International Journal of Scientific Research and Management (IJSRM)
||Volume||5||Issue||11||Pages||7411-7417||2017||
Website: www.ijsrm.in ISSN (e): 2321-3418
Index Copernicus value (2015): 57.47 DOI: 10.18535/ijsrm/v5i11.10

Research Paper on Artificial Intelligence

Jaspreet Singh

1. Abstract:
The branch of computer science is concerned with making computers behave like humans. Artificial intelligence includes game playing, expert systems, neural networks, natural language, and robotics. Currently, no computers exhibit full artificial intelligence (that is, are able to simulate human behaviour). The greatest advances have occurred in the field of games playing. The best computer chess programs are now capable of beating humans. Today, the hottest area of artificial .intelligence is neural networks, which are proving successful in a number of disciplines such as voice recognition and natural-language processing. There are several programming languages that are known as AI languages because they are used almost exclusively for AI applications.

2. Introduction:

The field was founded on the claim that a central property of humans, intelligence — the sapience of Homo sapiens — can be so precisely described that it can be simulated by a machine. Artificial intelligence is defined as developing computer programs to solve complex problems by applications of processes that are analogous to human reasoning processes. It is that branch of computer science that studies and develops intelligent machines and software.

This raises philosophical issues about the nature of the mind and the ethics of creating artificial beings, issues which have been addressed by myth, fiction and philosophy since antiquity. Artificial intelligence has been the subject of tremendous optimism but has also suffered stunning setbacks. Today it has become an essential part of the technology industry, providing the heavy lifting for many of the most difficult problems in computer science.

The central problems (or goals) of AI research include reasoning, information, planning, learning, communication, perception and the ability to move and manipulate objects. There are an enormous number of tools used in AI, including versions of search and mathematical optimization, logic, methods based on probability and economics, and many others.

3. History Of Artificial Intelligence:

The academic roots of AI, and the concept of intelligent machines, May be found in Greek Mythology. Intelligent artifacts appear in journalism since then, with real mechanical devices actually indicating behaviour with some degree of intelligence. After modern computers became available following World War-II, it has become possible to create programs that perform difficult academic tasks. The study of logic led directly to the discovery of the programmable digital electronic computer, based on the work of mathematician Alan Turing and others. Turing's theory of calculation suggested that a machine, by shuffling symbols as simple as "0" and "1", could replicate any conceivable (imaginable) act of mathematical assumption. This, along with simultaneous discoveries in neurology, information theory

and cybernetics, inspired a small group of researchers to begin to seriously think the possibility of structure an electronic brain.

1950 - 1960:-

The first operational AI programs were written in 1951 to run on the Ferranti Mark I machine of the University of Manchester (UK): a draughts-playing program written by Christopher Strachey and a chess-playing program written by DIETRICH PRINZ.

1960 – 1970 :-

During the 1960s and 1970s MARVIN MINSKY and SEYMOUR PAPERT issue PERCEPTRONS, representative limits of simple neural nets and ALAIN COLMERAUER developed the Pro log computer language. TED SHORTLIFFE established the power of rule-based systems for information representation and inference in medical diagnosis and therapy in what is at times called the first expert system. HANS MORAVEC developed the first computer-controlled vehicle to separately discuss cluttered barrier courses.

1980's ONWARDS :-

In the 1980s, neural networks became broadly used with the back broadcast algorithm, first describe by PAUL JOHN WERBOS in 1974. By 1985 the market for AI had reached over a billion dollars. At the same time, Japan's fifth generation computer project stimulated the U.S and British governments to return grant for academic research in the field. However, beginning with the fall down of the Lisp Machine market in 1987.

1990's ONWARDS :-

In the 1990s and early 21st century, AI achieved its greatest successes, albeit rather behind the scenes. Artificial intelligence is used for logistics, data mining, medical analysis and many other areas throughout the skill industry. The success was due to several factors: the rising computational power of computers a greater importance on solving exact sub problems, the creation of new ties between AI and other fields working on similar problems, and a new assurance by researchers to hard mathematical methods and exact scientific standards.

4. Components Of Ai :

The major components of AI are:

4.1 The Information Base :-

It stores all the facts and rules about a exacting problem domain. It makes these accessible to the inference engine in a form that it can use. The particulars may be in a form of background in order built into the system. The rules include both the manufacture rules that concern to the area of expert system and the heuristic and rules-of-thumb that are provided by the area expert in order to make the system find solutions.

4.2 The User Interface :-

The user interface is the means of statement between a user and the expert systems problem solving processes. A good expert system is not very useful if not it has an useful interface. It has to be able to confirm the directions in a form that the user enters. It should interpret the answers, formed by the system.

4.3 The Shell or interface Engine :-

The interface engine is the program that locates the suitable information in the information base, and infers new information by applying consistent processing and analytical strategies.

5. Branches Of Artificial Intelligence:

5.1 Epistemology:

Epistemology concerns itself with the study of the information that can show helpful in the study of the solving of the harms that disease the world. Epistemology, has managed to cut for itself a place in artificial engineering. As a branch of artificial intelligence however, epistemology focuses on answering four center questions: What is information? How is information acquired? What do people know? How do we know what we know? The term 'Epistemology' was first introduced into the English language by the Scottish philosopher James Frederick Ferrier.

5.2 Genetic Programming:

Genetic programming revolves around that functions that get programs to carry out exact tasks and solve exact problems. This is done by 'cover together' random lisp programs and choosing

between millions of generation. By meaning, genetic programming is a innovative algorithmbased method that can draw its ancestry to the organic growth that occupied the search for computer programs that performed user-defined tasks. The world can thank JOHN KOZA and his group of experts in 'Artificial Intelligence' for the method of genetic programming.

5.3 Heuristics :

It is a branch of artificial intelligence that concerns itself with the experience-based techniques for the solving of problems, learning and discovery. Heuristic methods and techniques are all concerning rapidly and powerfully discovering an optimal answer for a specific problem. Heuristics, usually speak, is all about judgment many or exact solutions to a exact problem.

5.4 Ontology :

Ontology is a branch of artificial intelligence that is anxious with the study of various kinds of objects. It is a set of concepts that are formally represented within an area. beam is then fearful on the association between the concepts in their exact domains. Ontology can also be used to cause about entity within a exacting area and explain the exacting area in detail.

6. Tools Used In Artificial Intelligence:

6.1 Optimization:

Many problems in AI can be solved in theory by intelligently searching through many possible solutions that is reasoning can be reduced to performing a search. For example, logical proof can be viewed as searching for a path that leads from premises to conclusions, where each step is the application of an inference rule. Planning algorithms search through trees of goals and sub goals, attempting to find a path to a target goal, a process called means-ends analysis. Robotics algorithms for moving limbs and grasping objects use local searches in configuration space. Simple exhaustive searches are rarely sufficient for most real world problems: the search space (the number of places to search) quickly grows to astronomical numbers. The solution, for many problems, is to use "heuristics" or "rules of thumb" that eliminate choices that are unlikely to lead to the goal (called "pruning the search tree"). Heuristics supply the

program with a "best guess" for the path on which the solution lies. These algorithms can be visualized as blind hill climbing: we begin the search at a random point on the landscape, and then, by jumps or steps, we keep moving our guess uphill, until we reach the top. Evolutionary computation uses a form of optimization search. For example, they may begin with a population of organisms (the guesses) and then allow them to mutate and recombine, selecting only the fittest to survive each generation (refining the guesses).

6.2 Logic:

Logic is used for information representation and problem solving, but it can be applied to other problems as well. Several different forms of logic are used in AI Research. Propositional or sentential logic is the logic of statements which can be true or false. First-order logic also allows theuse of quantifiers and predicates, and can express facts about objects, their properties, and their relations with each other. Fuzzy logic is a version of First-order logic which allows the truth of a statement to be represented as a value between 0 And 1, rather than simply true (1) or false (0). Fuzzy systems can be used for uncertain Reasoning and have been widely used in modern industrial and consumer product control Systems. Subjective logic models uncertainty in a different and more explicit manner than Fuzzy logic. Default logics, non-monotonic logics and circumscription are forms of logic designed to help with Default reasoning and the qualification problem. Several extensions of logic have been designed to handle specific domains of information, such as description logics, situation calculus, event Calculus and fluent calculus (for representing events and time), causal calculus; belief calculus, and modal logics.

6.3 Probabilistic Methods For Uncertain Reasoning:

Many problems in AI (in reasoning, planning, learning, perception and robotics) require the agent to operate with incomplete or uncertain information. AI researchers have devised a number of powerful tools to solve these problems using methods from probability theory and economics. Bayesian networks are a very general tool that can be used for a large number of problems: reasoning (using the Bayesian inference algorithm), learning (using the expectation maximization algorithm), planning (using decision networks) and perception (using dynamic Bayesian networks). Probabilistic algorithms can also be used for filtering, prediction, smoothing and finding explanations for streams of data, helping perception systems to analyze processes that occur over time. A key concept from the science of economics is "utility": a measure of how valuable something is to an intelligent agent. Precise mathematical tools have been developed that analyze how an agent can make choices and plan, using decision theory, decision analysis, information value theory. These tools include models such as dynamic decision networks, game theory and mechanism design.

6.4 Classifiers And Statistical Learning Methods:

The simplest AI applications can be divided into two types: classifiers ("if shiny then diamond") and controllers ("if shiny then pick up"). Controllers do however also classify conditions before inferring actions, and therefore classification forms a central part of many AI systems. Classifiers are functions that use pattern matching to determine a closest match. They can be tuned according to examples, making them very attractive for use in AI. These examples are known as observations or patterns. In supervised learning, each pattern belongs to a certain predefined class. A class can be seen as a decision that has to be made. All the observations combined with their class labels are known as a data set. When a new observation is received, that observation is classified based on previous experience. A classifier can be trained in various ways; there are many statistical and machine learning approaches. The most widely used classifiers are the neural network, kernel methods such as the support vector machine ,k-nearest neighbor algorithm, Gaussian mixture model, NAIVE BAYES classifier, and decision tree. The performance of these classifiers has been compared over a wide range of tasks. Classifier performance depends greatly on the characteristics of the data to be classified. There is no single classifier that works best on all given problems. This is also referred to as the "no free lunch" theorem. Determining a suitable classifier for a given problem is still more an art than science.

6.5 Neural Networks:

A neural network is an interconnected group of nodes, akin to the vast network of neurons in the human brain. The study of artificial neural networks began in the decade before the field AI research was founded, in the work of Walter Pitts and Warren McCullough. Early researchers were Frank Rosenblatt, who invented the perception and PAUL WERBOS who developed the back propagation algorithm.

The main categories of neural networks are acyclic or feed forward neural networks (where the signal passes in only one direction) and recurrent neural networks (which allow feedback). Among the most popular feed forward networks are perceptions, multi-layer perceptions and radial basis networks. Among recurrent networks, the most famous is the Hopfield net, a form of attractor network, which was first described by John Hopfield in 1982. Neural networks can be applied to the problem of

intelligent control (for robotics) or learning, using such techniques as competitive learning.

7. D Optimisation:

There are different types of searches, the easiest of which comprises of trying out all the solutions in a specific order. The whole set of potential solutions is called the search space.

7.1 Constraint Satisfaction:

Here, the problem is modeled as a set of variables, which can be allocated specific values. Several types of constraints are set-up on these variables (equality, numerical constraints), in order to point out the requirements for the problem. Variables are

then searched in order to find the probable solution. There are many effective tricks in which can be used to fairly resolve constraints in order to direct the search more efficiently (this is called a heuristic search). The problems solved can also be a combinatorial optimization , where a specific solution has a better value than the other one, and the best needs to be searched. The set of problems usually solved is NP-complete, where the difficulty raises exponentially as the problem size raises linearly.

7.2 Function Optimisation:

This is a job of finding the best set of parameters of a function. There are many simple ways of doing this, counting hill-climbing. Metaphorically, hill climbing looks around the current position for a higher position, and moves to it. the the top is reached if there is no higher position This method is quite naïve or less effective, and can lead to finding sub-optimal solutions (called local maxima).

Optimization Capabilities are also provided by Genetic Algorithms, by imitating the Process of evolution (according to Darwin's theory) and the survival of the fittest. The best solutions are paired off together to produce better offspring solutions. This method has less trouble with local maxima, but there are still no guarantees of finding the perfect solution.

7.3 Planning:

Planning involves finding a sequence of actions that can lead from the current state, to the goal state. This is usually done in a hierarchical manner: overall plans are highly structured first, and the details are worked out later. This is a more efficient approach. Imperfect world is the major problem that planning has to compete with. With perfect environments, a simple search can be executed, and if a result is found, it will be possible in practice. It is not always possible to get desired results so, when sometimes the process does not work out or does not have the anticipated results then the plans do not work out.

7.4 Machine Learning:

Machine learning is becoming increasingly famous, and evenly vital. People feel that it is much simpler to get a machine to learn something from facts, rather than have to spend time teaching it explicitly. The major factor is the quality of the learning algorithm.

7.5 Neural Networks:

Artificial Neural Networks, also known as Neural Networks (NN), are modeled on the human brain. In this, the internal structure is made up of a small number of artificial neurons, suggests that the information learnt is not ideal. There is, however, the benefit of being able to generalize, i.e. work with information that it didn't come across during its training. It is important that how well the network was designed and trained on which depends how well it can generalize which in turn implies how well it perform.. As such, a lot of research is done on the methods to nail down good generalization.

7.6 Inductive Programming:

Given only the outcomes of a function (a limited amount of them), inductive programming tries to write the definition of the program that created those results. This is more or less successful depending on how many example results were given, and how complex the function is. Currently, some inductive programming algorithms can learn simple logic programs, even recursively defined. More difficult programs will not only prove difficult to learn but also challenging to implement this process to real-life data rather than computer produced functions.

7.7 Decision Tree Learning:

A decision tree is a structure that permits learning of outlook (e.g. good or bad) about objects established on their attributes (length, colour…). Given a series of examples, the learning algorithm can construct a decision tree that will be capable of classifying new examples. If the new examples are controlled properly, nothing is done. Otherwise, the structure of the tree is tailored until the exact outcomes are exhibited. The test is to getting the algorithm to do well on large sets of data, handling faults in values (noise), and determining the most favorable fit of the tree to the training and analyzing data.

7.8 Data Mining:

This is the course of obtaining helpful rules from a very large set of data. When trends are studied, their root needs to be identified, and a rule stating their relationship needs to be established. In this area, the challenge is being able to process a lot of information very efficiently, and overlook the possible errors.

7.9 Bayesian Networks:

Bayesian Networks represent the bond between variables. This is known as conditional dependence: the state of a variable may rely on many others. This can be denoted as a graph, and there's a smart algorithm to guess the probability of unknown results given existing information. Confessing, one common complaint against this approach relates to the design; it can be very dull and boring to model such networks. As such, learning the formation and the conclusion between variables seems like an appealing option.

8. Conclusion:

Until now we have discussed about the significant features of artificial intelligence i.e. it's benefits, technologies, it's precise and a good definition. Now we can say that making a machine or say robot is not as easy as an ABC. It is difficult to make a machine like humans which can show emotions or think like humans in different circumstances.

Now we have accepted that artificial intelligence is the study of how to make things which can exactly work like humans do. It is the way in which we think sensibly, act wisely, think like humans, work like humans. We know that through artificial intelligence, even computer has defeated human in chess. So we can say that reaching so far has not gone waste, somehow, it is contributing towards the advancement in the Artificial intelligence.

At present, there is no computer showing full artificial intelligence, but the course of making machines like ourselves is on its path.

9. Future Scope:

It is not easy to predict the future of Artificial intelligence. Artificial intelligence in the 90's was focused just about enhancing human circumstances. But is that the only goal in the future? Research is centered on constructing human-like machines or robots. This is because scientists are concerned in human intelligence and are awestruck by trying to copy it. If machines start doing the work done by humans then, the role of humans will definitely change. The hard work of researchers may pay them off someday and we will find our work done by machines and a robot walking with us.

References:

1.http://en.wikipedia.org/wiki/Artificial_intelligence#CITEREFPooleMackworthGoebel2017

2.http://en.wikipedia.org/wiki/Artificial_intelligence#CITEREFRussellNorvig2017

3.www.cs.utexas.edu/users/ear/AILongForSeminar.ppt

4.www.amodit.com/en/AMODIT/Artificialintelligence-elements.aspx

5. www.militaryaiworks.com/tools.html