Designing Expert System Using Precisiated Knowledge Base And Deduction Techniques.

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Abstract : Since the beginning of A I from 1956 remarkable works have been done in almost every fields, and ever since the most challenging job is to make the system intelligent so that it gives the feeling to the user that it understand them, for that system must understand natural or Formal languages, and more precisely answer the user i.e. an Expert system which interpret the Knowledge base through some Patton recognition or speech recognition or text recognition ,now as we all know that computer is a binary system so to answer in yes or no will be simple task by using above recognition techniques ,but as the questions fired by the user are uncertain they can't be answered in yes or no ,and if we don't develop a compact system the efficient search techniques can't be implemented and by heuristic search (blind search) we may complicate the structure .Using the precisiation Natural language technique proposed by Prof . L A Zadeh U C Berkeley University we can make our knowledge base compact as well as the search is fast and efficient.

Introduction:

If we focus on the search engines the technique is entirely different say for Google, it is entirely Text base search it answer the query using the World wide web and further the semantic web and gives the user all the links available in the web of the required text .Google maintain a very large database of the all the text searched so far and continuously updating the new search text in its database so not to search the entire web all again for the same text, Further some commercial issues are also linked with Google as the first page will be given to the highly paid link for commercial search say for hotels etc .So Google is not in the class of A I expert system as for example if we search for "what is cat" the system will give results of "Combined Aptitude test" along with kitties.

To implement a system that interpret the Formal language many organizations have developed their own expert system mainly in medical organizations and automobile industries Using Java Prolog and lisp Using rules and Facts Mainly If- Then- Else Rule

IF (mammal) and if carnivore

Family is cat and

Color is brown

THEN

Animal is lion

In Prolog the same rule is:

Animal (mammal):-

Mammal (carnivore):-

Carnivore (Lion):-

Family (cat),

Color (brown).

Same goes with lisp and java with some syntax and visual changes but the core technique is same which is rule and fact base.

Now if we have to question in this system we have to follow a yes no path to satisfy the if then else rule as:

Q what is that animal which is brown?

The system will answer as

Is the animal mammal? Yes or no

We answer yes then the system will ask Q: is the mammal carnivore? Yes or no

We again answer yes and hence we get the required answer

Same is done for diagnosis of a disease as follows:

Is the patient suffering from fever y/n?

Is the patient having head ache y/n?

Is the patient having shivering y/n?

Is the patient having cold y/n?

Is the patient having weakness y/n?

If all yes the medical diagnosis system may deduce that patient may have malaria.

These expert systems work mainly on semantic nets for relationship and frames for individual knowledge eg.

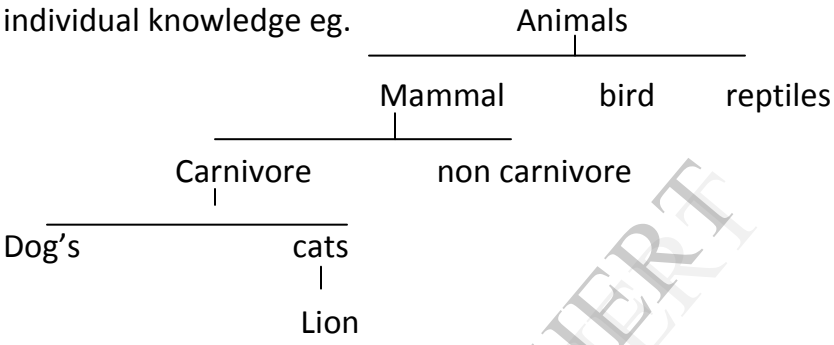

Fig 1. Semantic net

The above semantic net shows the relation ship

Lion	
Brown	Hunter
Claws hairs	golden
Sharp tooth	flesh eater

Fig 2. Frame Lion.

In these expert systems the frame is matched using if-then- else rule and True False Binary search techniques and we have to traverse through the entire semantic net to found the matching frame.

Due to this problem Prof. Zadeh in his research proposed fuzzy logics to be used in question answering system as the question or the queries will be uncertain if fuzzy logics everything is not only true or false and quantified it can also deal with perception and quality say for e.g. A question come, Who is beautiful? Or what is stronger? From the present techniques we can't answer the question until and unless we mention some frame strong or beautiful or else quantify it in numeric or grade using fuzzy numbers form, further the comparison is not possible in If-then-else format as it can't interpret the perception. Hence use of fuzzy logic is required

PNL Approach As we can find in the above approach that all the knowledge is scattered there is no precise technique of query deduction, now using PNL approach we can achieve two things , firstly the basic thing we get is a compact knowledge base and so we get a unique and fast search technique and briefly we achieve **oops** .Prof. K.R. Chowdhary, Dr. Jayashri Vajpai, Dr. V.S. Banal of J N V U Jodhpur, presented a paper named NATURAL LANGUAGE TEXT COMPRESSION USING 5-W BASED PRECISIATION STRUCUTRE this paper presents a approach for the precisiation of natural language text using a highly structured grammar for the five principal elements to represent world knowledge. These five elements viz., who, what, when, where and why. In a question answering system the basic questions comes via the above 5 elements a which and a how.

Now if a user asks a question using older technique that what is lion? Or which one is stronger Lion or a leopard? the former Expert system don't have any direct technique to answer the query.

Using Precisiation we will now make a object of 7 elements which can be increased or decreased accordingly with respect to usage of the system ,Now all the queries will be processed using this precisiated object and all the elements present in the object will be linked to the Knowledge base using relationship already present in the semantic net ,in a knowledge base ,and if the elements aren't present in the question which is like 1 to 9 % possible then we can answer these queries using the conventional approach.

In a A I expert system the relationships between the entities and attributes of the knowledge base are also declared depending on the field and usage of system some of the commonly used relationships are is_a, has_a , is_in , have_a, etc .now we map our 7 elements accordingly to the relationships and declare new one ,for e.g. what and who

can be mapped with is_a, where can be mapped with is_in or lives_in the text of the relationship will also be consider while searching the match. And now is the same question is asked to the system that what is lion ? then using the object the system will search lion and all the relation ship with is_a link will be used for the answer and the answer will be lion is a carnivore animal , question is in which family lion belong ?

The answer is : lion is in cat family, and so on .

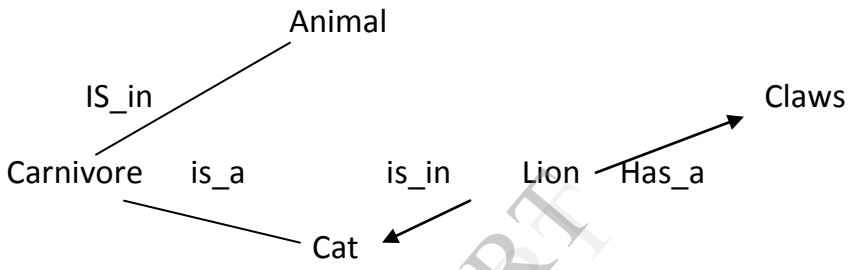

Fig 3 Semantic net with relationships

Lion	
Brown	Hunter
Claws hairs	golden
* 6	* 10
Sharp tooth	flesh eater

Fuzzy numbers

Fig 4 Declarative Frame of lion With Fuzzy numbers 6 and 10 for stronger and dangerous respectively

In case of frames during designing them we reserve slots for fuzzy number according to the nature of the slot for e.g. for a medical diagnosis system in a slot we assign a number according to the cure ability of the disease and the fuzzy numbers can be declared accordingly say 99 is curable and less dangerous for cold and 10 for cancer more dangerous, for our previously asked question that who or which one more stronger lion or leopard? The answer can be given comparing the fuzzy number of strong slot of the frame.

Malaria	
Due to female mosquito bite	In non flow dirty water areas
Infected in blood	30

Blood Cancer	
Unknown	unknown
Infect in blood	90

Fig 5 frames of diseases in a medical diagnosis expert system using fuzzy numbers

Conclusion: it is clearly evaluated that by the use of Precisiation and fuzzy numbers the system become more intelligent, efficient and compact ,the search technique is implemented easily and the answer of perception are also available like good bad ,strong weak, dangerous etc .and using **oop** we compress the Knowledge base in a object further making the system more unique .

References

[1] L. A. Zadeh, “Precisiated natural language,” AI Magazine, 25(3),2004, pp. 74-91.

[2] L. A. Zadeh, “Toward a generalized theory of uncertainty (GTU) -an outline,”in Information Sciences, 172, 2005, pp. 1-40.

[3] K. Toutanova, D. Klein, C. Manning, and Y. Singer, "Feature-Rich Part-of-Speech Tagging with a Cyclic Dependency Network,". in Proc. of HLT-NAACL 2003, pp. 252-259..

[4] M. Thint, M. M. S. Beg, Z. Qin, "PNL-enhanced Restricted Domain Question Answering System," IEEE International Conference on Fuzzy Systems, London, UK, July 2007, submitted for publication .

[5] Z. Qin, M. Thint, M. M. S. Beg, "Deduction Engine Design for PNL-based Question Answering System," World Congress of the International Fuzzy Systems Association , 2007, to be published.

[6]. L. A. Zadeh, A new direction in AI - toward a computational theory of perceptions, A.I. Magazine, Spring 2001.

[7]. L. A. Zadeh, From computing with numbers to computing with words ¡ from manipulation of measurements to manipulation of perceptions, Int. J. Appl. Math. Comput. Sci., Vol. 12/3: pp. 307-324, 2001.

[8]. Dr. K.R. Chowdhary, Dr. Jayashri Vajpai, Dr. V.S. Banal of J N V U Jodhpur, NATURAL LANGUAGE TEXT COMPRESSION USING 5-W BASED PRECISIATION STRUCUTRE ,ECTN-12, computer science and tech. dept jnvu 24 25 march 2012.

[9] From Search Engines to Question-Answering Systems: The Problems of World knowledge Relevance, Deduction, and Precisiation Lotfi A. Zadeh∗ http://www.springer.com/978-3-540-34780-4

[10] L.A. Zadeh: Precisiated Natural Language, Studies in Computational Intelligence (SCI) 36, 1–33 (2007)

[11] Building Expert Systems in Prolog by Dennis Merritt Published by: Amzi! inc. 861 Greentree Road Lebanon, OH 45036 U.S.A. On-line Edition Copyright ©2000 by Amzi! inc.

[12] The diagnosis of small kidney diseases in small prolog expert system, Eugene roventa ,George rosu "YORK" University Toronto ,Canada ,Aurel vlaicu university arad Romania SOFA 2009 • 3rd International Workshop on Soft Computing Applications • 29 July – 1 August • Szeged (Hungary) – Arad (Romania)