
Contents

Contributors	ix
Foreword <i>by Allen Newell</i>	xi
Preface	xvii

PART ONE Background

Chapter 1	The Context of the MYCIN Experiments	3
Chapter 2	The Origin of Rule-Based Systems in AI <i>Randall Davis and Jonathan J. King</i>	20

PART TWO Using Rules

Chapter 3	The Evolution of MYCIN's Rule Form	55
Chapter 4	The Structure of the MYCIN System <i>William van Melle</i>	67
Chapter 5	Details of the Consultation System <i>Edward H. Shortliffe</i>	78
Chapter 6	Details of the Revised Therapy Algorithm <i>William J. Clancey</i>	133

PART THREE Building a Knowledge Base

Chapter 7	Knowledge Engineering	149
Chapter 8	Completeness and Consistency in a Rule-Based System <i>Motoi Suwa, A. Carlisle Scott, and Edward H. Shortliffe</i>	159
Chapter 9	Interactive Transfer of Expertise <i>Randall Davis</i>	171

PART FOUR Reasoning Under Uncertainty

Chapter 10	Uncertainty and Evidential Support	209
Chapter 11	A Model of Inexact Reasoning in Medicine <i>Edward H. Shortliffe and Bruce G. Buchanan</i>	233
Chapter 12	Probabilistic Reasoning and Certainty Factors <i>J. Barclay Adams</i>	263

Chapter 13	The Dempster-Shafer Theory of Evidence <i>Jean Gordon and Edward H. Shortliffe</i>	272
------------	---	-----

PART FIVE Generalizing MYCIN

Chapter 14	Use of the MYCIN Inference Engine	295
Chapter 15	EMYCIN: A Knowledge Engineer's Tool for Constructing Rule-Based Expert Systems <i>William van Melle, Edward H. Shortliffe, and Bruce G. Buchanan</i>	302
Chapter 16	Experience Using EMYCIN <i>James S. Bennett and Robert S. Englemore</i>	314

PART SIX Explaining the Reasoning

Chapter 17	Explanation as a Topic of AI Research	331
Chapter 18	Methods for Generating Explanations <i>A. Carlisle Scott, William J. Clancey, Randall Davis, and Edward H. Shortliffe</i>	338
Chapter 19	Specialized Explanations for Dosage Selection <i>Sharon Wraith Bennett and A. Carlisle Scott</i>	363
Chapter 20	Customized Explanations Using Causal Knowledge <i>Jerold W. Wallis and Edward H. Shortliffe</i>	371

PART SEVEN Using Other Representations

Chapter 21	Other Representation Frameworks	391
Chapter 22	Extensions to the Rule-Based Formalism for a Monitoring Task <i>Lawrence M. Fagan, John C. Kunz, Edward A. Feigenbaum, and John J. Osborn</i>	397
Chapter 23	A Representation Scheme Using Both Frames and Rules <i>Janice S. Aikins</i>	424
Chapter 24	Another Look at Frames <i>David E. Smith and Jan E. Clayton</i>	441

PART EIGHT Tutoring

Chapter 25	Intelligent Computer-Aided Instruction	455
Chapter 26	Use of MYCIN's Rules for Tutoring <i>William J. Clancey</i>	464

PART NINE Augmenting the Rules

Chapter 27	Additional Knowledge Structures	493
Chapter 28	Meta-Level Knowledge <i>Randall Davis and Bruce G. Buchanan</i>	507
Chapter 29	Extensions to Rules for Explanation and Tutoring <i>William J. Clancey</i>	531

PART TEN Evaluating Performance

Chapter 30	The Problem of Evaluation	571
Chapter 31	An Evaluation of MYCIN's Advice <i>Victor L. Yu, Lawrence M. Fagan, Sharon Wraith Bennett, William J. Clancey, A. Carlisle Scott, John F. Hannigan, Robert L. Blum, Bruce G. Buchanan, and Stanley N. Cohen</i>	589

PART ELEVEN Designing for Human Use

Chapter 32	Human Engineering of Medical Expert Systems	599
Chapter 33	Strategies for Understanding Structured English <i>Alain Bonnet</i>	613
Chapter 34	An Analysis of Physicians' Attitudes <i>Randy L. Teach and Edward H. Shortliffe</i>	635
Chapter 35	An Expert System for Oncology Protocol Management <i>Edward H. Shortliffe, A. Carlisle Scott, Miriam B. Bischoff, A. Bruce Campbell, William van Melle, and Charlotte D. Jacobs</i>	653

PART TWELVE Conclusions

Chapter 36	Major Lessons from This Work	669
Epilog		703
Appendix		705
References		717
Name Index		739
Subject Index		742