International Journal of Information Technology and Knowledge Management
January-June 2011, Volume 4, No. 1, pp. 173-176

ARTIFICIAL INTELLIGENCE – MAN OR MACHINE

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Artificial intelligence conceived either as an attempt to provide models of human cognition or as the development of programs able to perform intelligent tasks, is primarily interested in the uses of language. This paper is not related to any specific research but it covers the problem solving and various AI techniques. Knowledge based systems proved to be much successful that earlier, more general problem solving systems. This paper also focuses on all aspects of knowledge: its representation, organization and manipulation. If anything in this world has advantage it has its disadvantage to. By covering it all in this paper concluded with the future prospects of Artificial intelligence by making man a machine and machine a man.
Keywords: Artificial Intelligence, Heuristic, Metaknowledge, HAM, Knowledge based System, Expert System

1. What is Artificial Intelligence?

AI is the study of heuristics, rather than algorithms, Heuristic means rule of thumb, which usually works but may not do so in all circumstances. Example: getting to university in time for 8.00 lectures. Algorithm means prescription for solving a given problem over a defined range of input conditions. Example: solving a polynomial equation, or a set of N linear equations involving N variables. It may be more appropriate to seek and accept a sufficient solution (Heuristic search) to a given problem, rather than an optimal solution (algorithmic search).

It is the integrated sum of those facts, which give us the ability to remember a face not seen for thirty or more years. In short we can say:

1. It is the ability to think and understand instead of doing things by instinct or automatically.
2. It is the ability to learn or understand to deal with new or trying situation.
3. It is the ability to apply knowledge to manipulate one's environment or think abstractly as, measured by objectives criteria.
4. It is the ability to acquire, understand and apply knowledge or the ability to exercise thought and reason.

Intelligence is evolved from knowledge. It is having a familiarity with language, concepts, procedures, results, abstractions and associations, coupled with an ability to use those notions effectively, in modeling different aspects of the world. Knowledge can be of declarative or procedural type. Declarative knowledge means representation of action or consequences and tells "how" of a situation. Two other knowledge terms which we shall occasionally use are epistemology and metaknowledge. Epistemology is the study of the nature of knowledge, whereas metaknowldege is knowledge about knowledge, that is, knowledge about what we know.

> Basically Intelligence is what we use when we don't know what to do.

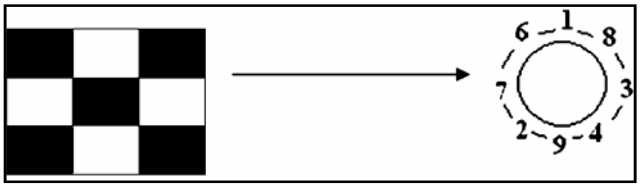
2. Knowledge Representation

Among the things that AI needs to represent are: objects, properties, categories and relations between object; situations, events, states and times; causes and effects; knowledge about knowledge (what we know about what other people know); and many other, less well research domains. A complete representation of "what exists" is an ontology (borrowing a word from traditional philosophy), of which the most general are called upper ontology. Any choice of representation will depend on the type of problem to be solved and the inference methods available.

Let us now turn to enumerating important parameters or a good knowledge representation scheme before actually describing the various schemes.

2.1. Ease of Representation

With which a problem can be solved, depends upon knowledge representation scheme. For example image we have 3 x 3 chess board with a knight in each corner and we want to know how many moves will it take to move knight round the next corner.



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Looking at the diagram the solution is not of obvious, but if we label each square and present valid moves a adjacent points on a circle the solutions becomes more obvious.

2.2. Granularity of Representation

It can effect, its usefulness that is, how detailed the knowledge need to be represented. For example, if a knowledge base about family a relationship is to be built and we start with 'cousin'. We may represent the definition of the relation as: your cousin is a child of sibling of you parent. For a female cousin your cousin is a daughter of a sibling of your parent and for a male cousin your cousin is a son of a sibling of your parent.

2.3. Effectiveness

In order to be effective the scheme must provide a means of inferring new knowledge from old. It should also be amenable to computation, allowing adequate tool support;

The knowledge is rule-based expert systems, for example, is represented in the form of rules listing conditions to check, for and conclusions to be drawn if those conditions are satisfied. For example, a rule might state that IF certain conditions hold (e.g. the patient has certain symptoms), THEN certain conclusions should be drawn (e.g., that the patient has a particular condition or disease).

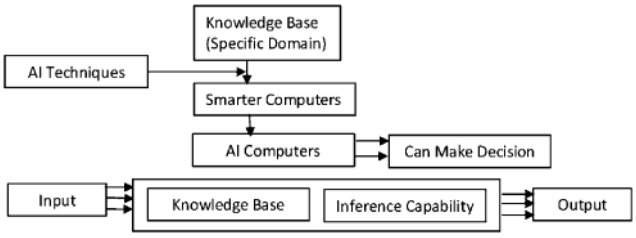
According to Mylopoulos and Levesque (1984) knowledge representation has been classified into four categories:

1. Logical Representation Scheme: This scheme has become popular among AI practitioners. Perhaps the most important of these is the predicate logic. It greatest weakness is its limitation as a model for commonsense reasoning. A typical statement in this logic might express the family relationship of fatherhood as FATHER(Sam, Tim) where predicate father is used to express the fact that Sam is the father or Tim.
2. Procedural Representation Scheme: It represent as a set of instruction for solving a problem. In a rule-based system, for example production system.
3. Network Representation Scheme: Also called semantic and conceptual network, fuzzy logic, modal logics and object oriented methods. For example, an object such as a ball an its properties and its relationship to other objects are grouped together into a single structure for easy access.
4. Structured Representation Scheme: It extends networks by allowing each node to be a complex data structure consisting of named slots with attached values.

AI research has explored a number of solutions to these types or problems. There can be the form of unconscious knowledge informs, support and provides a context for our conscious knowledge.

How AI Techniques Help Computers to be Smarter?

It is the question that we think when we think about AI. So let us think once again about the constraints of knowledge between them. Figure below shows how computers become intelligent by infusing inference capability into them.



How does computer work like human being, this can be known by the considering few question as: how does a human being store knowledge, how does human being learn and how does human being reason? The art of performing these actions is the aim of AI. The difference between conventional and AI computing is majorly that in previous the computer is given data and is told how to solve a problem where as AI is given knowledge about a domain and some inference capability. If we compare then we have the following table by which it will be cleared:

Dimension	Conventional Computing	AI Computing
Processing	Primarily algorithmic	Includes symbols conceptualization
Nature of Input	Must be complete	Can be complete
Search Approach	Frequently based on algorithms	Frequently uses rules an heuristics
Explanation	Usually not provided	Provided
Focus	Data, information	Knowledge
Maintenance and update	Usually difficult	Relatively easy, changes can be made in self contained modules
Reasoning capability	No	Yes

Since knowledge based system depend on large quantities of high quality knowledge for their success. The

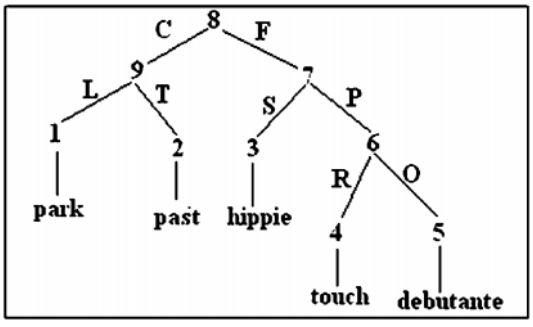
ultimate goal is to develop technique that permits systems to learn new knowledge autonomously and continually improve the quality of the knowledge they possess.

2.4. Knowledge Organization and Management

We humans live in a dynamic, continually changing environment. To cope with this change, our memories show some remarkable properties. We are able to adapt changes because our memory system is continuously adapting through a reorganization process. This process leads to improved memory performance through out most of our lives. There are some conceptual clusters of knowledge organization characteristics that an effective computer memory organization system should posses:

1. An organization scheme should facilitate the remembering process and should be possible to locate any stored item from its content.
2. There should be possibility of adding an integration new knowledge in memory with considering the size of it.
3. The organization should facilitate the process of consolidating recurrent incidents or episodes and forgetting knowledge when it is now longer valid or needed.
4. The addition of knowledge should not limit its access to previous knowledge and it should allow identifying the items of knowledge.

To organize the memory or knowledge we have different models in which Human Associative Memory (HAM) system is well known developed by John Anderson and Gordon Bower (1973). It organizes memory as a network of propositional binary trees. And example of simple tree which represents the statement "In a part a hippie touched a debutante" is illustrated in the figure below.



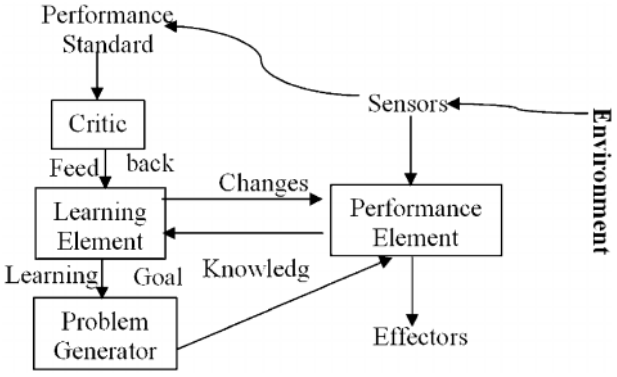
Nodes in the tree are assigned unique numbers, while links are labeled with the following functions as HAM informed of new sentences, they are parsed and formed into new tree like memory structures, the structure with the closets match is used to formulate an answer to the query. Access to nodes is accomplished through word indexing in LISP.

2.5. Machine Learning

One of the issues which are endless is that the machine cannot be called agents because they cannot react or adapt to new conditions. Once the average computer system reaches the computational power and structural complexity of human brain, an even which if measured in raw hardware terms, should occur between the year 2020-2050, the emergence of fully intelligent agents will become an almost forgone conclusions.

Learning takes place as a result of interaction between the agent and its world and this interaction can be addressed through the example, through belief network or through a feedback from the agent's previous knowledge which it either possess or has acquired. In fact there is a close parallel between the goals of AI and education teaching of our students to learn to think.

Important machine learning problems are: Unsupervised learning in which it finds a model that matches a stream of input "experiences" and be able to predict what new "experiences" to expect. Supervised learning, such as classification (be able to determine what category something belongs in, after seeing a number of examples of things from each category) or regression (given set of numerical input/ output examples, discover a continuous function that would generate the outputs form the inputs). Reinforcement learning: the agent is rewarded for good responses and punished for bad ones. There are number of model of learning the elements of the same are shown in figure.



2.6. Evaluating Artificial Intelligence

How can one determine if an agent is intelligent? In 1950 Alan Turing proposed procedure to test the intelligence of an agent now know as the Turing test. This procedure allows almost all the major problems of artificial intelligence to be tested. Artificial intelligence can also be evaluated on specific problem such as small problem in botany, face recognition and game-playing. Such tests have been termed subject matter expert Turing tests. The broad classes of outcome for an AI test are: optimal in which it is not possible to perform better, strong super-human which performs better

than all humans, super-human which performs better than most human and sub-human which performs worse than most human.

Advantage and Disadvantage of AI: Advantage counts the smarter artificial intelligence which promises to replace human jobs, freeing people for other pursuits by automating manufacturing and transportation, self-modifying, self-writing, and learning software which relieves programmers of the burdensome task of specifying the whole of a program's functionality – now we can just create the framework and have the program itself fill in the rest, self-replicating applications which can make deployment easier and less resource-intensive.

AI can see relationships in enormous or diverse bodies of data that a human could not. Disadvantage involves potential for malevolent programs, "cold war" between two countries, unforeseen impacts because it is complex technology, environment consequences will most likely be minimal. Self-modifying, when combined with self-replicating, can lead to dangerous, unexpected results, such as a new and frequently mutating computer virus. Rapid advances in AI could mean massive structural unemployment AI utilizing non-transparent learning (i.e. neural networks) is never completely predictable.

Why AI?: AI can have two purposes. One is to use the power of computer to augment human thinking, just as we use motors to augment human or horse power. Robotics and expert systems are major branches of that. The other is to use a computes artificial intelligence to understand how humans think. If you test your programs not merely by what they ca accomplish, but how they accomplish it, then you are really doing cognitive science; you are using AI to understand the human mind.

Future of AI: In its short existence AI has increased understanding of the nature of intelligence and provided and impressive array of application in a wide range of areas. It has sharpened understanding of human reasoning and of the nature intelligence in general. At the same time, it has revealed complexity of modeling human reasoning, providing new areas and rich challenges for the future.

In the next 10 years technologies in narrow fields such as speech recognition will continue to improve and will reach human levels. In 10 years AI will be able to communicate with humans in unstructured English using text or voice, navigate (not perfectly) in an unprepared environment and will have some rudimentary common sense (domain-specific intelligence). Some parts of the human (animal) brain will be recreated n silicon. There will be an increasing number of practical applications based on digitally recreated aspects human intelligence, such as cognition, perception, rehearsal learning, or learning by repetitive practice.

Should we Start Caring Yet? Very sophisticated – perhaps even sentient- AI may not be far off; with sufficient computation power it is possible to "evolve" AI without much programming effort.

What Should Happen…: When programs that appears to demonstrate sentience appears a panel of scientists could be assemble to determine if a particular program is sentient or not. If sentient, it will be given rights, so in general, companies will try to avoid developing sentient AI since they would not be able to indiscriminately exploit it. AI and robotics have the potentially to truly revolutionize the economy by replacing labor with capital, allowing greater production – it deserves a corresponding share of research funding.

If AI machine can be capable of doing tasks originally done by humans, then the role of humans will change. Robots have already begun to replace factory workers. They are acting as surgeons, pilots, astronauts, etc. A computer scientist, robots take over clerical workers, the middle managers and on up. Eventually what society will be left with are machines working at every store and humans on every beach. As Moravec puts it, we'll all be living as millionaires.

"The thinking power of silicon 'brains' will be so formidable that if we are lucky they will keep us as pets". But what if those visions become a reality? Will humans have to worry about their futures if artificial intelligence takes over?

Finally, not but the least, Man will become the Machine and Machine will become Man.

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