ECML'2001 Workshop

Machine Learning as Philosophy of Science

Edited by
Kevin B. Korb and Hilan Bensusan

Preface

Machine learning studies inductive strategies in algorithms. The philosophy of science investigates inductive strategies as they appear in scientific practice. Although the two disciplines have developed largely independently, they share many of the same issues. This is slowly coming to be recognized, as evidenced in the annual *Uncertainty in AI* and *AI and Statistics* conferences. This workshop explores the extent to which the methods and resources of philosophy of science and machine learning can inform one another.

The workshop therefore focuses on such questions as:

- How machine learning experiments and results can inform our knowledge of scientific inductive discovery?
- What theoretical results in computational learning can be useful to understand scientific methods?

  How accounts of confirmation, explanation, discovery and theoretical unification developed in the philosophy of science area can be used to develop automatic learning systems?
- How induction is to be assessed: is empirical adequacy (predictive accuracy) enough both to account for scientific dynamics and to evaluate automated induction performance?
- Is there a substantial difference between scientific reasoning as conceived in the philosophy of science and in artificial intelligence?
- Is scientific method mechanisable? Are scientific practices algorithmic?

Venue

This workshop is one of a number of workshops jointly sponsored by the *12th European Conference on Machine Learning (ECML'01)* and the *5th European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD'01).*

Invited Speakers

- **Professor Kevin Kelly** (CMU, Philosophy), author of *The Logic of Reliable Inquiry* (Oxford, 1996). His recent work concerns reliable belief revision, the solution of methodological regresses, and efficient convergence.
- **Dr Peter Flach** co-editor of *Abduction and Induction: essays on their relation and integration* (Kluwer, 2000) and co-organiser of workshops on Abductive and Inductive Reasoning in AI at ECAI'96, IJCAI'97 and ECAI'98.

Program Committee

- Atocha Aliseda (Mexico)
- Hilan Bensusan (Bristol)
- Peter Flach (Bristol)
- Ronald Giere (Minn)
- Holger Hoos (UBC)
- Colin Howson (LSE)
- John Josephson (Ohio State)
- Kevin Kelly (CMU)
- Kevin Korb (Monash)
- Henry Kyburg (Rochester)
- David Pearce (DFKI)
- Peter Slezak (UNSW)
- Thomas Stuetzle (Darmstadt)
- Paul Thagard (Univ of Waterloo)
- Charles Twardy (Monash)
- Henry Tirri (Helsinki)
- Chris Wallace (Monash)
- Jon Williamson (KCL)
- Jan Zytkow (deceased)

Program

09:00-09:15 Introduction

09:15-10:15 **Kevin Kelly**

10:15-10:45 Coffee Break

10:45-11:15 **Jon Williamson**

11:15-11:45 **Evgenii Vitayev**

11:45-12:15 **Kevin Korb**

12:15-14:15 Lunch Break

14:15-14:45 **Jan Rauch**

14:45-15:15 **Vincent Corruble**

15:15-15:45 **Lorenzo Magnani**

15:45-16:15 Coffee Break

16:15-17:15 Round Table Discussion

Kevin Kelly

Some short-run implications of convergent success

Standard philosophy of science has attempted to understand inductive reasoning in terms of a relation of confirmation or partial evidential support. An alternative approach, reminiscent of C. S. Peirce, H. Reichenbach and H. Putnam, views science as a self-correcting process that eventually converges to a correct answer without announcing when. The former camp has alleged that the latter view is incomplete because long run performance is consistent with any foolish behavior in the short run. I will argue that long run convergence and efficiency actually imply some very sharp short run methodological recommendations. In particular, I will show that recently proposed models of iterated belief revision have markedly different learning powers so that convergent methodology can serve as a useful constraint on axiomatic accounts of inductive "rationality".