

# Contents

List of Figures xiii

List of Tables xix

Figure Credits xxi

Preface xxvii

## **1. Evolution of Libraries 1**

- 1.1 Why Digital Libraries? 1
- 1.2 History of Libraries 3
- 1.3 Vannevar Bush 13
- 1.4 Computer Technology 16
- 1.5 Early Language Processing 23
- 1.6 The Internet and the Web 25
- 1.7 Summary 29

## **2. Text Documents 31**

- 2.1 Computer Typesetting 32
- 2.2 Text Formats 35
- 2.3 Ways of Searching 39
- 2.4 Web Searching 51

- 2.5 Thesauri 52
- 2.6 Statistical Language Processing 53
- 2.7 Document Conversion 55
- 2.8 Summary 59

### **3. Images of Pages 61**

- 3.1 Scanning 62
- 3.2 Image Formats 68
- 3.3 Display Requirements 69
- 3.4 Indexing Images of Pages 73
- 3.5 Shared Text/Image Systems 77
- 3.6 Image Storage vs. Book Storage 80
- 3.7 Large Scale Projects 87
- 3.8 Summary 88

### **4. Multimedia Storage and Retrieval 91**

- 4.1 Sound Formats: Vinyl, Tape, and CD 91
- 4.2 Pictures: GIF and JPEG 95
- 4.3 Color 98
- 4.4 Image Search 100
- 4.5 Automatic Speech Recognition 105
- 4.6 Moving Images 107
- 4.7 Summary 115

### **5. Knowledge Representation Schemes 117**

- 5.1 Library Classifications 119
- 5.2 Indexing: Words and Thesauri 127
- 5.3 Metadata 132
- 5.4 Knowledge Structures 134
- 5.5 Hypertext 137
- 5.6 Vector Models 139
- 5.7 XML and the Semantic Web 143
- 5.8 User-Provided Links 148
- 5.9 Summary 150

### **6. Distribution 153**

- 6.1 Books, CD-ROMs, and DVDs 153
- 6.2 Computer Networks 157

- 6.3 Information on the Internet 165
- 6.4 Grid Computing 168
- 6.5 Open Source and Proprietary Systems 170
- 6.6 Handheld Devices 172
- 6.7 Security and Cryptography 174
- 6.8 Privacy 181
- 6.9 Summary 184

## **7. Usability and Retrieval Evaluation 185**

- 7.1 General Human Factors Considerations 186
- 7.2 Text Displays: Fonts and Highlighting 189
- 7.3 Image Displays and Compression Systems 191
- 7.4 Web Page Graphics 193
- 7.5 Interface Controls: Menus and Keywords 195
- 7.6 Access Methods 203
- 7.7 Retrieval Evaluation 209
- 7.8 Page Ranking and Google 213
- 7.9 Summary 215

## **8. User Needs 217**

- 8.1 Overview 217
- 8.2 User Services 219
- 8.3 Acceptance in the Past: Why Not Microfilm? 220
- 8.4 Finding Library Materials 221
- 8.5 Web Searching 223
- 8.6 Performance Measurement 226
- 8.7 Need for Quality 228
- 8.8 Summary 231

## **9. Collections And Preservations 233**

- 9.1 Traditional Paper Collections 233
- 9.2 Traditional Preservation Problems: Acid Paper and Perfect Binding 236
- 9.3 Digitizing Special Collections and Archives 241
- 9.4 Preservation Through Sharing and Distribution 245
- 9.5 New Materials and Their Durability 248
- 9.6 Emulation as a Preservation Technique 259
- 9.7 Summary 260

**10. Economics 261**

- 10.1 Library Benefits 263
- 10.2 Traditional Economics and Economies of Scale 266
- 10.3 Scholarly Publishing Today 268
- 10.4 Models for Library Funding 271
- 10.5 Access vs. Ownership 278
- 10.6 Administrative Costs 279
- 10.7 Electronic Commerce 286
- 10.8 The “dot-com” Boom and Bust 289
- 10.9 The Future of Quality Information 289
- 10.10 Summary 291

**11. Intellectual Property Rights 293**

- 11.1 History of Copyright Law 295
- 11.2 History of Patent Law 301
- 11.3 Access Regulation and Control 305
- 11.4 Technology for Intellectual Property Protection 307
- 11.5 Peer to Peer Systems 316
- 11.6 Summary and Future Research 319

**12. A World Tour of Digital Libraries 321**

- 12.1 Information Policy, Not Industrial Policy 321
- 12.2 Multilingual Issues 324
- 12.3 Multicultural Issues 326
- 12.4 Text-oriented Projects 328
- 12.5 Images 336
- 12.6 Sound and Music 342
- 12.7 Video 343
- 12.8 3-D Images 346
- 12.9 Scholarship in Digital Libraries 349
- 12.10 Scientific Data 353
- 12.11 Access and Infrastructure 357
- 12.12 Summary 358

**13. Scope of Digital Libraries 361**

- 13.1 Readers 361
- 13.2 Authors 363
- 13.3 Flow Control 365

- 13.4 Education 367
- 13.5 Science 368
- 13.6 Technology and Creativity 369
- 13.7 How Big Can They Get? 371
- 13.8 Summary 372

## **14. Future: Ubiquity, Diversity, Creativity, and Public Policy 375**

- 14.1 Dream to be Realized 375
- 14.2 Future Roles in Information Handling 378
- 14.3 Effect of Digital Technology on Universities 380
- 14.4 Digital Libraries and Society 381
- 14.5 Digital Libraries, Society, and Creativity 382
- 14.6 Public Policy Questions 384
- 14.7 Projections 385

## **References 387**

## **Index 413**