Contents

Preface / xiii
Nina Mishra and Tom Fawcett

ICML 2003 Organization / xv

ICML 2003 Corporate Sponsors / xviii

Hidden Markov Support Vector Machines / 3

Yasemin Altun, Ioannis Tsochantaridis, and Thomas Hofmann

Learning Distance Functions using Equivalence Relations / 11
Aharon Bar-Hillel, Tomer Hertz, Noam Shental, and Daphna Weinshall

Online Choice of Active Learning Algorithms / 19 Yoram Baram, Ran El-Yaniv, and Kobi Luz

Learning Logic Programs for Layout Analysis Correction / 27

Margherita Berardi, Michelangelo Ceci, Floriana Esposito, and Donato Malerba

Multi-Objective Programming in SVMs / 35 Jinbo Bi

Regression Error Characteristic Curves / 43

Jinbo Bi and Kristin P. Bennett

Choosing Between Two Learning Algorithms Based on Calibrated Tests / 51 Remco R. Bouckaert

Incorporating Diversity in Active Learning with Support Vector Machines / 59
Klaus Brinker

The Use of the Ambiguity Decomposition in Neural Network Ensemble Learning Methods / 67 Gavin Brown and Jeremy Wyatt

Tractable Bayesian Learning of Tree Augmented Naive Bayes Models / 75

Jesús Cerquides and Ramon López de Màntaras

AWESOME: A General Multiagent Learning Algorithm that Converges in Self-Play and Learns a Best Response Against Stationary Opponents / 83 Vincent Conitzer and Tuomas Sandholm

BL-WoLF: A Framework For Loss-Bounded Learnability In Zero-Sum Games / 91

Vincent Conitzer and Tuomas Sandholm

Semi-Supervised Learning of Mixture Models / 99
Fabio Gagliardi Cozman, Ira Cohen, and Marcelo Cesar Cirelo

On Kernel Methods for Relational Learning / 107 Chad Cumby and Dan Roth Fast Query-Optimized Kernel Machine Classification Via Incremental Approximate Nearest Support Vectors / 115

Dennis DeCoste and Dominic Mazzoni

Relational Instance Based Regression for Relational Reinforcement Learning / 123

Kurt Driessens and Jan Ramon

Design for an Optimal Probe / 131 Michael Duff

Diffusion Approximation for Bayesian Markov Chains / 139
Michael Duff

Using the Triangle Inequality to Accelerate k-Means / 147 Charles Elkan

Bayes Meets Bellman: The Gaussian Process Approach to Temporal Difference Learning / 154 Yaakov Engel, Shie Mannor, and Ron Meir

Action Elimination and Stopping Conditions for Reinforcement Learning / 162 Eyal Even-Dar, Shie Mannor, and Yishay Mansour

Utilizing Domain Knowledge in Neuroevolution / 170 James Fan, Raymond Lau, and Risto Miikkulainen

Boosting Lazy Decision Trees / 178 Xiaoli Zhang Fern and Carla E. Brodley

Random Projection for High Dimensional Data Clustering: A Cluster Ensemble Approach / 186 Xiaoli Zhang Fern and Carla E. Brodley

The Geometry of ROC Space: Understanding Machine Learning Metrics through ROC Isometrics / 194

Peter A. Flach

An Analysis of Rule Evaluation Metrics / 202 Johannes Fürnkranz and Peter A. Flach

Margin Distribution and Learning / 210
Ashutosh Garg and Dan Roth

Perceptron Based Learning with Example Dependent and Noisy Costs / 218
Peter Geibel and Fritz Wysotzki

Hierarchical Policy Gradient Algorithms / 226 Mohammad Ghavamzadeh and Sridhar Mahadevan

Solving Noisy Linear Operator Equations by Gaussian Processes: Application to Ordinary and Partial Differential Equations / 234 Thore Graepel

Correlated Q-Learning / 242

Amy Greenwald and Keith Hall

Online Ranking/Collaborative Filtering Using the Perceptron Algorithm / 250 Edward F. Harrington

Goal-directed Learning to Fly / 258 Andrew Isaac and Claude Sammut

Probabilistic Classifiers and the Concepts They Recognize / 266 Manfred Jaeger

Avoiding Bias when Aggregating Relational Data with Degree Disparity / 274 David Jensen, Jennifer Neville, and Michael Hay

A Faster Iterative Scaling Algorithm for Conditional Exponential Model / 282 Rong Jin, Rong Yan, Jian Zhang, and Alex G. Hauptmann

Transductive Learning via Spectral Graph Partitioning / 290 Thorsten Joachims

Evolving Strategies for Focused Web Crawling / 298 Judy Johnson, Kostas Tsioutsiouliklis, and C. Lee Giles

Exploration in Metric State Spaces / 306 Sham Kakade, Michael Kearns, and John Langford

Representational Issues in Meta-Learning / 313 Alexandros Kalousis and Melanie Hilario

Marginalized Kernels Between Labeled Graphs / 321 Hisashi Kashima, Koji Tsuda, and Akihiro Inokuchi

Informative Discriminant Analysis / 329 Samuel Kaski and Jaakko Peltonen

Characteristics of Long-term Learning in Soar and its Application to the Utility Problem / 337 William G. Kennedy and Kenneth A. De Jong

Unsupervised Learning with Permuted Data / 345 Sergey Kirshner, Sridevi Parise, and Padhraic Smyth

Discriminative Gaussian Mixture Models: A Comparison with Kernel Classifiers / 353 Aldebaro Klautau, Nikola Jevtic, and Alon Orlitsky

A Kernel Between Sets of Vectors / 361

Risi Kondor and Tony Jebara

The Significance of Temporal-Difference Learning in Self-Play Training TD-Rummy versus EVO-rummy / 369 Clifford Kotnik and Jugal Kalita

Visual Learning by Evolutionary Feature Synthesis / 376 Krzysztof Krawiec and Bir Bhanu

Classification of Text Documents Based on Minimum System Entropy / 384 Raghu Krishnapuram, Krishna P. Chitrapura, and Sachindra Joshi

Finding Underlying Connections: A Fast Graph-Based Method for Link Analysis and Collaboration Queries / 392

Jeremy Kubica, Andrew Moore, David Cohn, and Jeff Schneider

Learning with Idealized Kernels / 400 James T. Kwok and Ivor W. Tsang

The Pre-Image Problem in Kernel Methods / 408 James Kwok and Ivor Tsang

Improving Accuracy and Cost of Two-class and Multi-class Probabilistic Classifiers Using ROC Curves / 416
Nicolas Lachiche and Peter Flach

Reinforcement Learning as Classification: Leveraging Modern Classifiers / 424 Michail Lagoudakis and Ronald Parr

Robust Induction of Process Models from Time-Series Data / 432

Pat Langley, Dileep George, Stephen Bay, and Kazumi Saito

The Influence of Reward on the Speed of Reinforcement Learning: An Analysis of Shaping / 440 Adam Laud and Gerald DeJong

Learning with Positive and Unlabeled Examples Using Weighted Logistic Regression / 448
Wee Sun Lee and Bing Liu

Linear Programming Boosting for Uneven Datasets / 456 Jurij Leskovec and John Shawe-Taylor

Text Classification Using Stochastic Keyword Generation / 464 Cong Li, Ji-Rong Wen, and Hang Li

A Loss Function Analysis for Classification Methods in Text Categorization / 472 Fan Li and Yiming Yang

Decision Tree with Better Ranking / 480 Charles X. Ling and Robert J. Yan

An Evaluation on Feature Selection for Text Clustering / 488
Tao Liu, Shengping Liu, Zheng Chen, and Wei-Ying Ma

Link-based Classification / 496 Qing Lu and Lise Getoor

Hierarchical Latent Knowledge Analysis for Co-occurrence Data / 504 Hiroshi Mamitsuka

The Cross Entropy Method for Fast Policy Search / 512 Shie Mannor, Reuven Rubinstein, and Yohai Gat

The Set Covering Machine with Data-Dependent Half-Spaces / 520 Mario Marchand, Mohak Shah, John Shawe-Taylor, and Marina Sokolova

Identifying Predictive Structures in Relational Data Using Multiple Instance Learning / 528

Amy McGovern and David Jensen

Planning in the Presence of Cost Functions Controlled by an Adversary / 536 H. Brendan McMahan, Geoffrey J. Gordon, and Avrim Blum

Using Linear-threshold Algorithms to Combine Multi-class Sub-experts / 544 Chris Mesterharm

Optimal Reinsertion: A New Search Operator for Accelerated and More Accurate Bayesian Network Structure Learning / 552 Andrew Moore and Weng-Keen Wong

Error Bounds for Approximate Policy Iteration / 560 *Rémi Munos*

Machine Learning with Hyperkernels / 568 Cheng Soon Ong and Alexander J. Smola

Justification-based Multiagent Learning / 576 Santi Ontañón and Enric Plaza

Mixtures of Conditional Maximum Entropy Models / 584

Dmitry Pavlov, Alexandrin Popescul, David M. Pennock, and Lyle H. Ungar

Online Feature Selection using Grafting / 592

Simon Perkins and James Theiler

Weighted Order Statistic Classifiers with Large Rank-Order Margin / 600

Reid Porter, Damian Eads, Don Hush, and James Theiler

Relativized Options: Choosing the Right Transformation / 608

Balaraman Ravindran and Andrew G. Barto

Tackling the Poor Assumptions of Naive Bayes Text Classifiers / 616

Jason D. Rennie, Lawrence Shih, Jaime Teevan, and David Karger

Learning with Knowledge from Multiple Experts / 624

Matthew Richardson and Pedro Domingos

Combining TD-learning with Cascade-correlation Networks / 632

François Rivest and Doina Precup

Kernel PLS-SVC for Linear and Nonlinear Classification / 640

Roman Rosipal, Leonard J. Trejo, and Bryan Matthews

Stochastic Local Search in k-Term DNF Learning / 648

Ulrich Rückert and Stefan Kramer

Q-Decomposition for Reinforcement Learning Agents / 656

Stuart Russell and Andrew L. Zimdars

Adaptive Overrelaxed Bound Optimization Methods / 664

Ruslan Salakhutdinov and Sam Roweis

Optimization with EM and Expectation-Conjugate-Gradient / 672

Ruslan Salakhutdinov, Sam Roweis, and Zoubin Ghahramani

TD(0) Converges Provably Faster than the Residual Gradient Algorithm / 680

Ralf Schoknecht and Artur Merke

On State Merging in Grammatical Inference: A Statistical Approach for Dealing with Noisy Data / 688

Marc Sebban and Jean-Christophe Janodet

Text Bundling: Statistics Based Data-Reduction / 696

Lawrence Shih, Jason Rennie, Yu-Han Chang, and David Karger

Flexible Mixture Model for Collaborative Filtering / 704

Luo Si and Rong Jin

Learning Predictive State Representations / 712

Satinder Singh, Michael L. Littman, Nicholas K. Jong, David Pardoe, and Peter Stone

Weighted Low-Rank Approximations / 720

Nathan Srebro and Tommi Jaakkola

Learning To Cooperate in a Social Dilemma: A Satisficing Approach to Bargaining / 728

Jeffrey L. Stimpson and Michael A. Goodrich

Evolutionary MCMC Sampling and Optimization in Discrete Spaces / 736

Malcolm J. A. Strens

Learning on the Test Data: Leveraging Unseen Features / 744

Ben Taskar, Ming Fai Wong, and Daphne Koller

Low Bias Bagged Support Vector Machines / 752

Giorgio Valentini and Thomas G. Dietterich

SimpleSVM / 760

S. V. N. Vishwanathan, Alexander J. Smola, and M. Narashima Murty

Testing Exchangeability On-Line / 768

Vladimir Vovk, Ilia Nouretdinov, and Alex Gammerman

Model-based Policy Gradient Reinforcement Learning / 776

Xin Wang and Thomas G. Dietterich

Learning Mixture Models with the Latent Maximum Entropy Principle / 784

Shaojun Wang, Dale Schuurmans, Fuchun Peng, and Yunxin Zhao

Principled Methods for Advising Reinforcement Learning Agents / 792

Eric Wiewiora, Garrison Cottrell, and Charles Elkan

DISTILL: Learning Domain-Specific Planners by Example / 800

Elly Winner and Manuela Veloso

Bayesian Network Anomaly Pattern Detection for Disease Outbreaks / 808

Weng-Keen Wong, Andrew Moore, Gregory Cooper, and Michael Wagner

Adaptive Feature-Space Conformal Transformation for Imbalanced-Data Learning / 816

Gang Wu and Edward Y. Chang

New v-Support Vector Machines and their Sequential Minimal Optimization / 824

Xiaoyun Wu and Rohini Srihari

Cross-Entropy Directed Embedding of Network Data / 832

Takeshi Yamada, Kazumi Saito, and Naonori Ueda

Decision-tree Induction from Time-series Data Based on a Standard-example Split Test / 840

Yuu Yamada, Einoshin Suzuki, Hideto Yokoi, and Katsuhiko Takabayashi

Optimizing Classifier Performance via an Approximation to the Wilcoxon-Mann-Whitney Statistic / 848

Lian Yan, Robert Dodier, Michael C. Mozer, and Richard Wolniewicz

Feature Selection for High-Dimensional Data: A Fast Correlation-Based Filter Solution / 856

Lei Yu and Huan Liu

Isometric Embedding and Continuum ISOMAP / 864

Hongyuan Zha, and Zhenyue Zhang

Learning Metrics via Discriminant Kernels and Multidimensional Scaling:

Toward Expected Euclidean Representation / 872

Zhihua Zhang

Learning Decision Tree Classifiers from Attribute Value Taxonomies and Partially Specified Data / 880

Jun Zhang and Vasant Honavar

Modified Logistic Regression: An Approximation to SVM and Its

Applications in Large-Scale Text Categorization / 888

Jian Zhang, Rong Jin, Yiming Yang, and Alex G. Hauptmann

Exploration and Exploitation in Adaptive Filtering Based on Bayesian Active Learning / 896

Yi Zhang, Wei Xu, and Jamie Callan

On the Convergence of Boosting Procedures / 904 Tong Zhang and Bin Yu

Semi-Supervised Learning Using Gaussian Fields and Harmonic Functions / 912 Xiaojin Zhu, Zoubin Ghahramani, and John Lafferty

Eliminating Class Noise in Large Datasets / 920 Xingquan Zhu, Xindong Wu, and Qijun Chen

Online Convex Programming and Generalized Infinitesimal Gradient Ascent / 928 Martin Zinkevich

Index / 937