Merging and Comparing Ontologies Generically

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Abstract : Ontology operations, e.g., aligning and merging, were studied and implemented extensively in different settings, such as categorical operations, relation algebras, and typed graph grammars, with different concerns. However, aligning and merging operations in the settings share some generic properties, e.g., idempotence, commutativity, associativity, and representativity, labeled by (I), (C), (A), and (R), respectively, which are defined on an ontology merging system $(D \sim M)$, where D is a non-empty set of the ontologies concerned, $\sim$ is a binary relation on D modeling ontology aligning and M is a partial binary operation on D modeling ontology merging. Given an ontology repository, a finite set $O \subseteq D$, its merging closure $\hat{O}$ is the smallest set of ontologies, which contains the repository and is closed with respect to merging. If (I), (C), (A), and (R) are satisfied, then both D and $\hat{O}$ are partially ordered naturally by merging, $\hat{O}$ is finite and can be computed, compared, and sorted efficiently, including sorting, selecting, and querying some specific elements, e.g., maximal ontologies and minimal ontologies. We also show that the ontology merging system, given by ontology V-alignment pairs and pushouts, satisfies the properties: (I), (C), (A), and (R) so that the merging system is partially ordered and the merging closure of a given repository with respect to pushouts can be computed efficiently.

Keywords : ontology aligning, ontology merging, merging system, poset, merging closure, ontology V-alignment pair, ontology homomorphism, ontology V-alignment pair homomorphism, pushout

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