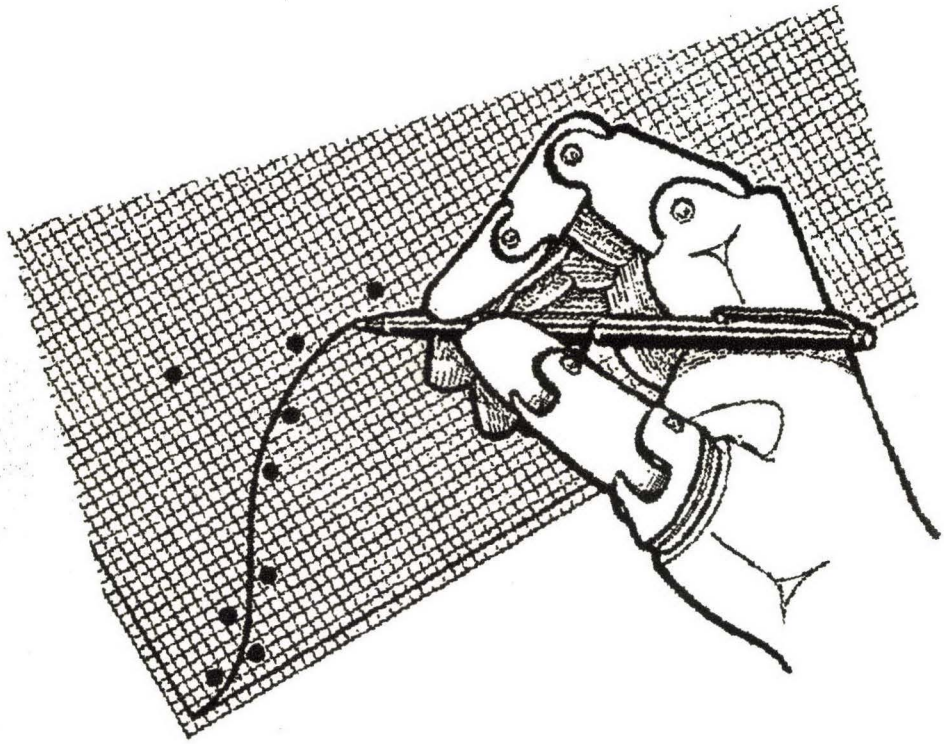
Preliminary Papers

of the

Sixth International Workshop on Artificial Intelligence and Statistics



January 4-7, 1997

Fort Lauderdale, Florida

Preface

Welcome to the Sixth International Workshop on Artificial Intelligence and Statistics.

This workshop is unique in bringing together statisticians and researchers in AI to discuss "common ground" in an interdisciplinary manner. The workshop series began in 1985 when Bill Gale and Daryl Pregibon then of AT&T conducted the first small workshop in the series. Workshops have subsequently taken place every 2 years, moving from the wintry woods of New Jersey south to the warmer beachfronts of Fort Lauderdale. Whether it was the locale or the workshop content, interest and participation have grown since that first workshop. Nonetheless, a key feature of this workshop is that it has remained relatively small and informal. Through the years this has made this workshop one of the more enjoyable and simultaneously more worthwhile workshops on what can be a very busy workshop/conference calendar for many of us.

The technical focus of the workshop can be hard to describe precisely, and indeed it has evolved over the years. One good example of the AI-Statistics intersection, at the last two workshops in particular, is graphical models. Graphical models are an excellent example of how Statistics and AI researchers can both contribute substantially to a field but in complementary ways. There are a wide variety of other topics being discussed in the various papers at this workshop, including model complexity, Markov models, neural networks, decision trees, Bayesian inference, causality, information retrieval, classification, and data analysis modeling. While the technical content of the papers is broad and varied there is an ever-present common thread, namely, the investigation of intelligence and automation within a statistical context. This reflects ongoing shifts in research thinking in both AI and Statistics. In Statistics, computational techniques are revolutionizing the field: a fundamental issue in this context is the interface between the data analyst and automated inference methods. Likewise, the field of Artificial Intelligence has in the last 10 years realized that uncertainty is critically important (necessary, but usually not sufficient) for building intelligent systems which interact with the real world. Thus, probabilistic and statistical methods are an increasingly important component in AI approaches to learning, planning, reasoning, vision, and so forth. The papers at this meeting reflect the dynamism and activity in research at the intersection of AI and Statistics.

This year we have 18 plenary papers and 38 poster papers being presented from January 5th to 7th. There is also a day of what promise to be excellent tutorials on January 4th. We thank all the paper, poster, and tutorial presenters for their participation. Thanks also to the Program Committee members for reviewing papers and providing feedback to the authors.

Finally, we would like to acknowledge the contributions of various people behind the scenes whose assistance was invaluable in making this workshop happen. Daryl Pregibon, both as treasurer and as unofficial local arrangements gopher, made the general chair's job much easier by taking care of many of the financial and contractual details. Doug Fisher, general chair of the last meeting, provided a broad range of advice and help on various logistical items. The Information and Computer Science Department at UC Irvine (Mike Pazzani, Department Chair and Bernie Bender, Administration) donated administrative support to handle registration, badges, etc.

David Madigan, Program Chair
Padhraic Smyth, General Chair

Programme Committee

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Saturday Jan 4

8:30-11:30 Tutorial A

Conditional Independence for Statistics and AI
A. P. Dawid, University College London

12:30-3:30 Tutorial B

Bayesian Time Series Analysis and Forecasting
Mike West, Duke University

12:30-3:30 Tutorial B

Learning in Information Agents
Tom M. Mitchell, Carnegie Mellon University

4:00-7:00 Tutorial C

Graphical models, neural networks and machine learning algorithms
Michael Jordan, MIT

Sunday Jan 5

7:30 to 8:45 CONTINENTAL BREAKFAST/REGISTRATION

8:45 to 9:00 OPENING COMMENTS

9:00 to 10:30 SESSION 1:

- *A Bayesian approach to CART*
  Hugh Chipman, Edward I George, & Robert E. McCulloch
- *A comparison of scientific and engineering criteria for Bayesian model selection*
  David Heckerman & David Maxwell Chickering
- *Strategies for model mixing in generalized linear models*
  Merlise Clyde

10:30 to 11:00 COFFEE BREAK

11:00 to 12:00 SESSION 2:

- *Variational inference for continuous sigmoidal belief networks*
  Brendan J. Frey
- *Extensions of undirected and acyclic, directed graphical models*
  Thomas Richardson

12:00 to 1:00 LUNCH (provided)

1:00 to 4:00 BREAK

4:00 to 6:00 POSTER SUMMARIES

6:00 to 7:00 DINNER

7:00 to 9:30 POSTER SESSIONS

Monday Jan 6

8:00 to 9:00 CONTINENTAL BREAKFAST

9:00 to 10:30 SESSION 3:

A note on cyclic graphs and dynamical feedback systems
Thomas Richardson, Peter Spirtes, & Clark Glymour

Estimating Latent Causal Inferences: Tetrad II model selection and Bayesian parameter estimation
Richard Scheines

Using classification trees to improve causal inferences in observational studies
Louis Anthony Cox

10:30 to 11:00 COFFEE BREAK

11:00 to 12:30 SESSION 4:

Building an EDA Assistant: A Progress Report
Robert St. Amant & Paul R. Cohen

Mixed memory Markov models
Lawrence K. Saul & Michael I Jordan

Wavelet based random densities
David Rios Insua & Brani Vidakovic

12:30 to 2:00 LUNCH (provided)

2:00 to 3:30 SESSION 5:

Using Prediction to Improve Combinatorial Optimization Search
Justin A. Boyan & Andrew W. Moore

Inference using Probabilistic Concept Trees
Doug Fisher & Doug Talbert

The Effects of Training Set Size on Decision Tree Complexity
Tim Oates & David Jensen

3:30 to 4:30 BREAK

4:00 to 5:00 BUSINESS MEETING

Tuesday Jan 7

8:30 to 9:00 CONTINENTAL BREAKFAST

9:00 to 10:30 SESSION 6:

WWW Cache Layout to Ease Network Overload
Kenichi Yoshida

PAC learning with constant-partition classification noise and applications to decision tree induction
Scott E. Decatur

Graphical Model Based Computer Adaptive Testing
Russell G. Almond & Robert J. Mislevy

10:30 to 11:00 COFFEE BREAK

11:00 to 12:00 SESSION 7:

Asessing and Improving Classification Rules
David J. Hand, Keming Yu, & Niall Ada

A variational approach to Bayesian logistic regression models and their extensions
Tommi S. Jaakkola & Michael I. Jordan

12:00 to 12:15 CLOSING COMMENTS

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