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Innovation The Research Concept

Importance of Artificial Intelligence as an Interdisciplinary Subject

Abstract

As per the title of this paper, the important aspects of Artificial Intelligence shall be highlighted. I think, Artificial Intelligence has become an important subject of study for the students studying Computer Sciences and other related subjects. In the very near future, the students of other fields shall also need to have at least the basic knowledge of this subject. The important aspects of this subject have been introduced in very simple words in this paper to gain the attention and interest of the readers towards this subject.

Keywords: Artificial Intelligence, Computers, Instructions, Programming, Input, Processing, Output, Expertise, Decision Making, Knowledge, Robots, Machine, Reasoning, Sensors, Heuristics, Inferencing, Neural Computing, Agents, etc.

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Introduction

The basic aim of writing this paper is to highlight the importance of studying Artificial Intelligence. Artificial intelligence is a new and emerging subject in the field of Computer Science. A good effort has been done in this paper to give the readers an overview of the basic concepts related to the Artificial Intelligence subject. In addition to it the readers should get motivated to study this subject and try to understand how computers can be made more and more intelligent.

Review of Literature

Computers cannot think by themselves. They work on the basis of user's instructions i.e., Programming. However there has been an exponential increase in their storage capacity and processing speed during the last few years. . Efforts are being made to make computers more and more intelligent. Artificial Intelligence is used to build expert systems to substitute for human expertise by supplying the necessary knowledge. Some intelligent technologies are used to support decision situations that require expertise. These technologies use knowledge to provide the needed support referred to as knowledge based systems.

Most experts agree that AI is concerned with two basic ideas:

First, it involves studying the thought process of humans to understand what intelligence is;

Second, it deals with representing these processes via machines such as computers and robots.

Artificial Intelligence is behavior by a machine that, if performed by a human being would be called intelligent. According to Rich and Knight (1991) "Artificial Intelligence is the study of how to make computers do things at which, at a moment, people are better.

Concepts and Hypothesis

Artificial Intelligence is a branch of Computer Science concerned with the study and creation of Computer Systems that exhibit some form of Intelligence. An Intelligent System should have the following characteristics:

1. Learning or understanding from experience.
2. Making sense out of ambiguous messages.
3. Responding quickly and successfully to a new situation.
4. Using reasoning in solving problems.
5. Dealing with perplexing situations.
6. Understanding and inferring in rational ways.
7. Applying knowledge to manipulate the environment.
8. Thinking and reasoning.
9. Recognizing the relative importance of different elements in a situation.

Intelligence is the ability to acquire, understand and apply knowledge. Knowledge is the food for intelligence. Intelligence is a superset of knowledge and feats, both conscious and unconscious; highly

refined sight and sound perceptive thought; imagination; the ability to read, write, drive, memorize facts and much more. Many intelligent systems have been developed to perform many types of intelligent tasks like: Systems that learn from examples, from being told, from past experiences and through reasoning, systems used to solve complex mathematical problems, in scheduling many diverse tasks, in finding optimal systems configurations, in planning strategies for business, medical diagnosis, military operations and much more. Many other Intelligent Systems have been developed which are capable of understanding large parts of many natural languages. Intelligent systems capable of recognizing objects from photographs, video cameras and other sensors have also been developed.

Symbolic Processing

AI is the branch of Computer Science that deals primarily with symbolic and non-algorithmic method of problem solving. Instead of processing numbers (Numeric Processing), AI tends to use mental ability to manipulate symbols rather than numbers. Similarly instead of using a step by step procedure (algorithm), non-algorithmic method is used to solve problems.

Heuristics

AI is the branch of Computer Science that deals with ways of representing knowledge using symbols with rules of thumb method for processing information. Using heuristics to solve similar problems, rethinking is not required.

Inferencing

Machines based on AI exhibit reasoning capabilities consisting of Inferencing from facts and rules using heuristics or other search approaches.

Pattern Matching

The pattern matching methods of AI attempt to describe objects, events or processes in terms of their qualitative features and logical and computational relationships.

Knowledge Processing

A computer uses the knowledge given to it by human experts consisting of facts, theories, concepts, heuristic methods, procedures and relationships and applies the same for problem solving and decision making.

Expert Systems

An expert system uses human knowledge captured in a computer to solve problems that ordinarily require human expertise. Such systems have the ability to imitate the reasoning processes used by experts to solve different problems. Expert systems could function better than any single human expert in making judgments in a specific area of expertise.

Natural Language Processing

Natural Language Processing (NLP) allows the users to communicate with a computer in their native language instead of using a programming language consisting of Computer jargon, syntax and commands. NLP consists of two sub-fields:

Natural Language Understanding investigates methods of enabling computers understand instructions given in simple English. Natural language generation tends to enable computers to generate simple English easily understandable to the users.

Speech Understanding

Speech / Voice understanding is the comprehension and recognition of spoken language by a computer.

Robotics and Sensory Systems

Robotics includes a broad category of sensory systems like vision systems, tactile systems and signal processing systems. A robot is an electromechanical device which can be programmed to perform different tasks. According to Robotics Institute of America, a robot may be defined as a programmable multifunctional manipulator designed to move materials, parts, tools or specialized devices through variable programmed motions for performing a variety of tasks. A robot uses some sensory apparatus like camera to collect information from the environment, interprets it and responds and adapts to change in environment.

Computer Vision and Scene Recognition

In order to interpret different scenarios a machine sensor such as camera is used. The combined information so received is used to perform or control operations like robotic movement, conveyor speed and production line quality.

Intelligent Computer Aided Instruction (ICAI)

ICAI is an expert system used to teach humans. Intelligent Tutoring System (ITS) is an attempt to create computerized tutors used to teach students. ICAI applications are not only used by schools but also by military and corporate sectors for problem solving, simulation, discovery, learning games, etc.

Intelligent Agents

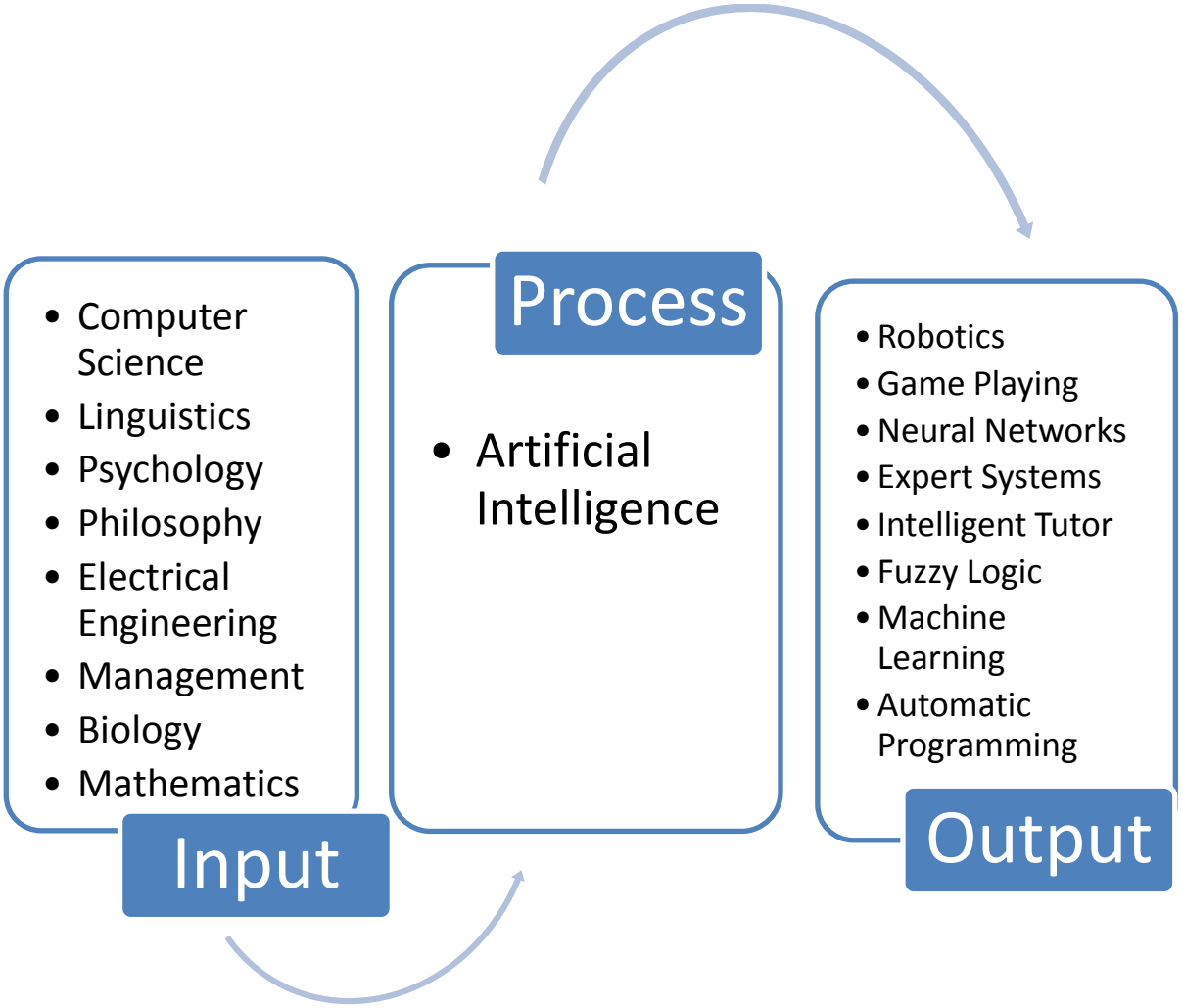
An Intelligent Agent learns the daily needs of a person in an unobstructive way and works like any other agent to serve his master. Intelligent agents work as personal assistant devices for handling e-mails, news filtering and distribution, appointment handling, etc.

Neural Computing

A Neural Computing Network is the model of the human brain consisting of large number of interconnected nerve cells (neurons). A Neural Network is similarly a large collection of processing elements which are interconnected to solve different complex problems.

Research Design

Artificial Intelligence (AI) faces many challenges that include production of systems capable of recognizing and remembering numerous objects to learn new sounds and to adapt to new situations. Some concepts of Artificial Intelligence overlap with the fields of psychology, cognitive science, linguistics, etc. A better understanding of AI can be gained by looking at the different component areas of study including robotics, memory organization, decision making, pattern recognition, searching, understanding natural languages, etc.



Findings

From the above design it is clearly visible that Artificial Intelligence is an interdisciplinary subject. In order to understand this subject, a reader needs to have at least the basic knowledge of Computer Science, Linguistics, Psychology, Philosophy, Electrical Engineering, Management, Biology and Mathematics subjects. Artificial Intelligence acts as the Centre of all these subjects. The data obtained from all these subjects is processed and many new things are produced as output. These include Robotics, Neural Networks, Game Playing, Expert Systems, Intelligent Tutor, Fuzzy Logic, Machine Learning and Automatic Programming.

Conclusion / Suggestions

Finally it is concluded that Artificial Intelligence is a very vast subject, combining many subjects together. There are plenty of job opportunities for the students having good skill of the different aspects of this subject. Hence this subject should be an important component of the curriculum designed for different degree programmes, especially the professional degree programmes. In addition to it, the readers should also study this subject to have at least some basic knowledge as its importance will increase exponentially in future.

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