

Introduction to Information Science

Technische Hochschule Darmstadt
FACHBEREICH INFORMATIK

B I B L I O T H E K

Inventar-Nr.: 2153

Sachgebiete:

Standort:

compiled
& edited
by
Tefko Saracevic

R. R. BOWKER COMPANY
New York & London
1970

Contents

Preface	xiii
Acknowledgements	xvii
General Introduction	xix

PART ONE—BASIC PHENOMENA

Chapter One. Notions of Information	3
1. What Is Information? Anatol Rapoport	5
2. The Promise and Pitfalls of Information Theory Anatol Rapoport	13
3. Semantic Information Yehoshua Bar-Hillel and Rudolf Carnap	18
4. On the Semantic Characteristics of Information Yu. A. Shreider	24
5. Morphology of "Information Flow" Robert A. Fairthorne	33
Chapter Two. Communication Processes	41
A. Behavior of Knowledge and Literature	43
6. Stability in the Growth of Knowledge Manfred Kochen	44
7. Networks of Scientific Papers Derek J. de Solla Price	56
8. Mathematical Approach to the Spread of Scientific Ideas: The History of Mast Cell Research William Goffman	65
9. Dispersion of Papers Among Journals Based on a Mathematical Analysis of Two Diverse Medical Literatures William Goffman and Kenneth S. Warren	70
B. Behavior of Information Users	
10. Information, Communication, Knowledge J. M. Ziman	76
11. Research for Psychologists at the Interface of the Scientist and his Information System Edwin B. Parker and William J. Paisley	85

12. Factors Affecting the Preferences of Industrial Personnel for Information Gathering Methods Victor Rosenberg	95
13. Collaboration in an Invisible College Derek J. de Solla Price and Donald deB. Beaver	101
X Chapter Three. The Concept of Relevance	109
14. The Notion of "Relevance" in Information Science Tefko Saracevic	111

PART TWO—INFORMATION SYSTEMS

Chapter Four. Structure of Information Retrieval Systems	155
15. Two Models for Retrieval System Design Donald J. Hillman	157
16. The Use of Simulation in Studying Information Storage and Retrieval Systems Norman R. Baker and Richard E. Nance	166
17. Systems Technology for Information Retrieval Manfred Kochen	174
Chapter Five. Acquisition	191
18. An Analytical Study of Book Duplication and Availability M. K. Buckland and I. Woodburn	193
19. Bradford's Law Applied to the Maintenance of Library Collections William Goffman and Thomas G. Morris	200
Chapter Six. Representation of Information	205
A. Structure of Languages	209
20. On the Equivalence of Models of Language Used in the Fields of Mechanical Translation and Information Retrieval Maurice Gross	210
21. A "Law" of Occurrences for Words of Low Frequency Andrew D. Booth	219
22. Semantic Road Maps for Literature Searchers Lauren B. Doyle	223
23. An Algol-Based Associative Language Jerome A. Feldmen and Paul D. Rovner	240
B. Indexing Vocabularies	253
24. Minimum Vocabularies in Information Indexing R. Moss	254
25. Semantic Clustering of Index Terms C. C. Gotlieb and S. Kumar	264
X 26. Distribution of Indexing Terms for Maximum Efficiency of Information Transmission Pranas Zunde and Vladimir Slamecka	279
C. Probabilistic and Statistical Indexing	285
27. A Framework for Comparing Term Association Measures Paul E. Jones and Robert M. Curtice	286
28. On Relevance, Probabilistic Indexing and Information Retrieval M. E. Maron and J. L. Kuhns	295

29. Word-Word Associations in Document Retrieval Systems M. E. Lesk	312
30. Automatic Subject Recognition in Scientific Papers: An Empirical Study John O'Connor	324
D. Citation Indexing	343
31. Citation Indexing and the Evaluation of Scientific Papers J. Margolis	344
32. An Examination of Citation Indexes John Martyn	353
E. Abstracting	363
33. Criteria for Acceptable Abstracts: A Survey of Abstracters' Instructions Harold Borko and Seymour Chatman	364
34. New Methods in Automatic Extracting H. P. Edmundson	377
F. Classification and Coding	393
35. Classification Systems and Their Subjects Ejnar Wåhlin	394
36. Automatic Document Classification Harold Borko and Myrna Bernick	411
37. Studies in Information Storage and Retrieval: On the Use of Gödel Indices in Coding R. Creighton Buck	418
G. Bibliographic Representation	427
38. Bibliographic Description, Arrangement, and Retrieval B. C. Vickery	428
39. Bibliographic Dimensions in Information Control Seymour Lubetzky and R. M. Hayes	436
Chapter Seven. Organization of Information Stores	443
40. A Literature Search and File Organization Model Ferdinand F. Leimkuhler	445
41. A Proposed Structure for Displayed Information to Minimize Search Time Through a Data Base David A. Thompson, Lawrence A. Bennigson and David Whitman	451
42. On the Geometry of Libraries A. D. Booth	456
Chapter Eight. Question, Handling, and Search Procedures	465
43. Natural Language Question-Answering Systems: 1969 Robert F. Simmons	467
44. An Indirect Method of Information Retrieval William Goffman	485
45. Variable Length Tree Structures Having Minimum Average Search Time Yale N. Patt	493
46. Search Strategy Evaluation in Manual and Automated Systems Michael Keen	498
Chapter Nine. Dissemination	507

47. The Bradford Distribution Ferdinand F. Leimkuhler	509
48. Bradford's Law and the Bibliography of Science B. C. Brookes	515
X 49. Empirical Hyperbolic Distributions (Bradford-Zipf-Mandelbrot) for Bibliometric Descriptions and Predictions Robert A. Fairthorne	521

PART THREE—EVALUATION OF INFORMATION SYSTEMS

Chapter Ten. Human Factors in Information Systems	537
50. Machinelike Indexing by People Christine Montgomery and Don R. Swanson	539
51. Imprecision in Meaning Measured by Inconsistency of Indexing (Part I) John F. Tinker	547
52. Imprecision in Indexing (Part II) John F. Tinker	554
53. Indexing Consistency and Quality Pranas Zunde and Margaret E. Dexter	563
Chapter Eleven. Testing	573
A. Measures of Performance	575
54. Information Retrieval Systems John A. Swets	576
55. The Measures of Information Retrieval Effectiveness Proposed by Swets B. C. Brookes	584
56. Measures for the Comparison of Information Retrieval Systems Stephen M. Pollock	592
57. Some Basic Comments on Retrieval Testing Robert A. Fairthorne	603
B. Results	607
58. The Cranfield Tests on Index Language Devices Cyril Cleverdon	608
59. Computer Evaluation of Indexing and Text Processing G. Salton and M. E. Lesk	621
60. MEDLARS: Report on the Evaluation of its Operating Efficiency F. W. Lancaster	641
61. Selected Results from an Inquiry into Testing of Information Retrieval Systems Tefko Saracevic	665
° 62. Scientists Meet the KWIC Index William Mansfield Adams and Laurence C. Lockley	682
Chapter Twelve. Economics and Growth	695
63. Economics of Inquiring, Communicating, Deciding Jacob Marschak	697
64. An Efficiency Model and a Performance Function for an Information Retrieval System Douglas H. Rothenberg	707

65. Systems Analysis in University Libraries Ferdinand F. Leimkuhler	715
PART FOUR—A UNIFYING THEORY	
Chapter Thirteen. A General Theory of Communication William Goffman	723
1. Communication and Epidemic Processes	726
2. Information Retrieval Processes	736
3. Information Retrieval Systems	740
4. Communication as a Control Process	744
<i>Index</i>	749