

Using Integer Programming to Find Minimum Deduction Graphs for Accomplishment Inference

Han-Lin Li

National Chiao Tung University

R.O.C.

Chao-Chih Yang

University of North Texas

U.S.A.

Abstract

This paper proposes the use of the integer programming method for finding a minimum deduction graph (MDG) to solve the inference problem in a fragment of the first-order logic. This fragment contains formulas, extended from Horn clauses (HC), which are referred to as Horn formulas (HF). Given a set * of HC's including possibly the instances of some given HC's caused by unifications and the ground unit clauses indicating some base relations, a source, and a sink, the problem of inferring the HF (source implies sink) from * is solved by selecting a minimum subset * of * to form an MDG(source, sink). This approach has the advantages of providing a systematic method to solve the central inference problem, which is easy to understand. One restriction of the proposed approach is that each rule in * should be nonrecursive function free.

Keywords: Complexity, Database, Deduction Graph, First-Order Logic, Inference, Integer Programming, Minimization, Unification.