Abstract

This thesis aims to develop a domain-independent system for repairing faulty Datalog-like theories by combining three existing techniques: abduction, belief revision, and conceptual change. Accordingly, the proposed system is named the ABC repair system (ABC). Given an observed assertion and a current theory, abduction adds axioms, which explain that observation by making the corresponding assertion derivable from the expanded theory. Belief revision incorporates a new piece of information which conflicts with the input theory by deleting old axioms. Conceptual change uses the reformation algorithm for blocking unwanted proofs or unblocking wanted proofs. The former two techniques change an axiom as a whole, while reformation changes the language in which the theory is written. These three techniques are complementary. But they have not previously been combined into one system. We are working on aligning these three techniques in ABC, which is capable of repairing logical theories with better result than each individual technique alone. In addition, ABC extends abduction and belief revision to operate on preconditions: the former deletes preconditions from rules, and the latter adds preconditions to rules. Datalog is used as the underlying logic of theories in this thesis, but the proposed system has the potential to be adapted to theories in other logics.

Abstract prepared by Xue Li by taking directly from the thesis.

E-mail: xuerr.lee@gmail.com