Exploring the Possibility of Using Intelligent Computers to Judge Criminal Offenders

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Abstract

The human race has never encountered a species equal to or greater in intelligence than itself. However, if computer scientists specializing in the field of artificial intelligence (AI) realize their ultimate goal, humans won't be the only intelligent "beings." This research explores the possibility that these intelligent beings (computers) might someday be used to replace the functions of the judge and/or jury in a criminal trial. Specific emphasis is placed on two issues: 1) examining the history and successes of AI to substantiate the future existence of an intelligent computer; and 2) exploring issues that affect the probability the United States Constitution will be changed in support of the new technology.

Introduction

This paper examines the possibility that an artificial form of intelligence could someday stand in judgement of a human criminal offender. This theoretical concept is not rooted in fantasy but in the fact that significant advances have been made in the fields of computer science and artificial intelligence (AI); advances that scientists hope will lead to the development of computer systems that have the ability to think, reason, learn, and make decisions much like humans. Berman and Hafner (1989) stated:

> It is widely viewed that the American legal system is in a state of crisis, plagued by excessive costs, long delays, and inconsistency leading to a growing lack of public confidence. One reason for this is the vast amount of information that must be collected and integrated in order for the legal system to function properly. In many traditional areas of law, evolving legal doctrines have led to uncertainty and increased litigation at a high cost to both individuals and society. (p. 928).

When looking for solutions to these problems confronting the American legal system and considering the technological advances experienced in the computer sciences, a reasonable question to ask is: Is it possible that, in the not-so-distant future, an artificial intelligence might replace the functions of the criminal trial judge and/or jury?

Overwhelming implications are associated with the idea that a machine might someday be given judgement over man. Two issues must be examined before attempting to answer the central question.

First, the likelihood that computer scientists will succeed in producing "intelligent" computers capable of processing information in much the same way as the human brain must be explored. In doing so, the past and present capabilities of AI are examined, thus giving some insight into the future possibilities of AI.

Second, the process of changing the United States Constitution in support of the new technology must be examined. The constitution guarantees criminal defendants a trial by jury and also sets forth the procedure for changing the constitution. Some perplexing constitutional legal issues need to be addressed when advocating a change

to the jury process. Assuming there is sufficient evidence to support the future existence of truly intelligent computers, overcoming constitutional issues might prove as challenging as the technological advancement of AI.

Once these issues have been addressed, the main questions concerning AI's fitness to stand judgement over man are examined.

Artificial Intelligence - Past and Present

"AI is the study of cognitive processes using the conceptual frameworks and tools of computer science" (Rissland, 1990, p. 1957). The study of AI began some 30 years ago when scientists from the Rand Corporation proved that computers could do more than calculate; that indeed they could be used to simulate certain aspects of intelligence. Their reasoning was based on the fact that computers are physical symbol systems and that these symbols could theoretically represent anything, including elements of the real world (Dreyfus, 1993).

One of these real world elements was the human process of reasoning. Reasoning, with its roots in formalized beliefs, rules and procedures, seemed to be a function ideally suited to computers. However, after many years of research the reality of computers with reasoning capabilities, or "thinking computers," has somewhat eluded computer scientists and AI practitioners. When pondering the basic question of "Can machines think?", many AI practitioners now believe there won't be thinking machines until we understand more about how a human thinks (Newquist, 1993). This becomes a problem because as we learn more about knowledge, intelligence or wisdom, the less we understand them (Angell, 1993).

Current technology suggests that AI scientists may be well on their way to realizing their ultimate goal. Neural networks, fuzzy logic architectures, and Bayesian belief networks are currently among the most promising of AI tools.

"Neural technology is in essence programming computers with enough intelligence to allow them to learn the rest for themselves" (Tyler, 1993, p. 28). Fuzzy logic is an approximate reasoning system which describes "possible states of the world in terms of their similarity to other sets of possible worlds" (Caudill, 1993, p. 28). "Bayesian belief networks provide a simple way for conflicting evidence to be combined to draw reasonable conclusions" (Caudill, 1993, p. 29). In simple terms, fuzzy logic systems attempt to determine the possibility of an event having occurred, where Bayesian belief networks attempt to determine the probability of an event having occurred.

In an effort to take advantage of both neural networks and fuzzy logic, researchers are combining the two to create a new architecture. "Using this combination, the learning neural networks ... are able to perform in a more 'human' fashion ..." (Johnson, 1993, p. 41). "According to a forecast by Market Intelligence Research Corp., large-scale parallel processors using combined neural network and fuzzy logic architectures could simulate the activity of the human brain within 10 years" (Studt, 1993).

Probably the closest thing there is today to artificial intelligence is expert systems. "Expert systems, which encode human expertise into a knowledge base, are being employed to provide the experience and advice of a human expert" (Bossinger & Milheim, 1993, p. 7). Expert systems consist of three parts: (a) a knowledge base; (b) an inference mechanism; and (c) an interface which allows the user to interact with the

system (Clark & Economides, 1991). Describing how these parts interact, Clark and Economides state:

> The interactive user interface presents the user with questions that are designed to elicit relevant information about the user's problem. As the interrogation proceeds, the questions that are asked and the order in which they are asked are determined by the system in accordance with the user's response to earlier questions .... The inference engine forms the link between the user interface and the knowledge base, enabling the system to deduce ... conclusions on the basis of the information supplied by the user. (p. 6)

Systems based on this foundation are currently being used to advise physicians, predict stock performances, detect tax and credit-card fraud, and pinpoint underground oil and gas deposits (Schwartz, 1993). Some expert systems of notable mention include:

1. Computers at General Electric (GE) containing the expertise of senior engineers, assist product-development engineers in the product designs for dishwashers, washers, dryers, refrigerators, and ranges. When interacting with the user the program responds with questions and scores designs on a scale of one to 100 for cost, producibility, and adherence to GE production standards (Jancsurak, 1993).

2. A system at General Electric Research and Development Center employs the use of a computer that has been taught the rudiments of how to read and digest a variety of printed texts and then how to understand and answer questions about what it has read (Anonymous, 1993).

3. A program called "VOTE" is being used to try to predict and analyze legislators' votes based on their views on certain issues and others' influence upon them. The program contains a set of interrelated databases with information on 200 issues, 150 constituency groups, 67 congressional members, and 16 decision strategies (Eliot, 1993).

4. A program fooled some panel judges into thinking it was a person. At the Loebner Prize competition for "thinking" computers, the program "Men vs. Women" won the competition by carrying on a human-like conversation about relations between the sexes. The contest is founded on the idea that a computer could be considered to think when its conversation was indistinguishable from that of a human (Buckler, 1993).

5. Regardless of the success of many expert system applications, critics continue to warn that expert systems still lack three basic necessities: human intelligence, human emotion, and freedom from intentional or accidental bias (Khalil, 1993).

Constitutional Considerations

The authors of the United States Constitution were deliberate in their desire to produce a set of laws that would ensure basic human rights to all citizens. Given the opportunity to talk with any one of them today, one can only wonder what they might say about the possibility of something other than another human being passing judgement on a fellow human.

Of particular importance when addressing constitutional considerations is Article III, Section 2; Amendment V; Amendment VI; and Amendment XIV, Section 1 of the United States Constitution. Article III, Section 2 and Amendment VI address the right of criminal defendants to a trial by [impartial] jury [of the state]. Amendment V and XIV address the right of criminal defendants to "due process of law" before being deprived of life, liberty, or property (Gunther, 1985). Since a trial by jury is part of the due process of law guaranteed all criminal defendants, the constitution essentially says that no criminal defendant will be deprived of life, liberty, or property without a trial by [impartial] jury [of the state].

Also important is the authority of the United States Supreme Court to extend judicial power to all cases and the right of Congress to ordain and establish inferior courts (Article III, Section 2). This is important because it establishes the basic authority for the existence of appellate courts and the right of a criminal defendant to appeal to a higher authority.

The key points to be considered here are: (a) the guarantees of life, liberty, or property; (b) "impartial" jury; (c) jury of the state; and (d) appeal to a higher authority.

In an effort to accentuate the significance of giving a machine judgement over criminal offenders, one must consider the constitutional guarantees of life, liberty, or property as they relate to due process of law. Based on the order of these three guarantees, the authors of the constitution gave definite insight into the level of importance for each. Life (or the deprivation of life) was of paramount concern to the authors when the due processes of law are exercised. The point to be made here is that criminal offenses can range anywhere from traffic infractions to petty theft to murder; the punishment for these crimes can range anywhere from probation to death. Since it is proposed that computers stand in judgement over all criminal offenders, it logically follows that a computer's verdict could lead to a sentence of death.

From a computer perspective, the right to an "impartial" jury appears to be the one constitutional guarantee that a computer judge can fulfill - even with today's technology. Simply program the computer so there is no discrimination on the basis of race, color, creed, status, sex, or the ability to pay for a good lawyer (Press, 1991). With these attributes programmed into the system, combined with the computer's inability to understand or sense human emotion, it could be assumed that the computer judge is then functionally impartial.

This scenario is illogical, however, for two important reasons. First, it assumes that the computer can be programmed free from discrimination even though it is being programmed by humans who, by their very nature, are discriminating beings.

Second, it fails to consider the extent to which computer technology had developed before being considered capable of replacing a human judge. Recall that the goal is for computers to have human-like thinking, learning, and decision making capabilities. If this goal is to be achieved then computers must possess human-like discriminatory

thinking patterns, or prejudice. If computers are to be programmed with human prejudice, this would negate the very reason computers were considered as replacements for human judgement - "namely their ability to be logical and disinterested" (Press, 1991, p. 69).

When discussing human-like characteristics of the futuristic computer judge as they relate to being impartial, an important characteristic that must be carefully guarded is the computer's need for self-survival. When humans make decisions, they do so using a discriminatory process based on need - the need to survive (Press, 1991). "Any computer system will likewise have to have programmed into it, by its human programmers, this need ..." (Press, 1991, p. 64).

Consider a case where a person is charged with the destruction of computers or computer data files and is presented before a computer judge. What is the likelihood the defendant will be judged in an impartial manner? It is obvious that the decision making processes of the computer judge cannot be based on its need to survive. For doing so the computer would always "weigh the evidence and verdict on scales which favor computers - that is, its own species" (Press, 1991, p. 64).

The right to a "jury of the state" implies that a defendant will be judged according to the laws of the state by a representative body of the state. In criminal cases this representative body of the state (jury) is selected by the counsels representing the state and the defendant. With a computer determining judgement, however, there would be no jury. The decision of innocence or guilt will be made based on data programmed into the computer by its human programmers and the knowledge the computer has learned while previously performing tasks of a similar nature (remember that this computer has human-like thought processes and will learn from its own experiences).

The implications are that the computer programmers might not represent the interests of the state, and the quality of any verdict is directly related to how long a computer judge has been in service. When addressing the issue of programmers' interests, Press (1991) questioned: "Are we not in fact shifting the whole question of judgement from the hands of the present day judges into the hands of computer programmers?" (p. 71).

The last issue involving individual rights is the right to appeal to a higher authority. While presenting more questions than answers, Press (1991) adequately addresses this issue in the following way:

> What happens when the defense institutes an appeal against a judgement? Does another computer hear the appeal? How does the appeal computer differ from the computer lower in the hierarchy? Perhaps a panel of computers sits? A whole host of interesting possibilities arise which lead to considerable philosophical problems.

> As we intimated earlier, in modern times teams or panels are often set up to solve problems. Are two computers, communicating via a cable, one computer or two? In essence a computer is a bundle of components connected together with wire; what is an apt description of two computers connected together by wire?

Will the appeal computer have a better, more expensive program? Will it be more advanced technically? If it overrules the verdict how can this be squared with the concept that computers are to be used for the very reason that they are 'perfect'? If it is proposed by the court that the appeal computer's program is more reliable, how will the defense be able to argue its case? Will the programmers be brought into court to give expert evidence, and to what or whom will they give their evidence -- another computer? (pp. 69-71)

The last constitutional issue to consider is the likelihood an amendment to the constitution authorizing the use of artificially intelligent judges would be adopted. The United States Constitution states that:

The Congress, whenever two thirds of both Houses shall deem it necessary, shall propose Amendments to this Constitution, or, on the Application of the Legislatures of two thirds of the several States, shall call a Convention for proposing Amendments, which, in either Case, shall be valid to all Intents and Purposes, as Part of this Constitution, when ratified by the Legislatures of three fourths of the several States, or by conventions in three fourths thereof, as the one or the other Mode of ratification may be proposed by the Congress. (Gunther, 1985)

The authors of the constitution, in an effort to solidify the structure and authority of the new government, made it quite difficult for amendments to be added to the constitution. Currently there are 26 amendments; the first ten are the Bill of Rights.

The amendments included in the Bill of Rights were ratified collectively in 1791 and focused on the rights of the individual. Amendments XI and XII were ratified in 1798 and 1804, respectively, and addressed clarifications to the structure of government as outlined in Article II and III of the original constitution.

It wasn't until 1865 during the Reconstruction Era following the Civil War that the next three amendments were ratified. These amendments address issues for which the Civil War was fought: the abolition of slavery, states' rights, and the right of slaves to vote. The remaining 11 amendments were ratified between 1913 and 1971 and address various issues.

The point of this constitutional history lesson is to emphasize the fact that in the 200 year history of the United States Constitution the people of the United States (through their representative government) have voted to amend the constitution only 26 times. When considering the extreme social and political conditions catalyzing the adoption of the majority of these amendments, considerable doubt exists as to whether the crisis in our legal system would generate the level of citizen concern necessary to amend the constitution to such a radical extent.

In addition, considerable doubt exists as to whether ordinary citizens will come to accept and rely on computers and entrust to them their life, liberty, or property. The Rome Laboratory dismisses much of this doubt and predicts the computer will become so omnipresent by the year 2025 that people will have ". . .crawled inside computers,

making the computer environment indistinguishable from the real environment" (Hendler, 1992, p. 6).

Conclusion

To produce change of any kind the components of means, method, and desire must be present. The means to achieving the hypothetical computer judge is the creation of a computer capable of thinking like a human. The method to introducing the computer judge is the determination of the criteria for its use and the subsequent proposal to amend the constitution. And the desire to employ the computer judge must come from the people through ratification of the amendment.

Based on a review of the literature, current trends in AI show great promise for the development of an intelligent computer. The review also reveals that methods for using a computer judge are already being assessed, and that as people become more accustomed to the everyday use of computers, they will become less aware of their (computers) consciousness.

Therefore, this writer believes sufficient evidence exists to substantiate the possibility a human-like (artificial) intelligence might someday stand in judgement of a human criminal offender. Findings do not predict the time frame for which this change might occur. Further research is needed to explore these issues.

Lieutenant Tony Dunn has spent all but one year of a 15 year law enforcement career with the University of Florida Police Department. He has been assigned to road patrol and as the coordinator of data processing. Since his promotion to lieutenant Tony has been in charge of all administrative functions including police records, data processing, payroll, personnel, purchasing, fleet maintenance, and auxiliary accounting. His interests are in the business management of and information processing in police departments. Tony has a Bachelors degree in Business Administration from the University of Florida.

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