

CONTENTS

INTRODUCTION

KNOWLEDGE AND MATHEMATICAL REASONING

1	Representation of knowledge in a geometry machine. E.W. ELCOCK	11
2	Typing and proof by cases in program verification. W.W. BLEDSOE and M. TYSON	30

PROBLEM-SOLVING AND DEDUCTION

3	Practical and theoretical considerations in heuristic search algorithms. I. POHL	55
4	Variable range restrictions in resolution theorem proving. S. SICKEL	73
5	A formal model for space-filling puzzles. W.M. MCKEEMAN	86
6	Achieving several goals simultaneously. R. WALDINGER	94

MEASUREMENT OF KNOWLEDGE

7	Dynamic probability, computer chess, and the measurement of knowl- edge. I.J. GOOD	139
8	A theory of advice. D. MICHIE	151

INDUCTIVE ACQUISITION OF KNOWLEDGE

9	Rationality, evidence, and induction in scientific inference. I.J. GOOD	171
10	An experiment on inductive learning in chess end games. R.S. MICHALSKI and P.G. NEGRI	175
11	Inductive learning in a hierarchical model for representing knowledge in chess end games. P.G. NEGRI	193
12	Summing up of the discussion on inductive inference. I.J. GOOD	205

PROGRAMMING TOOLS FOR KNOWLEDGE-REPRESENTATION

13	Programming language design for the representation of knowledge. J.M. FOSTER	209
14	Some observations on conceptual programming. E. SANDEWALL	223
15	Programming with resolution logic. M.H. van EMDEN	266
16	An overview of production systems. R. DAVIS and J. KING	300

DIALOGUE-TRANSFER OF KNOWLEDGE TO MACHINES

17 A hypothetical dialogue exhibiting a knowledge base for a program-understanding system. C. GREEN and D. BARSTOW 335

DIALOGUE-TRANSFER OF KNOWLEDGE TO HUMANS

18 Representing knowledge about mathematics for computer-aided teaching, part I – educational applications of conceptualizations from artificial intelligence. R.B. DAVIS 363

19 Representing knowledge about mathematics for computer-aided teaching, part II – the diversity of roles that a computer can play in assisting learning. R.B. DAVIS, S. DUGDALE, D. KIBBEY, C. WEAVER 387

20 Three interactions between AI and education. K. KAHN 422

CASE STUDIES IN EMPIRICAL KNOWLEDGE

21 Knowledge representation for archaeological inference. J. DORAN 433

22 Chromosome classification and segmentation as exercises in knowing what to expect. D. RUTOVITZ 455

PERCEPTUAL KNOWLEDGE

23 A duality concept for the analysis of polyhedral scenes. D.A. HUFFMAN 475

24 Realizable configurations of lines in pictures of polyhedra. D.A. HUFFMAN 493

25 How to see a simple world: an exegesis of some computer programs for scene analysis. A.K. MACKWORTH 510

WORLD-KNOWLEDGE FOR LANGUAGE-UNDERSTANDING

26 Inference and knowledge in language comprehension. E. CHARNIAK 541

27 Representation and understanding of text. R. SCHANK 575

SUBJECT AND NAME INDEX

621

AUTHOR INDEX

627