Extracting a justification for OWL ontologies by critical axioms

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Problems & Ideas

- Problems of Extracting a Justification for OWL Ontologies
  - The detection of justification is only depend on the contractive phase, but not related with expansive phase.
  - although it is easily operated given every entailment testing occurred in this procedure is independent with each other, it would generate unnecessary reasoning expenses.
- Ideas: Adopt a new solution architecture to the extraction of a justification.
  - Under our architecture we proposed, the justification can be detected by the expansive phase directly through defining the critical axiom.
  - the proposed new optimized strategy (e.t. axiom selection function & incremental reasoning for satisfiability decision) can reduce the reasoning procedure thus it is able to find the justification faster.

Main Contributions

- **Compared to the traditional pruning strategy for reducing axioms, our proposed method expands axioms directly.**

(units: ms/ times)

Ontology ID.	1	2	3	4	5	6	7
Expansion Method	59	347	3843	77014	1694	1341	6682
	29	276	2217	36978	937	1145	5719
Prune Method	45	178	2954	57824	1370	882	4998
	10	121	1654	21547	618	765	3998

- **some optimization techniques such as select function and increment reasoning have been adopted to improve this approach in further.**

(units: ms/ times)

Ontology ID.	1	2	3	4	5	6	7
Expansion with INP	37	58	862	3564	481	387	1194
	8	32	639	2184	173	402	579
Prune with WIN	43	87	1124	4811	609	512	2010
	10	51	731	2765	201	564	1874