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D. R. S. Michalski

BIBLIOGRAPHY OF RECENT MACHINE LEARNING RESEARCH 1985 - 1989

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INTRODUCTION

This bibliography is intended to be a useful source of reference for researchers, students and any other readers interested in the field of machine learning. It is a continuation of the bibliographies provided in *Machine Learning: An Artificial Intelligence Approach, Volume I and Volume II* (Michalski, Carbonell, and Mitchell, Eds.) published in 1983 and 1986, respectively. Volume I (ML1) covered the period since the beginning of the field until 1982 and contained 572 entries. Volume II (ML2) covered the period from 1983 to 1984 and contained 312 entries.

The present bibliography covers the period 1985 - 1989 and contains 1095 entries. This increased number of publications reflects a very rapid growth of the field in recent years. In selecting the items for the bibliography we primarily emphasized research in machine learning from the artificial intelligence perspective, although some relevant contributions from related disciplines, such as psychology, cognitive science, philosophy and mathematics are also included. The selection is representative rather than exhaustive, with greater than before emphasis on research done in Europe. In contrast to bibliographies in ML1 and ML2, the current bibliography includes also a substantial number of references on connectionist methods and the computational theory of learning, two areas that have been rapidly growing in recent years. To round out the bibliography, several classics in machine learning and a few selected overviews and background materials published prior to 1985 have been included. We restricted ourselves specifically to publications in English, due to their greater availability throughout the world. In a few cases when the publication is also available in another language we indicated this in the annotation.

To help the reader to locate publications of interest, each of the entries has been assigned one or more categories from 17 categories reflecting the type of article and/or research methodology used. All entries were sorted in lexicographic order, where the key is defined as the concatenation of the last name and initials of the first author, the year of publication and when applicable, the last names and initials of other authors.

In preparing this bibliography we thoroughly examined the following sources:

- Machine Learning Journal 1986 - 1989
- Proceedings of the International Machine Learning Workshops: Skytop 1985, Irvine 1987, Ann Arbor 1988, Ithaca 1989
- Proceedings of IJCAI: Los Angeles 1985, Milan, Italy 1987, Detroit 1989
- Proceedings of AAAI: Philadelphia 1986, Seattle 1987, Saint Paul 1988
- Proceedings of the European Conference on Artificial Intelligence (ECAI): Brighton, England 1986, Munich, W. Germany 1988
- Proceedings of the European Working Session on Learning (EWSL): Bled, Yugoslavia 1987, Glasgow, Scotland 1988, Montpellier, France 1989
- Proceedings of the 1988 AAAI Symposium on Explanation-Based Learning

- Proceedings of the International Conference on Genetic Algorithms: Pittsburgh 1985, Cambridge 1987, Fairfax 1989
- Proceedings of the Annual Workshop on Computational Learning Theory (COLT): Pittsburgh 1988, Santa Cruz 1989
- Proceedings of the ONR Workshop on Knowledge Acquisition, Arlington 1989
- Proceedings of the IEEE International Workshop on Tools for AI, Fairfax 1989
- Artificial Intelligence journal 1985 - 1988
- AI Magazine 1985 - 1989

We also searched through other relevant periodicals and publications, but covered them only partially. Among them are:

- Proceedings of the Workshop on Knowledge Discovery in Databases, Detroit 1989
- Proceedings of the First International Conference on Principles of Knowledge Representation and Reasoning, Toronto, Canada 1989
- Proceedings of International Symposiums on Methodologies for Intelligent Systems, 1986, 1987, 1988, 1989.
- Proceedings of the International Workshop on Machine Learning, Meta-Reasoning and Logics, Sesimbra, Portugal 1988
- Proceedings of the First, Second and Third Workshop on Knowledge Acquisition for Knowledge-Based Systems
- Proceedings of the Fourth IEEE Conference on Artificial Intelligence Applications, San Diego, 1988
- Proceedings of the 1988 Connectionist Models Summer School, Pittsburgh 1988
- Proceedings of the Workshop on Knowledge Compilation, Cornvalis, Oregon 1986
- IEEE Transactions on Pattern Analysis and Machine Intelligence 1985 - 1989
- IEEE Transactions on Systems, Man and Cybernetics 1985 - 1989
- IEEE Expert 1985 - 1989
- Proceedings of the 1986 IEEE International Conference on Systems, Man and Cybernetics
- Proceedings of the 1988 IEEE International Symposium on Intelligent Control
- International Journal for Man-Machine Studies
- Proceedings of the Conferences of the Cognitive Science Society
- ACM Sigart Newsletter
- ACM Computing Surveys
- Neural Network Journal
- Knowledge Acquisition Journal

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Despite all efforts, some references may have been overlooked and the editors apologize in advance to the authors of these works, as well as to the readers, for any omissions or errors.

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EXPLANATION OF THE CATEGORIES

Following the style introduced in Machine Learning volume I and II, we have categorized all publications with respect to the topic, research paradigm and type of publication. To accommodate the changes and the growth of the field we have modified and expanded the classification schemas used in Machine Learning volume I and II. Each publication is marked with a label, denoting the categories it belongs to. We also provide the cross reference to each category to enable the readers to identify publications belonging to the category of interest. Below are the labels, names of the associated categories, and a brief explanations of the categories.

- a Analogical and case-based learning systems**
Publications on methods that employ analogy to known problem solutions, concepts or past cases.
- b Background material, overviews and conference proceedings**
Foundational sources and introductory material to the field of artificial intelligence and machine learning. Also included are proceedings of the major AI-related conferences.
- c Conceptual clustering**
Publications concerned with organizing a set of observations into a hierarchy of meaningful categories. Each category is associated with a simple descriptive concept.
- d Discovery systems**
Publications on methods and systems that explore given domain either in passive or active way, trying to develop empirical laws and theories about it. Conceptual clustering can be viewed as one of the forms of discovery, as can be any form of unsupervised learning.
- e Experimental applications and comparisons**
Publications concerning applications of learning methods to artificial or real-world problems, as well as reviews and experimental comparisons of different learning systems.
- g Genetic algorithms and classifier systems**
Publications describing methods based on the idea of probabilistic search through large spaces involving states that can be represented as strings in some language.
- i Integrated learning systems**
Publications on systems combining two or more learning strategies or paradigms.
- k Knowledge acquisition for expert systems and learning apprentice systems**
Publications on methods or systems that acquire and improve knowledge through an interaction with a human expert, during the particular problem solving task.
- l Learning in control systems**
Publications about methods or systems developed for learning in complex, real-time systems, controlling various physical devices.
- m Cognitive modelling of learning and reasoning**
Research in this category is based on investigations of human methods of learning and reasoning. Primary effort is to build computational models of these processes and eventually apply them to some practical tasks.

- n Neural nets and connectionist systems**
These publications describe broad class of methods using algorithms for training a network to respond correctly to a set of examples by appropriately modifying its connection weights.
- p Problem solving and planning with learning capabilities**
Publications in this category describe systems for learning domain and control knowledge through observing their own performance on subsequent tasks. Some of these methods are closely related to learning apprentice systems.
- r Prediction and discovery of patterns in sequences and processes**
Publications about methods or systems dealing with prediction of sequences or time-dependent processes.
- s Symbolic empirical learning from examples**
Research methods in this category use examples in order to learn new concepts or solve problems. They use symbolic representation, easily comprehensible to humans: rules, decision trees, frames, scripts, semantic networks or some form of logic.
- t Theoretical analysis**
This category includes research concerned with theoretical analysis of formalized, abstract learning systems.
- v Constructive induction, abduction or knowledge representation shift**
Publications on inductive learning methods that utilize background knowledge to create knowledge represented at a higher level of abstraction (e.g., causal knowledge) and/or in a different form than the original input information.
- x Explanation-based learning and other analytic methods**
Publications in this category describe methods that rely heavily on the pre-existing knowledge in order to learn/improve the quality of possessed knowledge.

The list of publications follows. Next to each reference in the left margin are the code letters of the categories to which the reference belongs. This list is supplemented with the cross-reference, where under each category name are listed numbers of references belonging to this category.

CROSS-REFERENCE OF THE CATEGORIES

a	Analogical and case-based learning systems											
	[5]	[6]	[7]	[11]	[22]	[32]	[33]	[34]	[36]	[37]	[41]	[42]
	[43]	[44]	[46]	[47]	[100]	[101]	[102]	[115]	[120]	[121]	[158]	[180]
	[181]	[202]	[204]	[206]	[244]	[245]	[246]	[247]	[248]	[342]	[343]	[359]
	[363]	[364]	[365]	[367]	[368]	[406]	[421]	[450]	[454]	[455]	[458]	[459]
	[461]	[472]	[473]	[503]	[506]	[508]	[558]	[559]	[560]	[603]	[684]	[731]
	[732]	[771]	[774]	[798]	[799]	[827]	[830]	[844]	[868]	[871]	[887]	[924]
	[948]	[951]	[991]	[997]	[1025]	[1026]	[1027]	[1036]	[1088]			
b	Background material and overviews											
	[20]	[27]	[49]	[78]	[87]	[92]	[99]	[123]	[124]	[141]	[162]	[163]
	[167]	[182]	[187]	[191]	[193]	[236]	[255]	[276]	[289]	[298]	[306]	[320]
	[333]	[405]	[406]	[412]	[413]	[435]	[444]	[474]	[489]	[492]	[494]	[528]
	[530]	[531]	[534]	[562]	[581]	[611]	[614]	[619]	[626]	[627]	[628]	[629]
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	[664]	[677]	[680]	[698]	[709]	[742]	[759]	[760]	[776]	[781]	[782]	[783]

l Learning in control systems

[52] [98] [171] [209] [252] [277] [278] [283] [293] [321] [322] [340]
 [440] [500] [704] [708] [797] [875] [877] [878] [1039] [1082]

m Cognitive modelling of learning and reasoning

[8] [15] [22] [34] [87] [119] [167] [168] [221] [222] [227] [244]
 [262] [275] [298] [319] [404] [406] [435] [520] [540] [545] [547] [576]
 [598] [603] [607] [611] [614] [624] [644] [651] [693] [747] [750] [751]
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 [1060] [1078] [1079] [1080]

n Neural nets and connectionist systems

[3] [12] [17] [18] [19] [20] [38] [50] [81] [82] [179] [189]
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p Problem solving and planning with learning capabilities

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r Prediction and discovery of patterns in sequences and processes

[207] [216] [436] [453] [640] [973] [1081]

s Symbolic empirical learning from examples

[24] [25] [30] [35] [39] [51] [63] [64] [65] [66] [67] [68]
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t	Theoretical analysis											
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	[285]	[286]	[297]	[299]	[300]	[301]	[304]	[344]	[376]	[377]	[378]	[379]
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	[609]	[647]	[648]	[657]	[680]	[700]	[701]	[702]	[717]	[718]	[729]	[741]
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	[1095]											
v	Constructive induction, abduction or knowledge representation shift											
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	[493]	[499]	[502]	[526]	[569]	[570]	[582]	[609]	[610]	[622]	[623]	[666]
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	[1001]	[1030]	[1059]	[1063]	[1065]	[1066]						
x	Explanation-based learning and other analytic methods											
	[4]	[8]	[13]	[14]	[21]	[43]	[47]	[57]	[58]	[59]	[60]	[61]
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	[208]	[209]	[210]	[217]	[219]	[223]	[229]	[232]	[233]	[234]	[235]	[236]
	[249]	[270]	[303]	[309]	[313]	[315]	[316]	[326]	[344]	[345]	[352]	[357]
	[358]	[362]	[363]	[364]	[366]	[400]	[401]	[402]	[403]	[422]	[423]	[445]
	[447]	[459]	[460]	[462]	[463]	[464]	[465]	[466]	[468]	[488]	[493]	[513]
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	[723]	[724]	[725]	[745]	[746]	[748]	[749]	[750]	[753]	[754]	[755]	[756]
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	[830]	[857]	[860]	[896]	[904]	[905]	[906]	[907]	[908]	[909]	[910]	[911]
	[912]	[913]	[925]	[926]	[927]	[928]	[929]	[930]	[931]	[932]	[934]	[944]
	[945]	[953]	[959]	[968]	[974]	[975]	[976]	[977]	[981]	[984]	[1003]	[1012]
	[1014]	[1028]	[1055]	[1072]	[1090]							

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