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Programming Language and Artificial Intelligence Development

Mrs. Rekha Purohit^{*1}, Prof. Prabhat Mathur²

^{*1} Research Scholar, Department of Computer Science & Application, Jodhpur National University,
Jodhpur, India

² Associate Professor, Lahoo Memorial College of Science & Technology, Jodhpur, India
rekhapurohit22@yahoo.in

Abstract

The term language means communication tool which is used to write Computer program and develop application, scripts, or other set of instructions for a computer to execute. Computer programming languages are used to write programs that define the behavior of a computer system. They are based on certain syntactic and semantic rules, which define the meaning of each of the programming language constructs. The syntactic and the semantic rules of every programming language define the language implementation. Programming languages provide computer programmers with the means to express computer algorithms. A programming language is a notation for writing programs, which are specifications of a computation or algorithm. [1] In computer technology, a set of conventions in which instructions for the machine are written called programming language. [2] Artificial Intelligence is a branch of Science which deals with helping machines finds solutions to complex problems in a more human-like fashion. This generally involves borrowing characteristics from human intelligence, and applying them as algorithms in a computer friendly way. A more or less flexible or efficient approach can be taken depending on the requirements established, which influences how artificial the intelligent behaviour appears. [1] AI is generally associated with Computer Science, but it has many important links with other fields such as Maths, Psychology, Cognition, Biology and Philosophy, among many others. Our ability to combine knowledge from all these fields will ultimately benefit our progress in the quest of creating an intelligent artificial being. [2] The Present work is to identify relationship between programming language and AI development. The main objective of the work is to study the Application of Programming language, role of Programming language in AI development, The Languages Used for AI Programming and computer programming from Machine language to Artificial intelligence (AI) or future perspective of AI. This work will help the researchers to understand the concept, application, role and types of programming languages which is used in development of AI.

Keywords: AI means “Artificial Intelligence”, Programming language, application and role of programming language, AI development.

Introduction

Programming language is a system of communication which is used to express our thoughts, plans and gestures. An artificial language used to write instructions that can be translated into machine language and then executed by a computer. The different notations used to communicate algorithms to a computer. A computer executes a sequence of instructions (a program) in order to perform some task. In spite of much written about computers being electronic brains or having artificial intelligence, it is still necessary for humans to convey this sequence of instructions to the computer before the computer can perform the task. The set of instructions and the order in which they have to be performed is known as an algorithm. The result of expressing the algorithm in a programming language

is called a program. Programming language is a formal language in which computer programs are written. The definition of a particular language consists of both syntax and semantics. Languages that programmers use to write code are called Programming language. It is a set of commands, instructions, and other syntax use to create a software program. A vocabulary and set of grammatical rules for instructing a computer to perform specific tasks called Programming language. AI is the best approach to solutions was through the development of general purpose problem solvers, that is, systems powerful enough to prove a theorem in geometry, to perform complex task, or to develop a plan to complete a sequence of intricate operations. AI is a field of study that encompasses computational

techniques for performing tasks that apparently require intelligence when performed by humans.

Importance of Programming Language & AI

Without programming languages, we would have to program computers using their native code, called machine code. This is nothing more than a series of binary digits (bits), where the particular bits within the code tell the processor which instruction you would like to execute. Programming languages make programming faster and easier. It is faster because most languages make complex tasks, such as printing text to the screen, take up far less time to program. It makes programming easier by allowing the developer to write in a language comfortable to humans. Instead of writing something like:

```
0A2BCDAD143900983AA9
we could use programming language as "C"
In C, the program to print "hello, world" is
#include <stdio.h>
main()
{
printf("hello, world\n");
}
```

The importance of artificial intelligence is the ability to create a never-ending thought process and collective that could solve our problems. AI is the field where human brain and machine talks together. The importance of AI is very wide. Human brain can be transformed into a machine format and all the research is done through AI. Cognitive Psychology and AI are much related. Cognitive Psychology discusses on human behavior and AI deals how to transform machine close to human.

Programming Languages in Artificial Intelligence (AI)

Programming language in AI are the major tool for exploring and building computer programs that can be used to simulate intelligent processes such as learning, reasoning and understanding symbolic information in context. Although in the early days of computer language design the primary use of computers was for performing calculations with numbers, it was also found out quite soon that strings of bits could represent not only numbers but also features of arbitrary objects. Operations on such features or symbols could be used to represent rules for creating, relating or manipulating symbols. This led to the notion of symbolic computation as an appropriate means for defining algorithms that processed information of any type, and thus could be

used for simulating human intelligence. Soon it turned out that programming with symbols required a higher level of abstraction than was possible with those programming languages which were designed especially for number processing, e.g., FORTRAN.

AI programming languages

The main programming languages used in AI are Lisp and Prolog. Prolog especially used in Europe and Japan, and Lisp in the U.S. In AI, the automation or programming of all aspects of human cognition is considered from its foundations in cognitive science through approaches to symbolic and sub-symbolic AI, natural language processing, computer vision, and evolutionary or adaptive systems. It is inherent to this very complex problem domain that in the initial phase of programming a specific AI problem, it can only be specified poorly. Only through interactive and incremental refinement does more precise specification become possible. This is also due to the fact that typical AI problems tend to be very domain specific; therefore heuristic strategies have to be developed empirically through generate-and-test approaches (also known as rapid proto-typing). In this way, AI programming notably differs from standard software engineering approaches where programming usually starts from a detailed formal specification. In AI programming, the implementation effort is actually part of the problem specification process. Due to the "fuzzy" nature of many AI problems, AI programming benefits considerably if the programming language frees the AI programmer from the constraints of too many technical constructions (e.g., low-level construction of new data types, manual allocation of memory). Rather, a declarative programming style is more convenient using built-in high-level data structures (e.g., lists or trees) and operations (e.g., pattern matching) so that symbolic computation is supported on a much more abstract level than would be possible with standard imperative languages, such as Fortran, Pascal or C. Of course, this sort of abstraction does not come for free, since compilation of AI programs on standard von Neumann computers cannot be done as efficiently as for imperative languages. However, once a certain AI problem is understood (at least partially), it is possible to re-formulate it in form of detailed specifications as the basis for re-implementation using an imperative language. From the requirements of symbolic computation and AI programming, two new basic programming paradigms emerged as alternatives to the imperative style: the functional and the logical programming style. Both are based on mathematical formalisms, namely recursive function theory and formal logic.

The first practical and still most widely used AI programming language is the functional language Lisp developed by John McCarthy in the late 1950s. Lisp is based on mathematical function theory and the lambda abstraction. A number of important and influential AI applications have been written in Lisp so we will describe this programming language in some detail in this article. During the early 1970s, a new programming paradigm appeared, namely logic programming on the basis of predicate calculus. The first and still most important logic programming language is Prolog, developed by Alain Colmerauer, Robert Kowalski and Phillippe Roussel. Problems in Prolog are stated as facts, axioms and logical rules for deducing new facts. Prolog is mathematically founded on predicate calculus and the theoretical results obtained in the area of automatic theorem proving in the late 1960s.

Application of AI

AI is used in various fields as playing games, speech recognition, understanding natural language, computer vision, and expert system and in heuristic classification etc.

1 Game playing

You can buy machines that can play master level chess for a few hundred dollars. There is some AI in them, but they play well against people mainly through brute force computation--looking at hundreds of thousands of positions. To beat a world champion by brute force and known reliable heuristics requires being able to look at 200 million positions per second.

2 Speech recognition

In the 1990s, computer speech recognition reached a practical level for limited purposes. Thus United Airlines has replaced its keyboard tree for flight information by a system using speech recognition of flight numbers and city names. It is quite convenient. On the the other hand, while it is possible to instruct some computers using speech, most users have gone back to the keyboard and the mouse as still more convenient.

3 Understanding natural language

Just getting a sequence of words into a computer is not enough. Parsing sentences is not enough either. The computer has to be provided with an understanding of the domain the text is about, and this is presently possible only for very limited domains.

4 Computer vision

The world is composed of three-dimensional objects, but the inputs to the human eye and computers' TV cameras are two dimensional. Some useful programs can work solely in two dimensions, but full computer vision requires partial three-dimensional information that is not just a set of two-dimensional views. At present there are only limited ways of representing three-dimensional information directly, and they are not as good as what humans evidently use.

5 Expert systems

A "knowledge engineer" interviews experts in a certain domain and tries to embody their knowledge in a computer program for carrying out some task. How well this works depends on whether the intellectual mechanisms required for the task are within the present state of AI. When this turned out not to be so, there were many disappointing results. One of the first expert systems was MYCIN in 1974, which diagnosed bacterial infections of the blood and suggested treatments. It did better than medical students or practicing doctors, provided its limitations were observed. Namely, its ontology included bacteria, symptoms, and treatments and did not include patients, doctors, hospitals, death, recovery, and events occurring in time. Its interactions depended on a single patient being considered. Since the experts consulted by the knowledge engineers knew about patients, doctors, death, recovery, etc., it is clear that the knowledge engineers forced what the experts told them into a predetermined framework. In the present state of AI, this has to be true. The usefulness of current expert systems depends on their users having common sense.

6 Heuristic classifications

One of the most feasible kinds of expert system given the present knowledge of AI is to put some information in one of a fixed set of categories using several sources of information. An example is advising whether to accept a proposed credit card purchase. Information is available about the owner of the credit card, his record of payment and also about the item he is buying and about the establishment from which he is buying it.

Future Perspective of AI

1. Reducing the time and cost of development is a big plan for AI.
2. Allowing students to work collaboratively is another plan from Researchers.
3. **Perfect rationality:** the classical notion of rationality in decision theory.
4. **Bounded optimality:** A bounded optimal agent behaves as well as possible given its computational resources.
5. **Game theory** studies decision problems in which the utility of a given action depends not only on changing events in the environment but also on the actions of other agents.

Conclusion

AI is a branch of Computer Science concerned with the study and creation of computer systems. AI systems also can understand a natural language or perceive and comprehend a visual scene, and perform other types of feats that require human types of intelligence. AI is one of the most important developments of this century. The importance of AI become apparent to many of the world's leading countries during the late 1970s.

1. AI just finished with its period of infancy. It has ramifications that yet remain unknown to everyone. The effort and research can bring the surprising innovations.
2. There are also results which cannot be foreseen when the computer begins to think for itself. A computer it can be used in different ways depending on the user's needs.

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