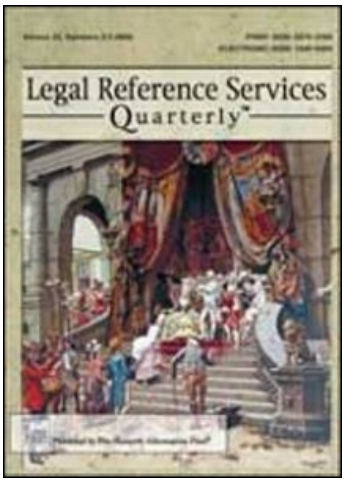

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A Hypothetical Case Study: Creating AI Assistants in the Law Library

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A Hypothetical Case Study: Creating AI Assistants in the Law Library

Roy Balleste

SUMMARY. This article explores the burgeoning world of artificial intelligence (AI) and its applications to law libraries. An AI system is best described as a technology made to mimic intelligence derived from the combinations of various processes that the computer can perform simultaneously and automatically. A library's input in designing and programming an AI system is a critical component of the system's success. AI systems have the potential to supplement and expand the public services offered by libraries. Using current technology a library may create a basic AI system but more sophisticated systems have yet to emerge.
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KEYWORDS. Artificial intelligence, intelligent systems, AI assistant, technology, computer language, algorithm, avatar, agent, natural language, database

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The fellow that can only see a week ahead is always the popular fellow, for he is looking with the crowd. But the one that can see years ahead, he has a telescope but he can't make anybody believe that he has it.[1]

THE NEXT GENERATION

Virtual Reference projects in law libraries give the impression of a decline, at least in 2006. This does not necessarily reflect a dislike for or lack of interest in this technology. The nature of the reference interview in law libraries is for the most part, a complex transaction. Patrons confronted with the complexity of Virtual Reference Desk (VRD) technology might find reference chat cumbersome. To search the "law of the District of Columbia" can take the reference librarian in many directions. Yet, this type of question is not uncommon. The exchange between librarian and patron may continue for several minutes as the librarian tries to identify the real need of the patron. What part of the District law? It is administrative law? Is it part of the code? How do you navigate the Digest? This discussion can be problematic over a VRD technology set up. Some patrons might lack technological sophistication. Others might be utilizing dial-up connections. Yet others might not have a computer accessible to them. VRD technology is not for everybody, but its evolution into intelligent systems offers new possibilities for innovation.

Intelligent systems are commonly known as artificial intelligence technologies or AI. The AI world is fascinating. It is a world that transcends the ambit of computer science and delves into questions of existentialism, psychology, biology, and theology. It has been a long and complicated process for scientists facing the challenge of conceptualizing a true AI system. Some progress has been made, yet, a truly artificial intelligence is not available to us. The AI system involves the relationship between available AI technologies with their algorithmic designs and law libraries with their customer service needs. The case study presented in this chapter will delve deeply into the following questions:

- What is an intelligent system?
- How this technology can help a law library?
- Why consider it? and above all,
- What are its realistic implications for the future as a tool for libraries?

Today, faster and better computers have proliferated through all of our academic departments. The Internet is at full power and extensive databases are being created. Online catalogs organize our law library collections. Wireless technologies have emerged as a promising information delivery method, allowing communication beyond the constraints of physical walls. AI technology is rising prominently as another potential tool for information delivery. The applicability of AI systems is permeating the computing world and will bring the next generation of technological tools to law libraries. There is no doubt that humanity has technologically advanced greatly in the last five decades. How far have we gone in the ambit of intelligent systems? It only takes a few moments to review magazines, newspapers, the Internet, and television to realize that AI applications are at the forefront of technological developments. Robotics is the physical representation of artificial intelligence, and enjoys a prominent place among scientists and science-fiction lovers alike. AI technologies are intended to work as "assistants" designed to interact with a human customer or with the environment based on preset instructions. The Mars Exploration Rover Mission is the best example. Spirit and Opportunity are probes designed by NASA to operate with AI technology.[2] They are automatons that continue to interact with NASA scientists while sending data back on Earth.[3]

Today, new discoveries are being made in computer science and in biology. Biology has become a model of study for computer scientists.[4] The human brain fascinates scientists because it contains a complex network of electrical connections that allows the formation of cognition.[5] This complex network is based on the neurons of the brain.[6] Replicating a type of "artificial neuron" would provide scientists with the ability to create an artificial brain. The artificial brain promises to provide another necessary element for a true artificial intelligence: cognition.[7] Cognition would bring the scientist (or librarian) face to face with the study of the mind, while considering its connection to questions of philosophy, psychology, and biology.[8] But cognition presents a bigger challenge to computer science. More important than the ability to think, a brain allows a human being to know that it exists. Who am I? Where am I going? What do I want? What is my purpose for being alive? These tenets of existentialism are important to consider when analyzing an AI system.[9] Questions remain as to the capability of future technologies and the necessity of creating a sentient AI system. To achieve the perfect AI system, scientists would have to design a complex machine that would perform like a human brain. Some scientists have speculated that if this is achievable, a complex artificial brain could develop sentience, in essence

a "mind," creating a link between computer science and psychology.[10] For now, artificial intelligence is best described as a technology made to mimic intelligence. This "intelligence" flows from the combinations of various processes that the computer can perform simultaneously and automatically.

CONSIDERING THE TECHNOLOGY

Asking a computer a question and receiving a correct response is encouraging. However, this is not the same as plugging a keyword into a Web browser. An intelligent system would return "the correct answer," and not a list of possibilities. This conversation, initially, would look just like virtual reference, except that the patron would not be communicating with a human librarian. Instead, it would be the independent communication of a computer with a human patron. The Encyclopedia of Science and Technology defines artificial intelligence as "the sub-field of computer science in which intelligent behavior is analyzed and computer systems are developed that are capable of emulating, mimicking, or generally exhibiting such behavior."[11] The goal continues to be the design of computers capable of developing aptitude and comprehension of natural languages, such as English. People communicate in natural language. Computers utilize programming languages. In essence, artificial intelligence could be understood as the "bridge" between programming and natural languages allowing efficient communication with computers.

The most basic element of an AI system lies in its programming. Computer language is drafted by a programmer to request a process or a function from a computer. Computer programming produces a result based on a preset process. Librarians are accustomed to library policies. Computers operate in a manner analogous to library policies. A "policy" for a computer is the ability to generate a process based on algorithms. These algorithms when put together, become a powerful computer language, a program, to provide us with a desired result. In the AI world, these algorithms define our interaction with the computer. An algorithm is a mathematical procedure or a "step-by-step operation," not that dissimilar from a procedure to request an interlibrary loan, collect materials, or create circulation policies.[12] A programmer would set up these algorithms or "preset processes" to evoke a "behavior" or result from a computer. Requesting information from an AI assistant would require several algorithms designed to provide specific results, for a particular purpose, while giving the impression of independent intelligence.

CONCEPTUALIZING AI SYSTEMS

In order to put the AI concept in perspective, it is best to think of an AI agent as another potential "member" of the library staff. The AI assistant would not be designed to replace librarians, but instead would make librarians' lives much easier and more productive. The librarian would be able to assign menial or repetitive tasks to the AI assistant. This chapter provides various examples in a later section. For now, consider that AI technologies are designed to be autonomous.

The AI concept was best represented in *2001: A Space Odyssey*.[13] Arthur C. Clarke and Stanley Kubrik's masterpiece took audiences deep in space to encounter the fate between astronauts and their relationship with an intelligent computer in a story of future space exploration. This chilling and yet fascinating story brought audiences closer to understanding artificial intelligence. Aboard the Discover spaceship, while traveling to Jupiter, the HAL 9000 was not a simple computer. It was a "living-intelligent" member of the crew. "HAL [was] programmed to control the mission and built to reason logically and unerringly; he [could] also think and speak."[14] This computer was able to interact with the astronauts as any other person would. Yet, the HAL 9000 was much more. It represented the potential future in human-machine interactions. Hal eventually became homicidal and killed most of the crew. As audiences discovered in the movie sequel, *2010: The Year We Make Contact*, HAL's actions were directly related to a series of conflicting orders received from Earth that caused the AI system to malfunction. This is the key to understanding AI technology. This technology is autonomous, but it is not independent. The AI assistant will always operate under the direct command of the designer, in this case the librarian.

Audiences also experienced another conception of artificial intelligence while watching the movie *The Time Machine*. In the story, around the year 2030, the inquisitive Dr. Hartdegen was found walking down the aisles of the New York Public Library (the branch portrayed in the movie is known as the Humanities and Social Science Library).[15] Director Simon Wells presented Vox, "the compendium of all human knowledge," as a virtual assistant that appeared behind panes of glass in the halls of that library. The conversation between Dr. Hartdegen and Vox was quite fascinating. Vox could interact, and even anticipate the needs of patrons. It had a personality, and above all, it was autonomous. Is this advanced technology at all possible?

AI APPLICABILITY

The AI assistant would not be easy to design. To create this tool, the AI designer (or librarian) would be required to design mathematical algorithms for intelligent processes. A background in mathematics and computer science would be required to handle the project independently. It would also require a database to contain the information processed by the algorithms. The procedure created by the algorithms would require interactivity with the environment; in our case, library patrons. A physical or graphical display would be required, such as an avatar.[16] An avatar is a graphic that stands for the AI assistant in the Web site. From the point of view of a Web site, this AI assistant (or avatar) would be powered by a computer program. This program would allow the agent to mimic a conversation with a patron. Finally, the assistant would be perceived as having an intelligent conversation based on the patron's input. Today, video games make use of "virtual reality," an advanced graphical display that mimics our natural environment. This graphical display adds interactivity to Web sites. The features that Adobe Flash adds to some Web sites are examples of the interactivity achieved through the use of a graphical display.

Current technologies offer some limitations. Nevertheless, limitations can be overcome and in essence a partial "intelligent" system may be created. The sophistication of the AI assistant is, of course, related to time and finances. Still, librarians have more than one option when creating an AI system in the law library.[17] There are vendors that provide some of the tools needed to start the project. The assistant or agent presently requires constant intervention and monitoring by a librarian. Law librarians would be key components of the AI system's inner workings. The librarian would be responsible for designing the graphical agent, or avatar, and pre-drafting responses to patron questions. Responses would be stored in a database, the "back end" of the system. The database would be populated using the vendor's custom made software, thus avoiding the need to use products such as MS Access and Cold Fusion. The Verbot 4 by Conversive[18] is one example, and definitely, not the only one.

To simplify the process, the library should use the database interface provided or suggested by the chosen vendor. The AI assistant database is like any other database. The accuracy of the information depends on the accuracy of the librarian in charge of the project.[19] In other words, if a mistake is made or inaccurate information is input into the database, assistant replies will also be erroneous.

This AI assistant is envisioned as part of the library's Webpage. As a graphical talking head, the avatar will speak and answer questions based on the information you request. The request or question is made by typing in a text chat box located below the avatar. This type of communication evokes the technology used in the VRD text chat, and indeed, it is the same concept.

The database may contain conversation logs between the AI assistant and the patrons. The logs are important because they allow the librarian to identify questions that the AI assistant failed to answer correctly. Privacy concerns raised by these logs can be alleviated if librarians delete them quickly after reviewing them.[20]

The creation of an AI assistant and the assistant's ability to interact with patrons is entirely in the hands of the librarian who creates the assistant. The AI assistant may become autonomous, but would continue to be dependant on the librarian's commands. The AI assistant, in essence, can be trained to provide substantial information about the library such as hours, material location, and names of library contacts. A librarian may outsource the service completely or outsource the database portion or graphical interface, or may take on the entire endeavor from beginning to end.[21]

A NEW PATRON ENVIRONMENT

Law libraries must offer the technological sophistication our patrons expect. AI assistants could make the patrons' experience at the library Web site friendly, fast, and proactive. Patrons will receive customer service from an AI assistant communicating in natural language and automatically delivering custom-made responses. This will allow patrons to engage AI assistants in a two-way communication. The assistant will be able to answer frequently asked questions and direct patrons to the appropriate librarian for assistance.

Pro Se patron questions and concerns of an AI assistant giving legal advice will not be a problem. The technology available to librarians now permits the design of an AI assistant that will answer only preset questions with predetermined answers found in the database created by the librarian. Questions that would involve legal advice would be rejected by the AI agent by referring the patron to a librarian. This referral capability would have to be added to the database.

A GLIPSE OF THE FUTURE

Previous sections have outlined a number of important issues and considerations pertaining to the ambit of artificial intelligence. As law librarians, we find ourselves at the crossroads of a continued technological transformation where artificial intelligence stands as a reminder of impending technologies. As libraries closely examine their operations, AI assistants may emerge as the ideal tool for a variety of functions. Think for a moment about public services. These assistants can be used to supplement the services provided at the reference desk. In essence, they could extend the hours of operation so that additional service (although limited) is available 24 hours a day, seven days a week. These assistants could be capable of answering simple library related questions. As the technology continues to improve, these assistants will be exceptionally helpful with circulation operations. As libraries move toward the automation of checking out materials, AI assistants will be there to help. Self-check out systems can be found in some libraries and supermarkets, and their presence will likely increase in the future. From checking out books, to renewals, to interlibrary loans, AI assistants will interact with patrons. In time, these assistants will learn from experience and will be able, for example, to intervene and assist patrons while they search the online catalog, to assist with an interlibrary loan request, or to contact a librarian and pass on a request on behalf of the patron.

In technical services, cataloging will be streamlined as the assistant communicates with the online catalog and other modules within the integrated library management system. These complex capabilities are still far from reality. Yet, the potential for this technology is fascinating. For now, the assistant is an effective way to engage and inform library patrons while enhancing their learning experience. We can only hypothesize about the future, yet there is plenty of evidence to suggest that artificial intelligence, as a trend, will continue to be explored and developed.

Over two thousand years ago, Heron of Alexandria managed to create robotic devices with the help of spindles, pegs, and ropes.[22] Although a very simple design, Heron managed to achieve perfect mechanization and automation. Now that our modern technological age has allowed us to rediscover this concept, new possibilities await the future of our law libraries.

NOTES

1. Will Rogers, *The Autobiography of Will Rogers* (Houghton Mifflin 1949) (cited in *American Heritage Dictionary of Quotations* 516 (Margaret Miner & Hugh Rawson, eds., Penguin 1997).

2. Marsha Walton, CNN.com, *What an Opportunity! Mars rover Reaches New Milestone,* http://www.cnn.com/2006/TECH/space/09/28/mars.opportunity/ (accessed Nov. 21, 2006).

3. Mars Exploration Rover Mission, Jet Propulsion Laboratory, NASA, http://marsrovers.nasa.gov/spotlight/20060320.html (accessed Nov. 22, 2006).

4. Henry Brighton & Howard Selina, *Introducing Artificial Intelligence* 41 (Totem Books 2003).

5. *See*, American Association for Artificial Intelligence, Cognitive Sciences, http://www.aaai.org/AITopics/html/cogsci.html (accessed Nov. 30, 2006).

6. Brighton & Selina, *supra* n. 58; see BMI, Brain Mind Institute, http://bluebrainproject.epfl.ch/FAQs.htm (accessed Nov. 30, 2006).

7. Brighton & Selina, *supra* n. 4, at 35.

8. *Id*.

9. *Id*.

10. *Id*. at 14.

11. *The Encyclopedia of Science and Technology, Artificial Intelligence* 44 (James Trefil, ed., Routledge 2001).

12. Michael Negnevitsky, *Artificial Intelligence, A Guide to Intelligent Systems* 34 (2d ed. Addison Wesley 2005).

13. The movie is a masterpiece of cinematography. The movie won an Oscar for visual effects during the 41st Academy Awards. These visual effects allowed Stanley Kubrick to share with us a potential depiction of artificial intelligence.

14. Alexander Walker, Sybil Taylor & Ulrich Ruchti, *Stanley Kubrick, Director* 185 (W. W. Norton & Co. 1999).

15. New York Public Library, http://www.nypl.org/ (accessed Nov. 30, 2006).

16. A Beginner's Web Glossary, Case Western Reserve University, http://www.case.edu/help/webglossary.html (accessed Nov. 22, 2006).

17. For a discussion of the various options for outsourcing this service, *see* Roy Balleste, *The Future of Artificial Intelligence in Your Virtual Libraries*, 22 Computers in Libraries n. 10 (Oct. 2002).

18. *Id. See also*, Verbots, http://www.verbots.com/ (accessed Nov. 22, 2006).

19. The AI assistant or agent includes three main components: Face, Voice, and Brain. The brain is the database. For a more detailed description on how to build an AI assistant, see, Roy Balleste, Lisa Smith-Butler & Sonia Luna-Lamas, *Law Librarianship in the 21st Century* 152-154 (Scarecrow Press 2007).

20. Privacy considerations raised by AI and other technologies in the library are more completely considered in Anne Klinefelter's, *Privacy and Library Public Services: Or, I Know What You Read Last Summer*, in this publication.

21. Balleste, Smith-Butler & Luna-Lamas, *supra* n. 18. With the help of a powerful database, the librarian can customize the AI assistant's conversations based on prior information. This knowledge allows that assistant to be customized based on patron requirements. This functionality is easily accessible from a graphical tool for design and maintenance of the database and avatar. *See also* the book by Peter Plantec, *Virtual*

Humans: A Build-It-Yourself Kit, Complete With Software and Step-By-Step Instructions (American Management Association Nov. 2003).

22. One of the greatest visionaries of ancient times, Heron of Alexandria, a Greek inventor, worked at the famous Museum of the Library of Alexandria. His invention, such as the automated theater, was the precursor to today's computer programming. Heron was an automaton maker, in essence, a maker of primitive robots. *See, Ancient Discoveries: Heron of Alexandria* (History Channel Dec. 11, 2005) (TV broad.).

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