped a GUI around it. We carried out an experimental evaluation with six ontologies covering three different use-cases to determine whether arbitrary interchangeability is practically doable, and to what extent such changes affect the quality of the module and automated reasoning over it. The results are positive, with the success rate varying between 22-100% depending on the number of mappings between the source and target module. The evaluation also revealed that the interchangeability does indeed have an impact on a module's metrics. Regarding reasoning, when comparing an original ontology to one where a module has been swapped, the processing time is greatly improved for all except one of the swapped modules in the set.