

Knowledge table driven ontology enhancement

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1 Ontology Enhancement System

Our system enhances a consistent OWL ontology by adding new concept and property definitions, if they are found consistent with the existing ontology. New restrictions are allowed to be posed on existing concepts. But, no changes are allowed on existing restrictions. We build a *knowledge table* from the ontology to be enhanced, to determine the consistency of an input submission. *Knowledge table* is a two dimensional table, each row of which corresponds to a concept in the ontology. Each column corresponds to a property restriction appearing as *property flavor*, a combination of *property*, *restriction* and *value*. The cell values in *knowledge table* could be $\{1\}$, $\{0\}$ or $\{0,1\}$ depending on whether the *property flavor* is true, false or not applicable for a concept. This table intuitively stores property restrictions applicable to concepts in the ontology. Interactions between *property flavors* are captured in another data structure called *influence tables*. The *influence tables* take into account the effect of disjointness between ranges of *property flavors* and the functional characteristic of a property. The *knowledge table* describes a concept in terms all *property flavors* that appear in the ontology by updating cell values as per the *influence table*. Our *knowledge table* is built on the assumption that concept descriptions do not contain more than one value and one cardinality restrictions. Although we have tried to incorporate interactions introduced by role inclusions and inverse properties, we need to consider interactions due to the presence of a multiple value and cardinality restrictions. *Knowledge table* helps us to check the *subClassOf* and *disjoint* relationship between concepts directly. Ontology enhancement algorithm constructs the *knowledge table*, considering the concepts hierarchically. A new restriction on existing classes is accepted if it matches the respective concept description in *knowledge table*. Building a row in the *knowledge table* with respect to a concept fails, if any operation requires either a $\{0\}$ or a $\{1\}$ to be flipped. More details are given in technical report [1].

References

- [1] Sujatha R Upadhyaya and Saleena N and P Sreenivasa Kumar. Knowledge Table driven Ontology Enhancement. Technical report, IIT Madras, INDIA, March 2005. available at "<http://aidb.cs.iitm.ernet.in/papers/DLRevised.pdf>".

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