

'Web Intelligence': Is anthropomorphising the Web a good thing?

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Abstract

The semantic framework that encompasses Artificial Intelligence, Intelligent Agents, Web Intelligence and Wisdom Web reflects an interesting inferiority complex on the part of those who feel the need to anthropomorphise the computing machine activities. The level of anthropomorphising contained in the current development of these terms reflects upon the credibility of computer science and software engineering against the knowledge of other professionals. It needs also to be noted that there appears to have been no discussion about cross-cultural issues in establishing either intelligence or wisdom. The broad Web Intelligence community has failed to justify the use of imprecise terms. Experience in developing innovative software activities, that are designed to feed into and be a part of the Web environment, suggest that, at least in the educational area, knowledge is so far behind defining independent machine activity to question the value of continuing in the current semantic structure if obsfuration is not to be the order of the day.

Introduction

The interest in anthropomorphizing machine behavior is not new. Isaac Asimov in his robot series (eg. 1996) created the archetypal structure for the intelligent machine. Not only did he produce the android as an understandable entity but he also created ethical behavioral characteristics for his robots. Ray Bradbury (1998), in his short story "I sing the body electric", took the android to a point where it gained another level of affect and intentionality. Arthur C. Clark (1998) created HAL the IBM anagram while Douglas Adams (1979) added paranoia to Marvin the computer and created Deep Thought, the computer that took 7.5 million years to, begrudgingly, determine the meaning of life - 42. And Grant Naylor (1992) had Holly, a bored computer with a self-proclaimed astronomical IQ system, to controlled Red Dwarf, the mining space craft. But the relationship between science-fiction computers and androids and the world of 21st century computing are extremely tenuous. If we look at the current state of computer science and its development of intelligent systems we have to say that they very limited in what they can achieve relative to human behavior.

The technical departure for this paper lies in a group of projects being carried out by the Computing Education Research Group at Monash University, partly in conjunction with the University of Melbourne. The first of these projects is based upon developing pedagogical agents that are designed to monitor the behavior of users of teaching software (markham et.al.) including that designed for the Web (PEDANT). The second is an attempt to build a platform independent virtual educational environment (PIAVEE). Associate with the latter is a third software system which will build a curriculum management system (TeLDA) that will provide a teacher oriented interface to standard online delivery software such as WebCT. All of these software initiatives are associated with the intelligent use of the Web, even though the some of the current developments are a little distant from

actual Web implementation in the sense that standalone PC applications are being developed to “talk to” the Web.

The development all of intelligent computer-based educational systems has been a major interest since the early days of programmed learning. Teaching machines were initially derived from behaviorist models of teaching and learning; derived from a very mechanistic concept of the educational environment. Computer-based teaching (CBT) evolved through many manifestations starting with the minicomputer based programs and finally moving into those that belonged to the PC. In the past 10 years there have been attempts to develop much more intelligent educational systems, including the Web based systems, such as the TILE project at Massey University in New Zealand (Kinshuk, Hong & Patel, 2002). It is probably true to say that the TILE project is the most ambitious of its type ever attempted, starting its life as a distributed access system that was supported by a complex model of student behavior and evolving into a mobile agent oriented system designed for the same task. The system fitted within the Web Intelligence thinking in a quite constructive way in that TILE would monitor and model the responses characteristics of the users with the aim of being able to anticipate user needs and go and collect the next most likely set of materials the user would need. Current information on the TILE web site indicates its core software structure has proved to be difficult and it is now being offered to the open source community in order to produce an operational system.

The other major area use of intelligent software for educational purposes has been the development all of intelligent tutors to support educational activities. Baylor (e.g. 1999) has developed number of these with varying degrees of intelligent response capability. She is also lead the field in attempting to build some pedagogical purpose into her systems. On the question of the basic intelligence all of these tutors little is clear from the published data.

Cultural hegemony?

There seems to be an implicit assumption about the Web that it is based upon Western, predominately North American, cultural concepts. Discussion may occur in the sociocultural journals but nothing appears to be happening in the IT-based literature. This raises real questions about how well-conceived some aspects of the Web may be.

There is a wealth of literature on cross-cultural differences and a recent article from the American Psychological Association [Benson] summarises some of the issues that surround intelligence across cultures as derived from current research.

Defining 'Intelligence'

It is incumbent upon those who choose to use language to establish the veracity of their particular use. More than this, there is a public relations element where the use of a given term has to be meaningful to those who might be 'consumers' of a defined activity.

As with Artificial Intelligence and Intelligent Agents, the assumption in using the term 'Intelligent Web' is that some sense can be made of the apparent intelligence of this system. The experience of the Web of many people is that it is hardly very intelligent, using any definition of intelligence, and that it supports anti-intelligent behaviour. The credibility gap is very large and even those software engineers and computer scientists who are not involved in 'intelligent' computing are not necessarily convinced by what is offered within the 'intelligent' computing area.

Looking through the presentations from some keynote speakers at WI 03 (eg [zhong] [Zadeh]), there

appears to be a wide ranging set of components in defining Web Intelligence and Web Wisdom. Characteristics range across logical ability, albeit novel logical abilities, right through to affective reactions including humour. They also include self-referent behaviors such as the capacity for self-regulation. The question to be asked is whether the WI and WWW groups are talking about the machine life area or whether they are talking about something simpler.

The question of 'intelligence' is a big enough issue without going into the nature of being. Within psychology and pedagogy there is no consistent definitional structure for intelligence. Looking at psychological positions, intelligence is seen from a cognitive-behaviorist position as a problem-solving activity and any complexity tends to be accommodated by a further explication of a memory-processor link. At the other extreme, excluding the existential and phenomenological thinkers, is ecological psychology which defines intelligence using a transactional model where intelligence is about reacting and responding processes and not capacities. Somewhere in the middle are the thinkers such as Piaget[piaget] who, in part, accept a developmental model that implies biological hardwiring of the growth of intelligence.

To complicate the issue, we have the complex, multi-intelligence model of Sternberg, where intelligence has a number of dimensions that he sees as interacting but independent.

The final level of complexity lies in the ways in which intelligence is assessed. The traditional models of intelligence, going back to the pioneering work of Binet on the the Intelligence Quotient, has seen assessment in terms of a set of standard tasks ranging from mathematical problem solving through to language skills. A level of intelligence is defined by the number of successfully completed components.

Not only does the WI/WWW area have to define its intelligent and wise behaviors but it also has to provide some criteria against which these characteristics can be measured or assessed. A current criterion for intelligent Web activity seems to be that it can search better than Google.

Current experience in Web-based intelligence

The Computing Education Research Group is working on a number of projects in educational activities, partly associated with the Web. This includes the way the Web is used, monitoring web user behavior, developing user-oriented curriculum development interfaces to Web tools and building a virtual educational environment.

The first point that has evolved out of this research is that there is little substantive belief by Australian Information and Communication Technology academic staff that the Web is particularly intelligent. Surveys of the way staff used the Web [postema 1] suggested that most tended to use it as a document repository rather than as a sources of pedagogical innovation. In another project that looked at educational innovation in ICT education (Hurst & Lynch, 2001), the projects being undertaken by ICT academics was more functional than using current technology in new and advanced ways.

There is very little material in the literature that leads us to have a clear picture of how we can define effective Web utilisation [Sheard 2] although there is a great deal of data analysis being done. The data mining of web logs in order to try to understand what it is that constitutes the effective use of the web has yet to produce critical, defining information. To date there has been a failure to generate any basic model of navigation behavior. For example, we do not know if we use the same information processing approach to working on a web information search as we would use for a paper information search. The deconstructionists have made a

great deal of the linearity of the book and the non-linear nature of the hyperlinked web, but this does not stand up to any sort of scrutiny. Similarly, critical theory places emphasis on cyberspace as being the spiritual home of critical pedagogy [], but fail to support this with any concrete analysis.

The work being done on the design and development of a virtual educational environment at Monash University, suggests that the gap between what would be liked by the visionaries and what is being attained by the practitioners is both wide and deep. It is wide in the sense that there is little application of methods such as fuzzy logic in the development of practical web applications, yet, from the presentation by Zadeh [] it would appear that decision systems broadly based upon this thinking are important in developing web intelligence.

WI and its criteria for being

If 'Web Intelligence' is to be a meaningful concept within the domain of discourse associated with the Web and the development of applications on the web then it needs a set of criteria that are meaningful and that reflect some commonality between computer science and psychology and pedagogy.

Conclusions

Some of the comments that have been made above are reflected in the WI Consortium's own website (http:). As a wise and intelligent version of Web application it is somewhat lacking and certainly gives a bad impression to those who are interested in finding out more about what WI is about. For example, there are no defining documents that can be downloaded, there is no way of doing an intelligent search of the site to gain useful information, there is no sense that the site wants to give up its information and, at least on Mozilla Firebird 0.6.1, some of the sites functionality did not work.

The credibility gap between the WI community and those interested in what WI has to offer to the general Web community is rather great. That gap makes it very difficult to have effective communication between those developing the actual processes and those they hope will want to take up those processes.

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