An ILP Model for a Monotone Graded Classification Problem

Peter Vojtáš; Tomáš Horváth; Stanislav Krajči; Rastislav Lencses

Abstract: Motivation for this paper are classification problems in which data can not be clearly divided into positive and negative examples, especially data in which there is a monotone hierarchy (degree, preference) of more or less positive (negative) examples. We present a new formulation of a fuzzy inductive logic programming task in the framework of fuzzy logic in narrow sense. Our construction is based on a syntactical equivalence of fuzzy logic programs FLP and a restricted class of generalised annotated programs. The induction is achieved via multiple use of classical two valued induction on α-cuts of fuzzy examples with monotonicity axioms in background knowledge, which is afterwards again glued together to a single annotated hypothesis. Correctness of our method (translation) is based on the correctness of FLP. The cover relation is based on fuzzy Datalog and fixpoint semantics for FLP. We present and discuss results of ILP systems GOLEM and ALEPH on illustrative examples. We comment on relations of our results to some statistical models and Bayesian logic programs.

Keywords: graded classification; ILP; annotated programs;

AMS Subject Classification: 68T37; 03B70; 03B50;