Interactive Information
New World in the Morning: Artificial Intelligence

The Dawn of a Solution for Serials.

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Introduction

As serialists, we face the desperation of abundance: abundance of high quality journal articles emerging from the refereeing and editorial processes, abundant numbers of old and new titles which should be in every library, and the abundant number of germane citations found by the researcher on every conceivable subject. Thus enters the desperation of the publisher to print more and more articles, issues, and titles with the subsequent increased charges. The library faces not the decisions as to which titles can be added, but rather which must be cancelled. The researcher confronts the enormous body of literature which he can not possibly read and comprehend for a given subject in his/her native tongue much less all that appearing in other languages. Thus the abundance of information is on a crash course with the desperate inability to produce, distribute, store, and, especially, use this enormously increasing glut of presumably high quality, superb, splendid, and greatly relevant knowledge traditionally packaged in the journal issue.

In the near future the thinking of Becky Lenzini as well as that of many others regarding access or article retrieval rather than journal ownership may offer a possible solution for the publisher and perhaps for the librarian. [1] The reader, however, continues to face the critically overwhelming challenge of how to obtain, read, evaluate, and synthesize an impossibly huge amount of information. In my mind the answer is the application of artificial intelligence within the information chain stretching from publisher to user.

What then is artificial intelligence? AI represents the interaction of computer hardware and software in the processing of information for the purpose of drawing plausible conclusions to a question and/or creating new knowledge. In a simplified expression and in its most futuristic extension, artificial intelligence represents computers which think or machines which replicate human thought. [2] Pretty wild stuff, I would think; demeaning to the human being, not really; an incredible advantage to civilization, quite possibly. Does it presently exist? Yes, in the form of hundreds of derivative expert systems but not yet in the terms that I will express for the future utilization of research published in journals or, for that matter, books. Where then did this cloudy, ethereal, fantasy arise?

History of Artificial Intelligence

Artificial intelligence originated from the efforts of a number of Englishmen. One of the essential elements emerged from the philosophic studies of Alfred North Whitehead and Bertrand Russell.

In their 1905 book, *Principia Mathematia*, they developed the theory of symbolic logic or the use of mathematical representation to express logic. With the advent of the Second World War, England's Alan Turing became deeply involved in developing the means of deciphering German Intelligence within the Ultra Program at Bletchley Park. From these experiences, he developed the logic machine, a crude early version of a computer. [3]

After the war, in America as well as in England, the early computer was programmed to make those decisions germane to the playing of games such as chess or checkers. Although subject to the chaffing of serious scientists, these computer-played games encouraged the development of the principle of heuristics or rules to control the possible decisions which could be made in a game of chess, checkers or cards. In the 1960's AI's "age of games" was replaced by a more serious vision in which artificial intelligence underwent the influences of cognitive

science and broadened its intellectual roots to include linguistic, philosophic, and psychologic elements with special attention given to neural science. The subsequent interweaving of these disciplines greatly enhanced the development of natural language processing including translation, text comprehension and speech/vision recognition, which are all elements of human thought processes and of the dream I hold.

Components of Artificial Intelligence

The potentials of artificial intelligence are rooted in various computer hardware and software components. The computer as we envision it today is only about 45 years old in its development. Conceptually this serial computer processed its data at a speed of less than 100 million bytes per second. The first supercomputers using this serial processing principle attained a rate of one billion instructions per second but still a pace far slower than that of the human mind. Perceiving that the mind carries out numerous conscious and unconscious separate operations at the same time, the development of the parallel computer with parallel processors followed. From these developments emerged the iwarp computer consisting of 72 cells, each one of which is capable of executing 1G million operations or decisions per second. [4] Even this processing speed falls short of replicating that of the human mind. At Scotland's Heriot-Watt University, however, important research is being conducted in the development of an optical computer. Using silicon semi-conductors with a processing speed of 50 trillionths of a second and using multiple streams of data on numerous light waves, this computer executes a decision every million-billionth's of a second. [5]

Today, the ultimate "hardware" development encompasses molecular computers using photochromic molecules. Research on this computer at the University of Maryland in America and at the University of Warick in England promises operating speeds and memory capacities equal to a billion times that of today's supercomputer. With these characteristics scientists are speculating on their ability to restore sight to the blind through literal implant in the eye of such photochromic molecular materials. Such computer capabilities are presently speculative but represent, never-the-less, enormously intriguing possibilities for the development of various aspects of artificial intelligence. [6]

The second major ingredient of AI is its software.

The two standard software programming languages currently used to support AI are LISP (list processor) and PROLOGUE (Programming in Logic). Although these languages have been useful, the desirable breakthrough, yet to be made, rests in the ability to use natural language. At the Present time, the slow development of effective software and program language has been the most disappointing aspect of AI.

Current Programs of Artificial Intelligence

Research in artificial intelligence is presently supported by millions of pounds, dollars and yen in a world-wide assault on its various facets. Japan began the development race for AI in October 1981 when it announced the Fifth Generation Computer Project. Under the auspices of the Japanese Ministry of International Trade and Industry (MITI), this project budgeted 500 million pounds in a ten-year project with the specific intent of bringing AI to fruition. [7]

The United States picked up the Japanese challenge with its own AI projects centered in the Microelectronics and Computer Technology Corporation and DARPA (the Defense Applied Research Agency). Here the focus of research concentrated on military applications involving the pilotless airplane and the robot tank. These efforts, however, have attained little practical success. Greater achievement has been experienced in image and vision processing as applied in American military intelligence and target identification programs.

In the United Kingdom, the British response to the Japanese challenge was determined by a Committee headed by John Alvey of British Telecom. In consequence of the Alvey Report, the British Government provided about 250 million pounds for AI research. The United Kingdom's universities have been particularly involved in artificial intelligence through their conduct of several programs of basic research. For example:

1. At the University of Southampton, developmental efforts are being made related to the application of nuclear fusion to the etching of semi-conductors.

2. At the University of Edinburgh, twelve different departments are participating in voice/speech recognition research. Here also new progress is being made in developing AI's essential Program languages, LISP and Prologue.

3. In London, the Imperial College is working on

new architectural patterns for computer hardware to support parallel processing and to develop natural language programming.

To complete this brief survey, on the continent both the Germans and French have a less certain and less focused attention on artificial intelligence. Eastern Europe and the Soviet Union have dabbled vaguely in the field but lack the resources to mount significant research programs.

The Emergence of Artificial Intelligence

When AI arrives you won't know it. It will slide slowly into place as new discoveries and applications are made, for that is the general nature of scientific development, progress through small· incremental advances. Hence, the print on paper publication will continue along with the microformat, the CD-ROM and online full text retrieval. Due to its likely high cost, AI will first be the prerogative of government, large business corporations, and major scientific research institutes. Next, special libraries and information centers will experience its use followed by large university research libraries. When you review the rapid growth in power of the desk top personal computer, who is to say that some form of AI might not even be available in your home in a few decades.

What might AI mean to each of the specific members of the serials information chain? For the Publisher it would offer another means of selling the journal or parts of its contents. If a year's subscription costs 125 pounds to a library, what would the charge be for the use of one article read by AI software? Publishers have stated their concerns for many years regarding lost revenue with the advent of the photocopy machine. Here, at least, would be an assured means of counting usage with each automated reading of an article or segment thereof. The initial establishment of machine readable text at the publisher's office is presently a reality for the major STM publishers and many others. Questions do remain, however, that are related to the presentation of some types of illustrative materials.

How will access be provided to the machine readable journal article by the user of artificial intelligence? Will the STM publishers band together in an ADONIS-like organization and mount their journals in an environment of supercomputers, develop software packages to accept AI inquiries, read the documents, form possible conclusions and transmit them back to the

inquirer? Or, will the traditional gate keeper of journal information, the subscription agent, carry out this function? To what extent would Blackwell, EBSCO, Faxon and others have to upgrade their computing ability to offer artificial intelligence services? Or, do we turn to such vendors as BRS, DIALOG, OCLC or RLN as the supplying agent? Although I have only questions here, it may be that only the national library institutions such as the British Library or the Library of Congress have the resources and breadth of vision and purpose to provide AI as it develops.

For the foreseeable future, serials librarians or librarians in general will prosper as the continued suppliers of information to its seeker. In a later age of artificial intelligence, the librarian will simply have an additional tool in the arsenal of available assistance to provide the library clientele. [8]

The knowledge user, as suggested earlier, will be the most affected by AI's existence. Rather than conducting various online database searches with possible supplementary investigations of CD-ROM and manual indexes, in my futuristic, if not surrealistic world, the client will, with the assistance of an expert system, formulate a thesis question of sufficient precision to be then taken and applied to a likely body of machine readable knowledge. At this point rather than trying to read hundreds of journal articles, half of which the local library does not have or can not make available, the scholar goes out to have tea or a couple of pints. In the meantime the computer processor reads the relevant articles in an extraordinary compression of time with perfect comprehension and recall after which possible conclusions to the researcher's question are down loaded to a local file or are printed out. Here, the scholar examines each potential suggestion within the framework of the problem and the intuition of his or her life experience. The human mind has not been subsumed but rather made more effective by not overloading it with a mass of processing far more capably accomplished by a computer which is not preoccupied with a cold, an overdraft on the checking account, or a teenage daughter. Thus, with conclusions in hand, some of which may display new relationships, the knowledge user moves to the process of application and synthesis or those functions appropriate to research and scholarship.

Conclusion

New world in the morning? Well, not tomorrow morning, or even next year. Neither do I see doom at dawn, but rather a slow, sure progression of science which in time will mature these concepts

and will utilize what practically emerges from them. The desperation of abundance will compel the acceptance of these new strategies for the creation, distribution, and use of knowledge.

Notes

1. Rebecca Lenzini, "Articles Unbound: Classical Comments on Journals." Presentation made at Charleston Conference on Issues in Book and Serial Acquisition. November 4, 1988.

2. George Johnson. *Machinery of the Mind.* Redmond, Wasnington: Tempus, 1987. pp.18-19.

3. Howard Gardner. *The Mind's New Science.* New York: Basic Books, 1988. pp.16-19.

4. Jeffrey Hsu. *The Fifth Generation.* Blue Ridge Summit, Pennsylvania: Windcrest Books, 1989.

5. J. Hsu. *The Fifth Generation.* 48.

6. J. Hsu. *The Fifth Generation.* 75-78.

7. Edward A. Feigenbaum. *The Fifth Generation.* Reading, Mass.: Addison-Wesley, 1983.

8. John F. Riddick. "Reference Librarians and Serial Publications in the Age of Artificial Intelligence." *The Reference Librarian.* nos. 25/26, 1990. ❑

Students' Appraisal

Of the United Kingdom Serials Group Conference Southampton, 2nd-5th April, 1990

The warm welcome given by the committee members on arrival undoubtedly helped to break down any "new girl" feelings and encouraged a participative rather than an observative approach to the whole proceedings.

The papers appeared to have been specifically selected to aid students in passing their final exams. The subjects were interesting, varied and forward thinking, involving management, sociological as well as technical aspects.

Although the lectures provided a wealth of information with the questions supplementing this, the social interaction was also invaluable. The conference provided an excellent opportunity to talk to professionals in the various fields of publishing, library supply as well as librarianship. This not only gave an insight into the variety of career openings available but it also highlighted the wide ranging application of journals and the complex and dynamic role they play in the information world.

It was fascinating to be given the opportunity to see and have demonstrated the most modern library technology available. CD-ROMs, LIBERTAS, LA-NET are all names frequently referred to so it was extremely useful to talk to those directly involved with the systems.

The balance between informative and social events was excellent. The informative events provided a useful basis for discussion with other delegates and the social events allowed the development of these meetings on a more personal level. When embarking on a new career it is encouraging to have met others within the same field and the UKSG helps to create this community support.

As the conference was so useful in broadening horizons one suggestion would be to extend the sponsorship to some library assistants working within the field, many of whom have a great commitment to information provision and would find this forum extremely stimulating.

On an organisational level there is little to be said, except that it was extremely good from the organisation of transport to the provision of vegetarian meals; it is difficult to find fault. Such a well organised and efficiently run event was a pleasure to attend.

Suzanne Ainscough

Gina Dobson

Rosalind Adshead

Belligerent portrait with friendly Swets' response,
Southampton Connference.

UKSG Committe: Front row left to right:
John Urquhart,   Albert Prior,   Hazel Woodward,   Albert Mullis,   Penny King,
Back row left to right: *Margaret Graham,   John Cowley (editor, co-opted),*
Steve Hobbs,   Mieko Yamaguchi,   Stella Pilling,   John Merriman.