

ARTIFICIAL INTELLIGENCE AND ROBOTICS SYNERGY

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Abstract: Artificial Intelligence insinuates the use of computer to simulate intelligent behavior. This paper focuses on the methods that can enable to integrate the synergy between Machine Intelligence and Robotics. This paper will discuss about some methods used in Artificial Intelligence which can be implemented in Robotics that can result in building intelligent machines that can operate and interact with the environment at the minimal human supervision or intervention.

Index Terms: Robotics, sensors, Artificial Intelligence, Information Retrieval, expert system, machine learning, Natural Language Processing, Problem Solving.

1. Introduction

Robotics is concerned in building physical agents that can perform tasks and manipulate things by interacting with the physical world by means of their peripheral or integral components such as sensors and effectors or actuators [1-5].

There have been attempts to make computer systems perceive their surroundings such as fitting them with cameras, microphones, etc. It has been observed that useful processing of complex data inputs requires machine understanding. Understanding needs a large knowledge database about the being perceived.

There has been a lot of success in the applications of artificially intelligent robots such as those intelligent robots used in medical robotics, automobile and other heavy industries, space explorations, military and defense systems, auto piloting, smart home appliances etc.

The remaining part of this paper will hint the methods used in AI field which could be implemented and realized in robotics [6-9].

Computer or robot vision:

It consists of methods for acquiring, analyzing, interpreting and understanding a real world scene or a

3D data from the real world into a machine understandable code for forming decisions [10-14].

Machine learning:

Learning capabilities will greatly improve the intelligence of the robot and hence enhance its performance too. In machine learning, it can be classified into:

Symbolic:

The result of the learning process is represented as graph structures or logical statements.

Non Symbolic:

The result is represented as quantities such as weights or ranks in the neural network.

There are many machine learning techniques that can be adopted which includes decision tress, induction, semantic nets, rule based, probability based, function based, etc. [15-18]

2. Problem solving

Finding a sequence of actions that leads to a desirable goal can solve many problems. It consists of the following components:

Initial State

Path and Path cost

One or more Goal State

Set of Operators

A State yields a new State whenever an operator is applied to that State. The set of operators are applied until the desired Goal is obtained at the best cost.

Theorem proving:

Proving by contradiction or resolution is used to prove that an original conclusion C1 followed from a set of statement is true by making a negation conclusion C2 of C1 such that C2 is inconsistent with the other sentences from where C1 is concluded.[19,20]

3. Natural language processing

This relies on machine learning and needs a good reservoir of Knowledge base. The operation includes the following:

Text understanding

Text generation

Speech understanding

Speech generation

Machine Translation

Natural Language databases and interface

A computer or a robotic those are capable of understanding input messages or speeches in natural language require both the contextual knowledge and the process for making the interfaces.

Information retrieval:

The intelligent machine system ideally stores a large base of factual datas and informations about their designated task objectives or subjects, in such a way that they can be used to accurately answer questions and queries (preferably in Natural language) regarding the task or subject.

Algorithms related to Information extraction such as key word search, can be used to a greater context with a higher complexity as this is more than just text mining.

Expert system:

An expert system in AI is a program that uses specific knowledge about an area of expertise in order to acquire competence that matches with that of a human expert in that area of subject or domain.

The expert system in application can interpret, conclude, predict, diagnose, design, solve, propose, compare, provide remedy, instruct and assist, supervise, etc in a very efficient and intelligent way.

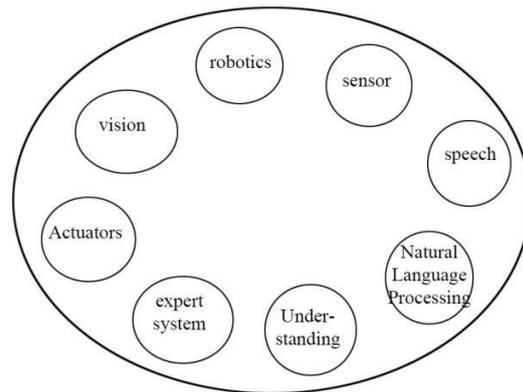


Figure 1. An intelligent Machine system.

Figure1 shows the realization component of an intelligent machine where AI concepts are synergized with robotics.

4. Conclusion

Automotive machines operating without much human intervention requires to simulate some complex and intelligent decision making of their own.

Future works will be about enhancing the functionality and realism of this encompassment. This paper also looks forward to the implementatiin of Software quality assurance and maintainence in an ideal realism.

Software programs greatly deals with algorithms that helps in optimization of codes efficiency for the execution of the codes to give an enhanced performance.

AI programs, just like any other softwares, are developed, tested, and enhanced. Intelligent Information processing being part of AI, could effectively guide in the designing of intelligent machines.

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