Artificial Blue and Deep Intelligence

Abdul Paliwala

CTI, Law Technology Centre, School of Law University of Warwick

This paper explores the implications of the Kasparov v Deep Blue Chess Match for work on legal knowledge based systems. It suggests that it is necessary to accept the specificity of computer and human legal cultures and not simply adopt legal theories which appear most easily palatable for AI workers. A second suggestion is that AI work is better conceived in terms of a cybernetic partnership between computers and human programmers, domain experts and users. A third suggestion, that of tendency for humans to make mistakes suggests a proper role for AI precisely in those areas where human weakness is a significant factor. The final observation is that there may already be in train a process of changing the rules or at least the conditions of law to suit AI in law. This superficially attractive idea raises the deepest political issues.

“Should we try to make artificial intelligence by duplicating how humans do it or instead try to exploit the particular strength of machines?” David Stork (1997)

“(I)n most knowledge based systems ... it is not intended to imitate the problem-solving approach and reasoning methods of the expert. Most LKBSs are based on artificial models only meant to produce reliable results.” (De Vries et al 1991.)

The victory of Deep Blue against Kasparov could, paradoxically, give comfort to those who believe in AI as well as those who believe in the uniqueness of human intelligence. For the AI community, there is tangible proof of success.[1] Deep Blue came close to fulfilling the promise of the original human v computer chess game with HAL in 2001. For believers in the ‘uniqueness of human intelligence’, there is satisfaction that Deep Blue can do well in chess only because it is ultimately a quantifiable game, and that even the Japanese Go is as yet not amenable to the number crunching power of current machines.

Thus it is suggested on the Kasparov vs Deep Blue website (1997a).

> Deep Blue, as it stands today, is not a ‘learning system’. It is therefore not capable of utilizing artificial intelligence to either learn from its opponent or ‘think’ about the current position of the chessboard.

Stork (1997) provides an apparently comfortable compromise reasoning that computer intelligence and human intelligence have their own strengths and domains. According to him, current computers have their strengths in quantification and research whereas humans do well those bits which call for “sophisticated pattern recognition” and rapid adaptability.

---

[1] There is a considerable developing literature on Deep Blue vs Kasparov. For the purpose of this article it may be sufficient to browse the IBM site guide on the match at http://www.chess.ibm.com/guide/html/j.1.html.

Computers are, of course, ever improving. An analysis offered of the victory of Deep Blue over Kasparov was that between 1996 and 1997, Deep Blue's program was made adaptable between games. The success of Deep Blue is not entirely the success of some abstract device, but that of a co-operative cybernetic partnership between computers and humans, with Deep Blue being assisted by expert programmers and an international grand master (Kasparov v Deep Blue website 1997a). Another explanation, of course, is the weakness of humans. Kasparov had a bad day in the last game. He was too tense, tried to play like Karpov and made some silly mistakes (Anand 1997). Deep Blue wouldn't make silly mistakes, but neither would it be able to adapt rapidly within the game. It does not operate by recognition of Kasparov's patterns of play. In fact unlike human opponents of Kasparov, it is not playing against Kasparov. Finally, and more significantly, Kasparov has suggested that a key reason for Deep Blue's victory was that the game was designed in a manner which suited the computer. He thought that Deep Blue would not stand a chance were the game to be played under 'human' conditions.

Each of the above issues has interesting implications for AI and law.

Different Cultures

The Deep Blue programmers' strength was not to ask the question in terms of 'How does Kasparov play?' but in defining the game of chess in terms amenable to the computer and determine the goals in terms of computer techniques. In contradistinction, while much of AI in law research has been about emulating legal reasoning, a considerable amount has attempted to fit legal reasoning into forms amenable to contemporary AI methodology. [2] Both approaches have their problems. In particular, the problems have arisen from the deliberate attempt to focus on analytical positivism as the basis for theoretical understanding of the legal system; perhaps because of deceptive similarity to logics accessible to computers. This is the case even for the exploration of 'deep structures' and deontic logic.

An alternative perspective would be to use the differences between computer reasoning and human reasoning as the starting point for analysis, to see them as two separate cultures attempting to solve similar problems. A wide range of alternative theoretical perspectives provide 'cultural' understanding of legal systems, whether in the tradition of legal anthropology and legal pluralism which appreciate legal systems within their own cultural contexts (Arthurs 1985, Abel 1982, Moore 1973), of US critical legal theory which emphasises the culture of law (Fish 1980), of autopoietic theory which sees law as self-referential cognitive systems (Luhmann 1985 and Teubner 1993) or the post-modernist approaches of Foucault 1979 and Derrida 1978 which emphasise and deconstruct the difference between discourses. None of these have specifically explored computer cultures, but cybernetic theory, for example of Deleuze and Guattari (1994), or the work of Baudrillard (1983) are concerned precisely with the specificity of computer cultures. Such a cultural approach would free the AI community of the albatross of copying the specificities of human legal reasoning. To put it crudely, it does not, a la Jerome Frank, have to deal with human quirks such as what the judge had to eat for breakfast that morning, or whether she quarrelled with her husband as an intrinsic part of the computer system. The issue would be whether the results achieved computationally were commensurate with the human goals of the legal system. More significantly, neither does it have to pretend that in some way crude logic programming systems are capable of providing answers to the mysteries of human reasoning. Instead,

---

2) Bench-Capon and Visser (1996) review the issues in their consideration of ontological techniques. It is interesting that their work is self-confessedly derived from computational issues and does not refer to legal theoretical ones.

research can take place on legal cultures as cultural systems and determine the separate ways in which computer cultures can develop practical solutions to some legal tasks. In the language of Deep Blue, work can concentrate on those bits of law which can be chessified. There is, of course, already evidence of such systems which are called ‘legal practice systems’. Very few are AI systems in the full sense, but they work. Genuine AI systems could within their own cultural constraints perform specific tasks without imitating human reasoning. More significantly, research on the development of legal KBS, for example in relation to neural networks, would continue without the artificiality of an attempt to copy human reasoning.

A cybernetic partnership?

Deep Blue’s minders could not do much while the game was going on, but could tweak the programming between games. This is an example of a cybernetic partnership between computers and humans. Richard Susskind’s (1989) Latent Damage System was based on a partnership in which the domain expert (Philip Capper) provided the heuristics which was cybernetically involved with computer logic. The typical decision support systems involve cybernetic partnerships both in terms of the domain expertise, heuristics and user decision making. The human makes the complex decisions which then lead to further computer analysis and so on. Of course, there is no necessary implication of the dominance of humans over computers, but of divisions of labour. The issue is how to determine the division of labour across different cultural systems. This is the reason for the cultural analysis of the type suggested.

The weakness of humans

Kasparov had an off day in the final game (Anand 1997). Computers do not have such off days. Computers can consistently perform giant feats of number crunching. An impressive feature of Deep Blue’s performance is that it becomes virtually unbeatable in endgame situations when the options are fewer and thus more amenable to the number crunching power of Deep Blue. It is not surprising that computer legal practice systems which have been successful until now have been precisely in those domains in which the computer can keep track of transactions and transaction requirements, whereas humans might be prone to error. The fact that hardly any of these systems qualify as true AI systems is not necessarily significant.

The Rules of the Game

The final consideration is that Deep Blue is alleged to have won because the conditions of the game favoured it. This is the most tantalizing aspect of the issue as far as law is concerned. If only law can be quantified so that it becomes amenable to number crunching, if it could be converted to algorithms, if judicial discretion could be effectively reduced – that is, if law could be jurimetricised, then the problems for AI systems of logic and legal reasoning and legal cultures would disappear. It is possible that such shifts in legal cultures are already taking place, that underneath the ideological adherence of most lawyers to the uncertainty of law, there is a surreptitious development of a jurimetric culture of quantification.

As early as the seventies, it was being suggested that legislation could use algorithms to communicate complex ideas (eg. Twining and Miers 1976). There has been an increasing use of mathematical formulae in legislation, most spectacularly in the United Kingdom with the Child Support Act 1990, under which Child Support is calculated in accordance with a complex mathematical formula. There are obvious advantages of such formulae. The Child Support provisions would be extremely difficult to describe in prose, whereas they are easily comprehensible as a formula. Moreover the formula can be complex and take account of a wide variety of factors. But most significantly, it can be amenable to the development of 'expert type' calculation systems which can provide for the parties and the civil servants consistent methods of calculation once the factors have been ascertained. That is, the rules of the game are made to fit computer logic. Such computation would also save considerable legal resources. I suggested that this development may be taking place at the 12th BILETA Conference in response to De Mulder and Noortwijk's (1997) paper. More significantly, in a recent unpublished paper, Zariski has begun to analyse tendencies in academic literature which show an increasing tilt towards quantification.

If this brings comfort to the AI/jurimetrics communities, then they should beware of the popular resistance against the crude formula of the Child Support Act. The objections to a lack of consideration for the human factors was such as to force the government to concede an element of discretion in the formula in the most recent legislative reforms.

Conclusions

The implications of chess games between computers and humans are not as simple as they appear at first sight. Neither are the implications for AI and law, and perhaps it is a mistake to draw analogies. But having been asked to do so by my hosts at this conference, as a good guest it is necessary to oblige. I have made four suggestions. Firstly, that like the programmers of Deep Blue, and some AI researchers, it is necessary to accept the specificity of computer and human legal cultures and not simply adopt legal theories which appear most easily palatable for AI workers. This would paradoxically liberate AI workers from trying to invent computer systems which mimic human legal reasoning and hence concentrate on tasks which computer systems can properly accomplish.

Another suggested lesson from Kasparov v Deep Blue is that AI work is better conceived in terms of a cybernetic partnership between computers and human programmers, domain experts and users. The third lesson, that of the tendency for humans to make mistakes suggests a proper role for AI precisely in those areas where human weakness is a significant factor.

The final lesson is much more controversial. Changing the rules, or at least the conditions, of the game to suit AI is superficially attractive, but raises the deepest human and political issues. Informed decisions cannot be made without proper research. Until now the focus of AI and law research has either been on development of practical systems, research into computing logic systems and analysis of legal reasoning. I would like to suggest a greater focus on analysis of both computer and legal cultures and in particular of the way in which legal cultures might be shifting towards jurimetrics. Only when we have done this can we speculate about the implications for human values.

References

Abel R. 1982 ed. The politics of informal justice. Vol 1 and 2. New York. Academic Press.

Anand, W. 1997. More questions than answers. Kasparov v Deep Blue website http://www.chess.ibm.com/home/may11/story3.html.

Arthurs H 1985. Without the Law: Administrative Justice and Legal Pluralism in mid-19th Century England. Toronto. University of Toronto Press.

Baudrillard J 1983. In the shadow of the silent majorities, New York, Semiotext(e).

Bench-Capon, T. and Visser, P. 1996. Deep models, ontologies and legal knowledge-based systems. In van Kralingen et al eds. Legal Knowledge Based Systems. Jurix '96. Tilburg UP 1996 at pp.3-15.

Capper, P. and Susskind R. 1989. Latent Damage: The Expert System. London Butterworths.

De Vries, W.S., van den Herik, H.J., Schmidt, A.H.J. 1991. Separate modelling of user system cooperation. In Breuker, J.A. et al. eds. Legal Knowledge Based Systems: Model-Based Legal Reasoning, Koninklijke Vermande, Lelystad.

Deleuze, Gilles and Félix Guattari 1994. What is philosophy? translated by Hugh Tomlinson and Graham Burchell. London Verso.

Derrida, J. 1978. Writing and Difference. London, Routledge.

Fish, S. 1980. Is there a text in this class? the authority of interpretive communities Stanley Fish. Cambridge, Mass. London Harvard University Press.

Foucault, M. 1979. The history of sexuality Vol 1. London. Allen Lane.

Kasparov vs Deep Blue website. 1997. Meet the Players http://www.chess.ibm.com/meet/html/d.html

Luhmann, Niklas. 1985. A sociological theory of law translated by Elizabeth King and Martin Albrow edited by Martin Albrow. London Routledge & Kegan Paul.

Moore, S. F. 1973. Law and Social Change: The semi-autonomous social field as an appropriate subject of study. Law and Society Review 7, 719-46.

Stork, D. 1997. The end of an era, the beginning of another? HAL, Deep Blue and Kasparov. Kasparov vs Deep Blue website http://www.chess.ibm.com/learn/html/e.8.1.html

Teubner, Gunther 1993. Law as an autopoietic system translated by Anne Bankowska and Ruth Adler, edited by Zenon Bankowski, Oxford, UK Cambridge, Mass., USA Blackwell Publishers.

Twining, W. and Miers, D. 1976. How to do things with rules. 1st ed. London, Weidenfeld & Nicolson. Ch 9.

Zariski, A. 1997. Virtual words and the fate of law (unpublished paper).