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CATS Solver: The Rise of Hybrid Abduction Algorithms

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The state-of-the-art complete algorithms to solve ABox abduction in DL include the original Reiter's algorithm for minimal hitting sets alongside its more recent updates: Wotawa's HST and Pill and Quaritch's RC-Tree. On the other hand, incomplete methods that quickly find some but not all solutions include Junker's QuickXplain and MergeXplain by Shchekotykhin et al. We present CATS, a new modular ABox abduction solver. It implements all the said algorithms together with the hybrid MHS-MXP, recently introduced by Homola et al., and two new analogous variants: HST-MXP and RCT-MXP, based on HST and RC-Tree, respectively. The user can choose any of the eight algorithms. The solver uses the JFact reasoner as a black box and thus allows any DL expressivity up to $\mathcal{S}, \mathcal{R}, \mathcal{O}, \mathcal{I}, \mathcal{Q}$. The modular implementation served as a test bed for an evaluation and comparison of the implemented algorithms, which we conducted over the LUBM ontology. Out of the complete algorithms, the hybrid ones were proven to find explanations faster, and they were also more memory-efficient.

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Authors: KLOC, Jakub; BOBOROVA, Janka; PUKANCOVÁ, Júlia; HOMOLA, Martin

Presenter: BOBOROVA, Janka

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