

# Knowledge Representation in Artificial Intelligence using Domain Knowledge and Reasoning Mechanism

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**Abstract:** *There are few knowledge representation (KR) techniques available for efficiently representing knowledge. However, with the development in convolution, better methods are needed. Some researchers came up with hybrid mechanisms by connecting two or more methods. In an effort to construct a rational computer system, a constitutional consideration is to represent large amounts of knowledge in a way that allows effective use and efficiently organizing information to facilitate making the approved inferences. There are merits and demerits of combinations, and directed method for representing knowledge. In this paper, Knowledge is represented using domain Knowledge and reasoning mechanism with the help of a construction.*

**Keywords:** Knowledge Representation, Reasoning mechanism, Expert system, Artificial Intelligence

## 1. Introduction

Artificial intelligence (AI) is intelligence exhibited by machines. In computer science, the field of AI research defines itself as the study of "intelligent agents".

The term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving".

In artificial intelligence, an expert system is a computer system that emulates the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning about knowledge, represented mainly as if-then rules rather than through conventional procedural code. The first expert systems were created in the 1970s and then proliferated in the 1980s. Expert systems were among the first truly successful forms of artificial intelligence (AI) software. The ability of a system to calculate, reason, perceive relationships and analogies, learn from experience, store and retrieve information from memory, solve problems, comprehend complex ideas, use natural language fluently, classify, generalize, and adapt new situations.

This troubleshooting expert system helps a user to search solution with specific solution for the given specific problem.

This system appropriate troubleshooting for maintenance and accessing the knowledge base. This system present the technique with a list of guiding question, when answered system with information about what problem sets the issue may belong to and one it does not belongs to. This system has ability to make device troubleshooting process automatic and help professional to find the cases within few second. This expert system has also self-learning power to handle new problem occurring in the computer system and their

respective solution.so, this is the efficient way to solve problem in computer system.

## 2. Background

Log files store the Application Programming Interface (API) functions calls that are made by communication applications [1, 2]. Our results show that it is sometimes difficult to distinguish between normal behavior and malicious behavior. The correlation algorithm shows that there are high numbers of correlated events in attack case generated by bots compared to. A major characteristic of developments in the broad field of Artificial Intelligence (AI) during the 1990s has been an increasing integration of AI with other disciplines. A number of other computer science fields and technologies have been used in developing intelligent systems, starting from traditional information systems and databases, to modern distributed systems and the Internet. This paper surveys knowledge modeling techniques that have received most attention in recent years among developers of intelligent systems, AI practitioners and researchers. The techniques are described from two perspectives, theoretical and practical. Hence the first part of the paper presents major theoretical and architectural concepts, design approaches, and research issues. The second part discusses several practical systems, applications, and ongoing projects that use and implement the techniques described in the first part. Finally, the paper briefly covers some of the most recent results in the fields of intelligent manufacturing systems, intelligent tutoring systems, and ontologies.

A fundamental observation arising from work in artificial intelligence (AI) has been that expertise in a task domain requires substantial knowledge about that domain. The effective representation of domain knowledge is therefore generally considered to be the keystone to the success of AI programs [15] (see Figure 1). Domain knowledge typically has many forms, including descriptive definitions of domain-

specific terms (e.g., “power plant,” “pump,” “flow,” “pressure”), descriptions of individual domain objects and their relationships to each other (e.g., “Pi is a pump whose pressure is 230 psi”), and criteria for making decisions (e.g., “If the feed water pump pressure exceeds 400 psi, then close the pump’s input value”). Because of this emphasis on representation and domain knowledge, systems that use AI techniques to achieve expertise are often referred to as *knowledge-based systems*, or simply as *knowledge systems*.

Knowledge representation is most desirable area of research to make the system intelligent. Today is the ERA of knowledge that requires articulations, semantic, syntax etc. These requirements, forced to design a general system which is applicable to represent declarative as well as procedural knowledge. Without effective inference/Reasoning mechanism, the strength and utility of knowledge representation technique fulfill the partial requirement for an intelligent system. The objective of this research work is to present the Effective/Appropriate knowledge representation technique for representing the general knowledge and a reasoning algorithm so that appropriate knowledge can be infer from the system. The architecture of Knowledge Representation (KR) system is capable to integrate different type of knowledge.

The research in AI is divided in to two categories Knowledge representation and general. For making the computer or Machine as intelligent as human being we require two things Knowledge representation and inference mechanism. Development of an AI system is a crucial task because some time we have incomplete information and it can be ambiguous and uncertain. So solution to these problems is to build a knowledge effective knowledge base and an effective inference mechanism. The objective of this paper is to present the knowledge base system architecture/model for intelligent system and to present the issues in various hybrid KR techniques.

Knowledge is not a simple concept to define, and although many definitions have been given of it, only a few describe the concept with enough detail to grasp it in practical terms; knowledge is sometimes seen as a *thing* out in the real world waiting to be uncovered and taken in by the receptive mind; however, knowledge is not a *thing* to be encountered and taken in, no knowledge can be found in any mind without first have been processed by cognition. Knowledge is not something just to be uncovered or transmitted and stored, it has to be constructed. The construction of knowledge involves the use of previous knowledge and different cognitive processes, which play an intertwined function to facilitate the development of association between the new concepts to be acquired and previously acquired concepts. Knowledge is about information that can be used or applied, that is, it is information that has been contextualized in a certain domain, and therefore, any piece of knowledge is related with more knowledge in a particular and different way in each individual. In this chapter, a model for the representation of conceptual knowledge is presented. Knowledge can have many facets, but it is basically constituted by static components, called concepts or facts, and dynamic components, called skills, abilities, procedures,

actions, etc., which together allow general cognition, including all different processes typically associated to it, such as perceiving, distinguishing, abstracting, modelling, storing, recalling, remembering, etc., which are part of three primary cognitive processes: learning, understanding and reasoning (Ramirez and Cooley, 1997). No one of those processes can live isolated or can be carried out alone, actually it can be said that those processes are part of the dynamic knowledge, and dynamic knowledge typically requires of conceptual or factual knowledge to be used.

There are few knowledge representation (KR) techniques available for efficiently representing knowledge. However, with the increase in complexity, better methods are needed. Some researchers came up with hybrid mechanisms by combining two or more methods. In an effort to construct an intelligent computer system, a primary consideration is to represent large amounts of knowledge in a way that allows effective use and efficiently organizing information to facilitate making the recommended inferences. There are merits and demerits of combinations, and standardized method of KR is needed. In this paper, various hybrid schemes of KR were explored at length and details presented.

Combining various knowledge types - and reasoning methods - in knowledge-based systems is a challenge to the knowledge representation task. The paper describes an object-oriented, frame-based knowledge representation system aimed at unifying case-specific and general domain knowledge within a single representation system. It is targeted at the representational needs that have emerged from research in knowledge-intensive case based reasoning, addressing complex problem solving in open and weak theory domains. Emphasis is put on representational expressiveness, on flexible reasoning and control schemes, and on easy inspection of cases and other knowledge objects.

Controlled natural languages (CNLs) are effective languages for knowledge representation and reasoning. They are designed based on certain natural languages with restricted lexicon and grammar. CNLs are unambiguous and simple as opposed to their base languages. They preserve the expressiveness and coherence of natural languages. In this paper, it mainly focuses on a class of CNLs, called machine-oriented CNLs, which have well-defined semantics that can be deterministically translated into formal languages to do logical reasoning. Although a number of machine-oriented CNLs emerged and have been used in many application domains for problem solving and question answering, there are still many limitations: First, CNLs cannot handle inconsistencies in the knowledge base. Second, CNLs are not powerful enough to identify different variations of a sentence and therefore might not return the expected inference results. Third, CNLs do not have a good mechanism for defeasible reasoning. This paper addresses these three problems and proposes a research plan for solving these problems. It also shows the current state of research: a paraconsistent logical framework from which six principles that guide the user to encode CNL sentences were created. Experiment results show this paraconsistent logical framework and these six

principles can consistently and effectively solve word puzzles with injections of inconsistencies.

In this paper, we discuss how our work on evaluating Semantic Web knowledge base systems (KBSs) contributes to address some broader AI problems. First, we show how our approach provides a benchmarking solution to the Semantic Web, a new application area of AI. Second, we discuss how the approach is also beneficial in a more traditional AI context. We focus on issues such as scalability, performance tradeoffs, and the comparison of different classes of systems.

Case-based reasoning is a recent approach to problem solving and learning that has got a lot of attention over the last few years. Originating in the US, the basic idea and underlying theories have spread to other continents, and we are now within a period of highly active research in case-based reasoning in Europe, as well. This paper gives an overview of the foundational issues related to case-based reasoning, describes some of the leading methodological approaches within the field, and exemplifies the current state through pointers to some systems. Initially, a general framework is defined, to which the subsequent descriptions and discussions will refer. The framework is influenced by recent methodologies for knowledge level descriptions of intelligent systems. The methods for case retrieval, reuse, solution testing, and learning are summarized, and their actual realization is discussed in the light of a few example systems that represent different CBR approaches. We also discuss the role of case-based methods as one type of reasoning and learning method within an integrated system architecture.

### 3. Proposed Work

Following Parameters are used:

#### 1. Explanation Part(EP):

In explanation part complicated data is divided into parts for understanding.

#### 2. Interface Engine(IE)

Interface Engine Use of efficient procedures and rules by the Inference Engine is essential in deducing a correct, flawless solution.

#### 3. Knowledge Acquisition Module(KAM)

#### 4. Knowledge Acquisition(KA)

Acquires information from subject expert by recording and observing work, etc. then categorizes and organizes the information in a meaningful way, in the form of IF-THEN-ELSE rules, to be used by interference machine.

#### 5. Knowledge Verification and validation(KVV)

Verification testing can be best demonstrated using V-Model. The artefacts such as test Plans, requirement specification, design, code and test cases are evaluated. Validation testing can be best demonstrated using V-Model. The Software/product under test is evaluated during this type of testing.

### 6. Knowledge Representation (KR)

Knowledge representation is the method used to encode knowledge in an intelligent system's knowledge base. The object of knowledge representation is to express knowledge in computer-tractable form, such that it can be used to help intelligent system perform well.

### 7. Knowledge Based System(KBS)

When system shows any problem than first it read and the whole problem and try to find the possible solution related to that problem. Knowledge base reasoning is to give knowledge to system. There are mainly 3 Knowledge base reasoning techniques:

- 1)Ontology based reasoning
- 2)Case based reasoning
- 3)Rule based reasoning

#### 3.1 Working Principal

We have users and computer they are connected to parameters with help of user interface this parameters are EP, IE, KAM, KA, KVV, KR, KBS. EP,IE,KAM are connect knowledge base for providing overall structure of system. Now on the other side we have KA, KVV, KR, KBS four of them are connected with KBOS which has known as well as other components also we have experts this side which are connected with all four parameters and finally KBOS will show the result at Knowledge engine.

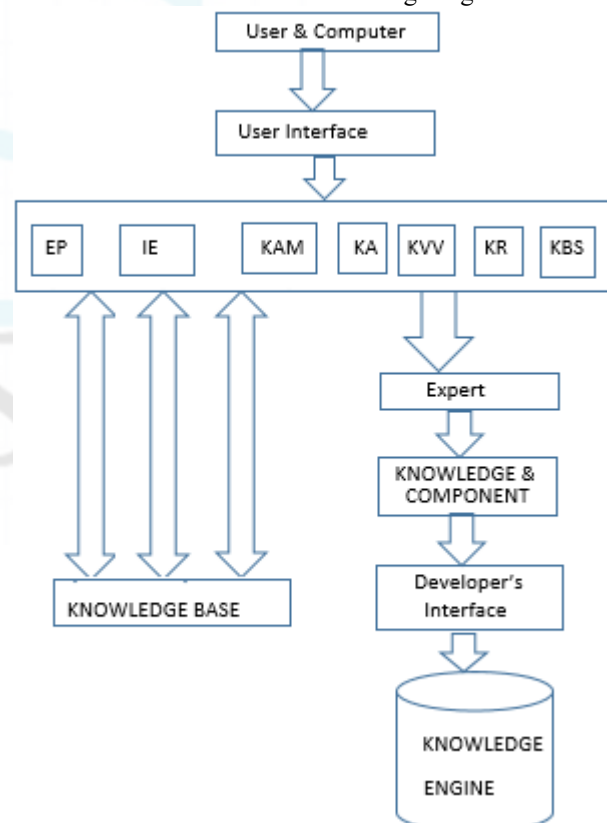


Figure 1: Flowchart of Knowledge Representation

### 4. Conclusion

This expert system was designed technicians and computer users to solve problems occurring in the computer system persuasively and comfortably. The knowledge's of domain

experts acquired through interview. The acquired knowledge was formed by using decision tree and represented by rule based appliance. The result of achievement evaluation indicated the expert system is very good and have ability to support technicians and computer users. The expert system should also further enhance to include the knowledge acquired from physical inspection of the computer condition for better agreement. Rule based system can handle any domain specific problem, if there is perfect knowledge. But, most of the time the causes from the computer and the user may not captivate the conditions of the given rule by this user can easily get knowledge from expert system.



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