This volume contains the papers accepted to the 3rd Asian Conference on Machine Learning (ACML 2011), following successful preceding conferences held in Nanjing, China and Tokyo, Japan in 2009 and 2010, respectively. The conference aims at getting leading machine learning researchers in both Asia and the rest of the world together to discuss their recent research work. ACML 2011 was held November 13 - 15 in Taoyuan, Taiwan. The conference followed immediately and was co-located with the 2011 Annual Conference on Technologies and Applications of Artificial Intelligence (TAAI 2011). Both conferences shared a joint tutorial day.

The papers in this volume were accepted to ACML following a selective review process. We had 102 submissions. Among them, 60 successfully followed our full-text submission and formatting requirement and received full review. We eventually accepted 23 of them for inclusion in the proceedings. Every paper was double-blind reviewed, initially by at least 4 reviewers who were chosen from our program committee members according to their bidding results. To ensure the quality, each reviewer had a quota of no more than 4 papers to review. Every paper was also assigned to a senior program committee member who oversaw the review process by moderating email discussions among reviewers and resolving their differences. Finally, the program committee co-chairs or additional reviewers read borderline papers and reviewers comments to make confident decisions for all papers.

All accepted papers received both an oral and poster presentation. Following the tradition of previous ACMLs, all oral presentations are plenary. Constraints imposed by the length of the conference and a policy of avoiding parallel sessions restrict the number of papers that can be accepted. The poster session allowed us to include 6 additional papers to present at the conference.

This year, the submissions came from 22 countries around the world. The submissions covered a wide range of topics, including supervised, semi-supervised and unsupervised learning, clustering and dimensional reduction, classification, ranking, structural learning, learning in graphs and networks, multi-label classification, reinforcement learning and online learning, computational learning theory, and applications.

In addition to submitted papers, we were excited to have three keynotes. Yann LeCun talked about Learning Feature Hierarchy. Peter A. Flach talked about Scale Matters: On the Many Uses of Calibration in Machine Learning and Oren Etzioni talked about Open Information Extraction at Web Scale. The conference was preceded by a day of tutorials. The tutorials included Partially Observable Markov Decision Process by Wee Sun Lee and Learning from Graph Data: Graph Kernels, Graph Mining, and Recent Developments by Koji Tsuda. We thank them for their great contributions to the program.

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Last but not least, we would like to thank all authors who submitted their work to this conference.

Our special thanks go to the Local Chair, Chia-Hui Chang, for handling the budget and organizing everything from conference rooms, to hotels, to meals, to pins for putting up the posters. Allen Meng-Lun Wu handled visa issues, registrations, hotel booking and the Web-site. Ho-Hsuan Chien helped with editing the conference brochures, bag design, accounting, and other logistics.We are grateful to National Central University, Taiwan, and Taiwanese Association for Artificial Intelligence, for providing the many resources that went into the local organization of ACML 2011.

November 2011

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Invited Talks

Speaker: Prof. Oren Etzioni
Title: Open Information Extraction at Web Scale.

Abstract: Information Extraction (IE) is the task of mapping natural-language sentences to machine-processable representations of the sentences' content. IE is often formulated as a machine-learning problem where an extractor for a particular relation (e.g., seminar speaker) is learned from labeled training examples. My talk will describe Open IE—an approach to scaling IE to the Web where the set of potential relations is not known in advance making a standard machine learning approach impossible. I will describe various bootstrapping approaches that enables us to utilize machine learning at Web scale.

Biography: Oren Etzioni is the Washington Research Foundation Entrepreneurship Professor at the University of Washington's Computer Science Department. He received his bachelor's degree in Computer Science from Harvard University in June 1986 where he was the first Harvard student to "major" in Computer Science. Etzioni received his Ph.D. from Carnegie Mellon University in January 1991, and joined the University of Washington's faculty in February 1991, where he is now a Professor of Computer Science. Etzioni received a National Young Investigator Award in 1993, and was selected as a AAAI Fellow a decade later. In 2007, he received the Robert S. Engelmore Memorial Award. He is the founder and director of the University of Washington's Turing Center.

Etzioni is the author of over 100 technical papers in a wide range of conferences including AAAI, ACL, CIDR, COLING, EMNLP, FOCS, HLT, ICML, IJCAI, ISWC, IUI, KDD, KR, SIGIR, and WWW. He is a founder of three companies (see below) and a Venture Partner at the Madrona Venture Group. His work has been featured in the New York Times, Wall Street Journal, NPR, SCIENCE, The Economist, TIME Magazine, Business Week, Newsweek, Discover Magazine, Forbes Magazine, Wired, NBC Nightly News, and even Pravda.

Speaker: Prof. Yann LeCun
Title: Learning Feature Hierarchies.

Abstract: Intelligent perceptual tasks such as vision and audition require the construction of good internal representations. Machine Learning has been very successful for producing classifiers, but the next big challenge for ML is to devise learning algorithms that can learn features and internal representations automatically. Theoretical and empirical evidence suggest that the perceptual world is best represented by a multi-stage hierarchy in which features in successive stages are increasingly global, invariant, and abstract. An important question is to devise "deep learning" methods for multi-stage architecture than can automatically learn feature hierarchies from labeled and unlabeled data.

We will demonstrate the use of deep learning methods, based on unsupervised sparse coding, to train convolutional network (ConvNets). ConvNets are biologically-inspired architectures consisting of multiple stages of filter banks, interspersed with non-linear opera-

tions, and spatial pooling operations. A number of applications will be shown through videos and live demos, including a category-level object recognition system that can be trained on the fly, a pedestrian detector, a system that recognizes human activities in videos, and a trainable vision system for off-road mobile robot navigation. Specialized hardware architecture that implement these algorithms will also be described.

Biography: Yann LeCun is Silver Professor of Computer Science and Neural Science at New York University. He is also a Fellow of the NEC Research Institute (now NEC Labs America) in Princeton, NJ. He received a Diplme d'Ingnieur from the Ecole Superieure d'Ingnieur en Electrotechnique et Electronique (ESIEE), Paris in 1983, a Diplme d'Etudes Approfondies (DEA) from Universit Pierre et Marie Curie, Paris in 1984, and a PhD in Computer Science from the same university in 1987. His PhD thesis was entitled "Modeles connexionnistes de l'apprentissage" (connexionist learning models) and introduced an early version of the back-propagation algorithm for gradient-based machine learning.

Speaker: Prof. Peter A. Flash
Title: Scale Matters: on the many uses of calibration in machine learning.

Abstract: Calibration is the process of adjusting measurements to a standard scale. In machine learning it is most commonly understood in relation to the class probability estimates of a probabilistic classifier: we say that a classifier is well-calibrated if among all instances receiving a probability estimate p for a particular class, the proportion of instances having the class in question is approximately p. The advantage of a well-calibrated classifier is that near-optimal decision thresholds can be directly derived from the operating condition (class and cost distribution). In this talk I explore various methods for classifier calibration, including the isotonic regression method that relates to ROC analysis. I will discuss how these methods can be applied to single features, resulting in a very general framework in which features carry class information and categorical features can be turned into real-valued ones and vice versa. I will also discuss an alternative notion of calibration whereby a classifier's score quantifies the proportion of positive predictions it makes at that threshold. I will introduce the ROL curve, a close companion of ROC curves that allow to quantify the loss at a particular predicted positive rate. Rate-calibrated classifiers have an expected loss that is linearly related to AUC, which vindicates AUC as a coherent measure of classification performance (contrary to recent claims in the literature).

Biography: Peter Flach is professor of Artificial Intelligence at the University of Bristol. He has published widely on inductive logic programming, multi-relational data mining, and machine learning. He was PC co-chair of ILP'99 and ECML'01, is on the steering committee of the recent ECML/PKDD conferences, and is a regular PC member of all major machine learning and data mining conferences including ICML, ECML/PKDD, ILP, ICDM, SDM, and PAKDD. Prof Flach is associate editor of Machine Learning, and serves on the editorial boards of Journal of Machine Learning Research, Journal of Artificial Intelligence Research, and Artificial Intelligence Communications.

Tutorials

Speaker Name: Prof. Wee Sun Lee
Title: Partially Observable Markov Decision Process.

Abstract: Partially Observable Markov Decision Process (POMDP) provides a mathematically elegant formulation for adapting the actions of an agent based on past observations in order to achieve high expected rewards in the future. However, solving POMDPs is computationally intractable in the worst case, and until recently POMDPs were considered to be impractical for applications. In the last few years, tremendous progress has been made in solving POMDPs and they have been shown to be effective in application domains such as dialog systems, assistive technologies for the elderly, and aircraft collision avoidance systems. In this tutorial, we will go through the basic properties of POMDPs, try to understand when they are likely to be effectively solvable, and describe techniques for scaling to problems with very large state spaces and long search horizons.

Biography: Wee Sun Lee is an associate professor in the Department of Computer Science at the National University of Singapore. He obtained his PhD from the Australian National University in 1996 and was a research fellow at the Australian Defence Force Academy from 1996 to 1998 prior to joining the National University of Singapore. He is interested in machines that learn, perform inference, make decisions and plan. He works on obtaining theoretical understanding of when learning, inference and planning can be done effectively, on developing effective algorithms for these problems, and also on applying the algorithms to applications such as information extraction, natural language understanding, robotics and games.

Speaker: Prof. Koji Tsuda
Title: Learning from Graph Data: Graph Kernels, Graph Mining and Recent Developments.

Abstract: Labeled Graphs are general and powerful data structures that can be used to represent diverse kinds of objects such as XMLs, chemical compounds, proteins, and RNAs. In these 10 years, we saw significant progress in statistical learning algorithms for graph data, such as supervised classification, clustering and dimensionality reduction. Graph kernels and graph mining have been the main driving force of such innovation. In this tutorial, I start from basics of the two techniques and cover several important algorithms in learning from graphs. Successful biological applications are featured. If time allows, I also cover recent developments and show future directions.

Biography: Koji Tsuda is Senior Research Scientist at AIST Computational Biology Research Center. He is also affiliated with ERATO Minato Project, Japan Science and Technology Agency (JST). After completing his Dr.Eng. in Kyoto University in 1998, he joined former Electrotechnical Laboratory (ETL), Tsukuba, Japan, as Research Scientist. When ETL is reorganized as AIST in 2001, he joined newly established Computational Biology Re-

search Center, Tokyo, Japan. In 2000-2001, he worked at GMD FIRST (current Fraunhofer FIRST) in Berlin, Germany, as Visiting Scientist. In 2003-2004 and 2006-2008, he worked at Max Planck Institute for Biological Cybernetics, Tuebingen, Germany, first as Research Scientist and later as Project Leader. He has published more than 70 papers in refereed conferences and journals, and served as an area chair and a program committee member in leading machine learning conferences such as NIPS and ICML. IPSJ Nagao Award (2009).

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