

Remedial Solutions to Improve the Efficiency of Knowledge Based Systems

Hemant Kumar Soni

Dept. of Computer Science and Engineering, Amity School of Engineering and Technology, Amity University Madhya Pradesh, Gwalior, India

Corresponding Author: hemantsoni.gec@gmail.com

DOI: <https://doi.org/10.26438/ijcse/v7i6.720724> | Available online at: www.ijcseonline.org

Accepted: 11/Jun/2019, Published: 30/Jun/2019

Abstract - A learning base is an effectively available information stockpiling center that contains data about a specific item, administration, theme, or idea. Associations make learning bases to house the majority of the information inside their association about a specific subject, to give one area to get to this data. Information bases can target inside representatives (on account of an organization learning base) or the general population - clients or potential clients - who need to study a specific item, subject, or idea. The objective of a learning base is to legitimately give data to these clients, and, on account of an interior framework, to expand the general comprehension of the whole association. Designing and development of a efficient knowledge base system is a challenging task. In this paper author describe the challenges for KBS and failure of KBS and its causes. Author also provide a deep insight the remedial solution to improve the efficiency of a KBS.

Keyword:- Knowledge Base System, Expert System, Inference Engine, Knowledge Acquisition, Concept Development.

I. INTRODUCTION

Artificial Intelligence and Data Mining are two areas which is now in high demand[1,2]. Knowledge based system is consider to be the system which are capable of taking the decision by its own or we can say smart enough to solve a problem like a human solve a problem. No matter that this intelligence is provide by the human to the computer system but due to this now the system will act or takes the decisions likes an expert person take in this real world. This will also proves that how high we human reach in field of technology that now a day human is capable enough that it give the brain to computer system that make the system to be expert.

Expert system is considered to be the area of Artificial intelligence. Expert system is also known as knowledge based system. These systems sole the problems which do not have traditional algorithmic solution. The aim of developing the knowledge based system is to take the knowledge of human expert relative to some specific domain and code in the system in such a manner that the intelligence of an expert is available to the less experienced user. Knowledge is considered to be remembering of previously learned things. KBS is considering being a body of information, truth and principles that is acquired by humankind. Brain cells or we can say (interconnected neurons) which present in human brain which contain approx. 10^{12} neurons are the place where the knowledge is store in humans. The

interconnection of this neuron will provide approximately 10^{14} bits of potential storage capacity. While talking about the computer system the knowledge is store in form of voltage states [3].

The gap in storage capacity of human and computer has come down the system now are able to store nearly about 10^{12} bits of data but when we are going to talk about the efficiency and data representation so there is a wide gap between humans and computer system. After the implementation of these system the problem that face by the humans is that the system still need the interference of humans for understand the problem as well as find the solution for it. After some time it is find that these system will work efficiently after the solution given to them but the problem was that these system were design to solve number of problems not only a specific problem. Then the human work on how to system understand the problems and find the solution for it. These system means the KBS are develop for the progress in different field such as scheduling airplanes and bus, in electrical circuits & financial market, for configuration in computer system, as well as in diagnosing diseases such as diabetes. We can say these KBS system has a good scope in future[3]. The use of data mining techniques[4,5] also play an important role to improve the accuracy and productivity of KBS systems.

II. TYPES OF EXPERT SYSTEM

There are three basic types of expert systems:

Advisory - They set forward answers for further assessment by people, on the off chance that the client isn't fulfilled, at that point a specialist framework ought to have the capacity to discover another arrangement.

Dictatorial - This sort of frameworks are generally utilized as procedure controlling frameworks, where all activities (or practically all) are taken by a specialist framework, on the grounds that there is no real way to include a human or a human observation is to ease back to settle on legitimate choices.

Criticizing - An issue is given with an answer. A framework need to examine them and assess the viability.

A. Characteristics of KBS:

The most essential fixing in any master framework is the information. The force of master framework lives in the particular, top notch information it contain about undertaking spaces. In master frameworks, information is isolated from its handling i.e. the information base and the induction motor are part up. A customary program is a blend of learning and the control structure to process this information.

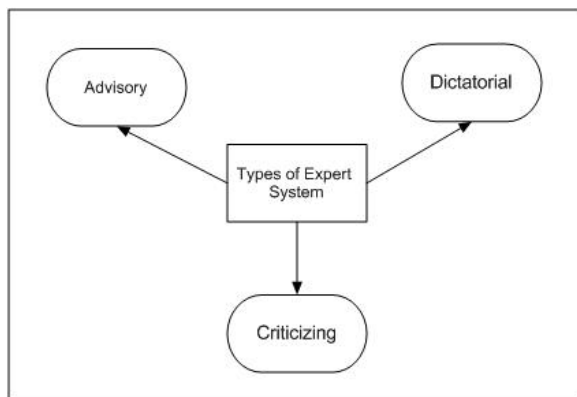


Fig.1 Types of Expert System

This blending prompts troubles in comprehension and checking on the program code, as any change to the code

influences both the learning and its handling. Master framework contains an information base having gathered experience and an arrangement of principles for applying the learning base to every specific circumstance that is depicted to the program. Advanced master frameworks can be upgraded with increases to the learning base or to the arrangement of principles. Master framework can be worked without any preparation, or manufactured utilizing a bit of improvement programming known as a "device" or a 'shell'. A shell is a total improvement environment for building and keeping up information based applications.

1. Master system gives the amazing execution which fathoms troublesome projects in a space in the same class as or superior to human specialists.
2. Master System has unfathomable amounts of space particular learning to the moment points of interest.
3. Master system applies heuristics to manage the thinking and accordingly lessen the scan range for an answer.
4. An extraordinary element of a specialist framework is its clarification ability. It empowers the master framework to survey its own thinking and clarify its choices.
5. Master system utilizes typical thinking when taking care of an issue. Images are utilized to speak to various sorts of information, for example, certainties, ideas and tenets.
6. Master system can guidance, alters, redesign, grow and manages dubious and superfluous information[6].

B. Architecture of KBS

A specialist framework instrument, or shell, is a product advancement environment containing the fundamental segments of master frameworks. The center parts of master frameworks are the learning base and the thinking motor.

1. Knowledge Base : The information base contains the learning vital for comprehension, figuring and for tackling issues. It is a distribution center of the area particular learning caught from the human master by means of the information securing module. To speak to the learning generation rules, outlines, rationale, semantic net and so on is utilized. The information base of master framework contains both truthful and heuristic learning. True information is that learning of the errand area that is generally shared, ordinarily found in course book or diaries.

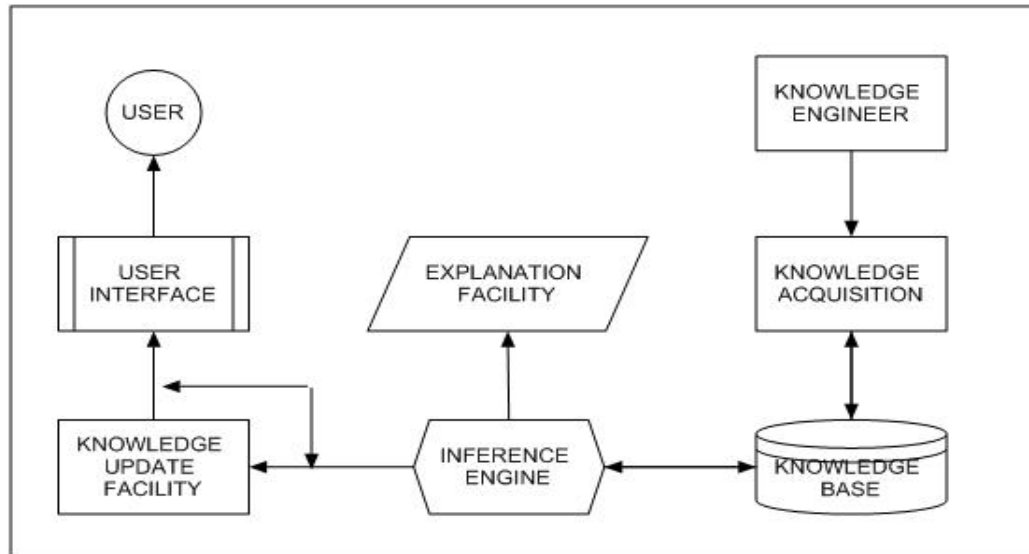


Fig. 2 Architecture of Expert System

2. Inference Engine : Inference Engine is a cerebrum of master framework. It utilizes the control structure (manage mediator) and gives philosophy to thinking. It goes about as a translator which examines and forms the standards. It is utilized to play out the undertaking of coordinating forerunners from the reactions given by the clients and terminating rules. The significant errand of derivation motor is to follow its way through woodland of principles to touch base at a conclusion. Here two methodologies are utilized i.e. forward anchoring and in reverse tying.

3. Knowledge Acquisition : Knowledge securing is the collection, exchange and change of critical thinking skill from specialists as well as reported information sources to a PC program for developing or growing the learning base. It is a subsystem which helps specialists to construct learning bases. For information procurement, systems utilized are convention investigation, meetings, and perception.

4. Explanation Facility : It is a subsystem that clarifies the framework's activities. The clarification can run from how the last or middle of the road arrangements were touched base at to supporting the requirement for extra information. Here client might want to ask the essential inquiries for what good reason and how and serves as a guide in imparting the framework's information to the client.

5. User Interface : It is a method for correspondence with the client. It gives offices, for example, menus, graphical interface and so on to make the discourse easy to use. Duty of UI is to change over the standards from its interior representation (which client may not comprehend) to the client reasonable frame[6] [7].

III. LITERATURE REVIEW

In this paper[8], authors explain Expert System Life Cycle. It is consider to be the most important cycle. It is divided in 5 stages each stage has its own importance. In first stage problem identification is performed while as in second stage decision on the vehicle for development which involve the language or tool use to solve the problem third stage is deals with prototype development which means the concept need to solve the problem then the fourth stage perform the plan for full scale system which means the implementation scheme then the last stage that is the fifth stage is about the implementation , maintenance and evaluation for full system which means the parallel conversation and testing.

In this paper[9], authors demonstrate the relation of KBS with knowledge management , development in KBS in this we get idea that in implementing the expert system engineering technique are used which is similar to software engineering technique. In this knowledge engineering there is use of different models (Common KADS, MIKE, and PROTEGE). From this paper we get an idea about the utility of expert system because this system can be use in different fields such as scheduling airplanes and bus, in electrical circuits & financial market, for configuration in computer system, as well as in diagnosing diseases such as diabetes. In this we also study about research in knowledge based system.

IV. CHALLENGES FOR KBS

Present day KBS faces difficulties which obstacle them to turn out to be totally fruitful AI framework. Some of them are recorded underneath –

A. Convoluted and constant changes in requirement : In any case, one of the challenges for designing a good KBS is the identifying the complexity of the system and continuous changes in requirements.

B. Cost occurred in KBS : Due to visit changes regularly in reality, KBS needs consistent refreshing. Along these lines the utilization of KBS innovation does not save money on programming support. Besides, due to high usefulness, the quantity of clients of any KBS application is by all accounts enormous and any costs must be recovered from the advantages to this modest number of clients.

C. Degrade Performance : KBSs, especially those with vast information bases, were found to run in all respects gradually and to devour generous registering assets. This influenced the selection of utilizations. Realtime applications were generally kept away from, however so were others where asset utilization was an issue.

D. Incomplete Solution : KBS are not, when all is said in done, a total arrangement, yet should be joined with different innovations to take care of practically any genuine issue. The KBS approach is all the more a strategy and an aptitude than an answer.

E. No Specific Methodology : There are no specific and standard methodology established for designing and developing KBS. A good methodology for testing a KBS is also need to be established.

V. FAILURE AND ITS CAUSES:

There are several projects which are still going in implementation of KBS. But there is still some complication in implementing the KBS in India. There are several reasons which is responsible for implementing the KBS which are as follows:

- The first reason behind the failure of KBS is the lack of appropriate organizational measure that is adapted in system.
- The second reason is that the expert is focus mainly on capturing the knowledge and packaging and neglecting the part of humans.
- If the knowledge that is captured in expert system is not updated regularly then it will also create an adverse or we can say wrong result if it face some problems.
- The important reason is the shortage of skills, time and most importantly the funding and sponsorship which is why India is lacking in the implementation of this technology of KBS.

Failure	Causes
In appropriate organizational measure	The lack of appropriate organizational measure

	adopted in system design
Negligence of Human	expert is focus mainly on capturing the knowledge and packaging and neglecting the part of humans
Non updating of knowledge regularly	it will also create an adverse or we can say wrong result if it face some problems.
Shortage of skills , time and funding	The shortage of skills, time and funding which is why India is lacking in the implementation of this technology of KBS.

VI. SOME REMEDIAL SOLUTION

- A. Concept Development :** It is required to be identify the basic concept and requirements to develop a KBS. For this purpose, gather information and archives that give setting to the learning base undertaking. Survey information produced amid big business and idea examination, and audit any business case and choice briefings for the venture. Become acquainted with recorded data, authoritative arrangements, norms, and guidelines that may influence necessities and force requirements. Assemble data on past activities, fruitful or not, that share qualities with the new task. Audit their framework particulars and other specialized reports[10].
- B. Contribution and Feedback from Stack Holder :** Partners ought to be approached to survey, remark on, and support prerequisites for which they are dependable. Set up a procedure for speaking with partners.
- C. Enabling Cognitive Adaptability of Software Systems :** Envisioning every single important circumstance in which programming operates is seldom possible because of vulnerability with respect to the conditions in which a product framework might be utilized and the difficulties it might look at run-time. Anticipating all relevant situations in which software operates is seldom possible due to uncertainty regarding the circumstances in which a software system may be used and the challenges it may face at run-time. An emerging solution to address this uncertainty is to furnish software systems with self-adapting cognitive capabilities.
- D. Governance of Self-Adapting Software :** Foreseeing the conceivable changes that a self-versatile framework may experience at run time requires recognizing the circumstances the framework ought to have the capacity to deal with. Since all relevant situations cannot be anticipated at design time, due to incomplete knowledge and uncertainty about the system environment, a self-adaptive evolving system may encounter situations that

have not been fully understood or anticipated. This may prompt ineffectual adjustments though AI-based psychological knowledge enables a product framework to self-improve its self-adjustment systems[11].

- E. **Dedicated Hardware** : Specialized processor architectures are emerging (neuromorphic chips, tensor processing units). They will offer exceptional figuring capacities, however programming designing difficulties must be routed to empower these new processing units to be fundamental pieces of new age PCs.

VII. CONCLUSION

Expert frameworks give steady responses to dreary choices, procedures and undertakings and holds critical level of data. The reason for master framework is not to supplant human specialists, but rather to make their insight and experience all the more broadly accessible and allow non-specialists to work better. For the achievement of the master framework appropriate administration of master framework, improvement and arrangement is required. Achievement variable of a specialist framework relies on upon the issue to be unraveled which must be subjective and contract in perspective. It is watched that space specialists not generally ready to clarify their rationale and thinking. Additionally a specialist framework can't react innovatively like a human master in abnormal conditions and can consequently alter its learning base, or modify existing guidelines or include new ones. The information specialist is still in charge of updating and keeping up the framework.

REFERENCES

- [1]. Hemant Kumar Soni, S. Sharma, and M. Jain, "Frequent Pattern Generation Algorithms for Association Rule Mining : Strength and Challenges", In: Proc. of IEEE International Conference on Electrical, Electronics and Optimization Techniques, pp. 3744-3747, 2016.
- [2]. Hemant Kumar Soni, S. Sharma and M Jain, "Plausible Characteristics of Association Rule Mining Algorithms for E-Commerce", In: Proc. of the 3rd International Conference on Advances in Electrical, Electronics, Information, Communication and Bio-Informatics, pp. 36-39, 2017.
- [3]. I.TL ESL, Introduction to Information Technology, Chapter 22.
- [4]. N. Mishra, H. K. Soni, S. Sharma and A K Upadhyay, "A Comprehensive Survey of Data Mining Techniques on Time Series Data for Rainfall Prediction", Journal of ICT Research and Applications, Vol.11, No.2, p 2017p. 167-183,.
- [5]. Hemant Kumar Soni, S. Sharma, AK Upadhyay, "An empirical algorithm for high and low correlative association rule mining", International Journal of Intelligent Engineering Systems, Vol. 11, Issue 3, , pp 223-232, 2018.
- [6]. Russell .S, and P.Norvig, Artificial Intelligence: A modern approach, Second Edition, Prentice-Hall, New Delhi. 2002.
- [7]. Dennis Ritchie, Artificial Intelligence, Tata McGraw-Hill, New Delhi. 1996

- [8]. K. P. Tripathi, "A review on knowledge-based Expert System: Concept and architecture." IJCA Special issues on Artificial intelligence techniques, pp19-23, 2011.
- [9]. Avram Gabriela, "Empirical Study on Knowledge Based Systems, The Electronic Journal of Information Systems Evaluation, Vol 8.Iss 1, pp. 11-20, 2005.
- [10]. Eliciting, collecting and developing requirements, available at <https://www.mitre.org/publications/systems-engineering-guide/se-lifecycle-building-blocks/requirements-engineering/eliciting-collecting-and-developing-requirements>
- [11]. Software and Artificial Intelligence, Executive summary, NESSI, issue 1, pp 1-6., 2019

AUTHORS PROFILE

Hemant Kumar Soni received M.Sc. in Computer Science from Jiwaji University, Gwalior, Madhya Pradesh, India in the year 1996 and M. Tech (IT) from Bundelkhand University, Jhansi, Uttar Pradesh, India in the year 2006. He is pursuing Doctoral degree in Computer Science and Engineering from Amity University Madhya Pradesh, Gwalior, India. He has 23 years of teaching experience for UG and PG courses in Computer Science and presently working as offg. Head of the Department of Computer Science and Engineering at Amity University, Gwalior, Madhya Pradesh, India. His research interest in Data Mining and Soft Computing. He published many research papers in National, International Conferences and Scopus Indexed Journals. He is Reviewer of many referred journals. He received a Best Paper Award in an International Conference and organized number of National level events and conferences. He is a member of International Association of Engineers, Hongkong, Universal Association of Computer and Electronics Engineers (UACEE), The Institute of Research Engineers and Doctors, USA, Life Member of ISTE (Indian Society for Technical Education), India and Member of IAENG Society of Computer Science and Data Mining.

