Revising Incompletely Specified Convex Probabilistic Belief Bases

Gavin Rens
CAIR_,
University of KwaZulu-Natal,
School of Mathematics, Statistics and Comp. Sci.
CSIR Meraka, South Africa
Email: gavinrens@gmail.com

Thomas Meyer
CAIR,
University of Cape Town,
Dept. of Comp. Sci.
CSIR Meraka, South Africa
Email: tmeyer@cs.uct.ac.za

Giovanni Casini
University of Luxembourg,
Comp. Sci. and Communication Research Unit
Luxembourg
Email: giovanni.casini@uni.lu

Abstract

We propose a method for an agent to revise its incomplete probabilistic beliefs when a new piece of propositional information is observed. In this work, an agent's beliefs are represented by a set of probabilistic formulae – a belief base. The method involves determining a representative set of 'boundary' probability distributions consistent with the current belief base, revising each of these probability distributions and then translating the revised information into a new belief base. We use a version of Lewis Imaging as the revision operation. The correctness of the approach is proved. The expressivity of the belief bases under consideration are rather restricted, but has some applications. We also discuss methods of belief base revision employing the notion of optimum entropy, and point out some of the benefits and difficulties in those methods. Both the boundary distribution method and the optimum entropy method are reasonable, yet yield different results.