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An Effective Way of Knowledge Representation by FRS

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Abstract: .Knowledge Representation is a medium of human expression, that is, a language in which we say things about the world. Different techniques of Knowledge representation exit. Focus, is on Frame representation system (FRS). The notion of 'Frames" as introduced by *Marvin Minsky[2]* emphasizes their role for the representation of knowledge. Frames are complex data structures for representing objects in an effective way. It provided a system for combining declarations and procedures with in a single knowledge representation environment. The problem related to frame representation is discussed and an effective way to remove it is suggested. The time complexity is affected for designing a frame structure. So, discuss some quality of knowledge representation which help to provide better knowledge to frame structure. And at the end, we have seen how a cost reduction knowledge of any product by FRS. And try, to present a logical and feasible knowledge representation of cost reduction to satisfy both the cost items target and the product function target.

Keywords: Frame Structure, knowledge Representation, cost reduction.

I. INTRODUCTION

A knowledge representation (KR) is most fundamentally a surrogate, a substitute for the thing itself, used to enable an entity to determine consequences by thinking rather than acting, that is, by reasoning about the world rather than taking action in it. A successful representation of some knowledge must, be in a form of *understandable* by humans, and must cause the system using the knowledge to *behave* as if it knows it. Different techniques of Knowledge representation are: Lists, Trees, Semantic networks, Rule-based representations, Logic-based representations, and Frames. Surveys of Recent years indicate, Frames are mostly used in organization for knowledge representation system. Where frames are complex data structures they represent objects and events of situations. They are basically an application of object-oriented programming for AI. Frames [2] provide a system for combining declarations and procedures within a single knowledge representation environment. Its looks like knowledge is stored in rather large chunks and that differentchunks are highly interconnected. A frame system is a collection of attributes or slots and associated values (Facts) which describe some real world entity. *Slots are* set of attributes that describe the object represented by the frame, that is., for a hospital frame, phone no. or address will be in the slots. Each slot contains one or more facets (sometimes called subslots) which describe some knowledge or procedures about the attributes in the slot. Frame package [5] contains both data and procedures into a single knowledge structure. This also represents as Frame Knowledge Representation (FRS).It discussed, The problem related to frame representation and suggested an effective way to remove it.

The basic problem of FRS to deal with quality of knowledge which creates time complexity problems in knowledge representation. In any existing database structure, which is designed on the Frame System in which, the time and instance dimensions are added to create a shared database for the domain. A shared database can provide storage, revision, analysis and also the multi-user facility for a large amount of data using integrated tools for data management. Without the retention of knowledge that is delivered in continuous time and from multiple individuals, it is hard to carry out the knowledge analysis, evaluation and accumulation of statistics. Improve the quality of knowledge representation which is a help to remove the incompleteness and also focused on the validity of knowledge. And at the end, an example of FRS of how the cost reduction of any product by FRS is defined.

Detail discussion of "Discuss improving the quality of knowledge representation". And "Mining The knowledge of Product By FRS" is included here in.

II. IMPROVING QUALITY OF KNOWLEDGE REPRESENTATION

Our discussion here is how to improving the quality of knowledge representation.

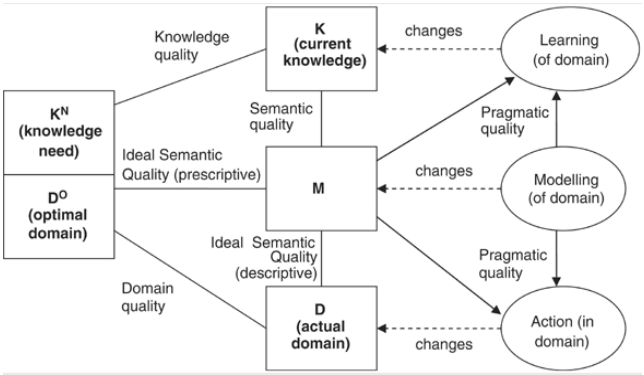

Figure1 A framework of knowledge representation

M(model), which may be changed by a modeling activity[6].

D(domain), which is similarly changed by actions taking place in the domain. It may be changed by directly or indirectly by the modeling activity.

$\boldsymbol{D^O}$ (optimal Domain), It discussed that whether a domain change is better or not.

K(Knowledge), It is a knowledge which organize before modeling activity and changes by learning and, May be facilitated by the model.

$\boldsymbol{K^N}$ (Knowledge Need), knowledge needed by the organization to perform its tasks.

The framework separates quality goals from quality means. Quality is defined on different levels. Following two levels are explained :-

A. Semantic Quality:- It has the quality goals of validity and completeness. Validity here means that all statements in the model are correct and relevant to the problem, while completeness means that the model contains all statements that would be correct.

Here three types of **semantic quality** are defined:-

a. Descriptive model
b. Prescriptive model
c. Perceived model

i. ***Descriptive Model*:-** This model explained, analysis of the early stages of problem by an information systems:- project in which understood the current situation of problem. It compared the validity: $M/D=\emptyset$, completeness: $D/M=\emptyset$. Data randomly generated from a "good" descriptive model will have the same characteristics as the real data. It creates the Relationship between domain and model.

ii. ***Prescriptive Model*:-** This model, help to understood the of current situation modification, which is analysis by outside (example., juridical laws and laws of nature).It is compared to D^O instead of D, that is, validity: $M/D^O=\emptyset$, completeness: $D^O/M=\emptyset$.

iii. ***Perceived model*:-**It create the relationship between K (the current knowledge) and M (the model). It is called 'perceived semantic quality.

The relationships of M with D and D^O are instead called *ideal semantic quality* (descriptive and prescriptive), indicating that these qualities are beyond evaluation and human achievement.

B. Pragmatic Quality:- It is the correspondence between the model and the audience's interpretation of the model and has one goal, comprehension, meaning that the model has been understood. Means to increase pragmatic quality include not only executability, animation, and simulation but also more advanced techniques like model transformations, model filtering to present model abstractions from several viewpoints, model translation, and explanation generation.

Understanding the pragmatic quality by following concerns:

a. Learning(Overall learning ,Local learning)
   K^M be the increase of the set K (i.e., the current knowledge) facilitated by the model M. Then, the overall learning gain of the model is $\Delta K^M \cap K^N$, that is, the new knowledge acquired by the organization, which is also within the knowledge need. In Local learning the goal of modeling might be knowledge transfer, by one or few person or group of people in an organization.
b. Domain Improvement:- D^M is change of the domain D facilitated by the model, and ΔD^m similarly by the modeling activity. The improvement resulting from the model and modeling activity together will then be $(\Delta D^M \cup \Delta D^m) \cap D^O$

Active model, a change to this model might cause a direct change of the domain, hence it might be reasonable to call this a *model-act* (analogous to speech-act); this is the relationship between modeling activity and domain change.

In this way a model can be developed into a new information system with the quality assurance. With this, Time Complexity would improved. It has to be effected the design of Frame structure.

III. MINING THE PRODUCT KNOWLEDGE BY FRS

Mining the data of cost reduction of any product design is a complex solution procedure based on knowledge reasoning. So, scientific knowledge representation is basis of the logical reasoning result.

A. Frame Knowledge Representation:-

A frame is a "Entity type" including a set of "Slot" .The Slot can be filled in various value or index to other frame. Also, the Slot can be divided particularly into many "Aspect" to detail the slot [1].

Frame structure can improve the knowledge by filling the value of Slot and Aspect which is auspicious to the extensive and extensible knowledge. Frame structure can gather the relative attribute of the entity and incarnate the administrative levels by Slot and Aspect. The default value and public attributes of frame can satisfy the demand of universal knowledge and the representation procedure and special illustrative knowledge can solve the conflicting problem.

B. Data Mining of Product Knowledge Represented by Frame:

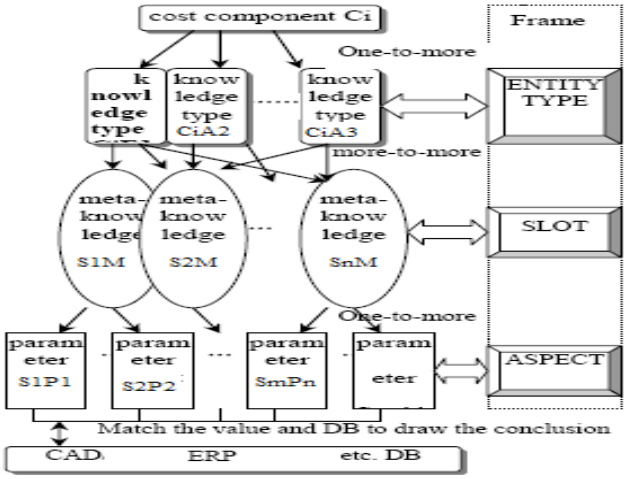

Figure2 Mining the data of product knowledge by frame structure

Mining the data of a Car product knowledge by frame have following step:-

a. At first, In a frame Structure, divided the cost reduction knowledge into types(CiA1, CiA2,…CiAn)according to special cost component (Ci).The type of relationship between cost component and knowledge is one-to-more. This Knowledge type is corresponding to "Entity type".

b. econd main point is, to divided knowledge into mate-knowledge(S1M,S2M,…SnM) corresponding to "Slot" in frame structure. The whole knowledge types have relationship with mate-knowledge is more-to-more relationship, but the relationship between the meta-knowledge and parameter is one-to-one relation.

c. At the end, every mate-knowledge(Sm) is could be determined by a series idiographic parameter(SmPk) which say as "Aspect" in frame structure. It would be obtain the value from CAD,ERP,DB etc.
In Figure 2.the "Slot" and "Aspect" has flexible value.

It could be idiographic value(logic ,integer ,character) or procedure of accessories, such value determine how to calculate the value or what will do for manipulation, explain how to get it, Which can illuminate the relation between the frames or store the index to the other frame.

Table1 Mining the konwledge of the Car product

Cost Components	Entity type	Slot(or Aspect)	Value
CiA1 operating cost	A05 knowledge about improving car(product) efficiency	S1M friction force	store the index to the ways of cost reduction n KD or other DB
		S2M percent recovery	
		S3Menergy Consumption	
		……	
CiA2 maintenance cost	A06 knowledge about choosing standard parts, appendage, shared parts etc.	S4M replaceable attribute of parts	

Finally, the knowledge conclusion about how to reduce cost component demanded is given by SQL as follows:

```
PARAMETERS [cost no] Text ( 255 );
SELECT [cost component table].[COST NO], [cost component table].[COST NAME], [entity type table].[ENTITY NO], [entity type table].[ENTITY NAME], [slot or aspect table].[NO], [slot or aspect table].NAME, [slot or aspect table].VALUE
FROM ([cost component table] LEFT JOIN [entity type table] ON [cost component table].[COST NO] = [entity type table].[COST NO]) LEFT JOIN [slot or aspect table] ON [entity type table].[ENTITY NO] = [slot or aspect table].[ENTITY NO]
WHERE ((([cost component table].[COST NO])=[cost no]));
```

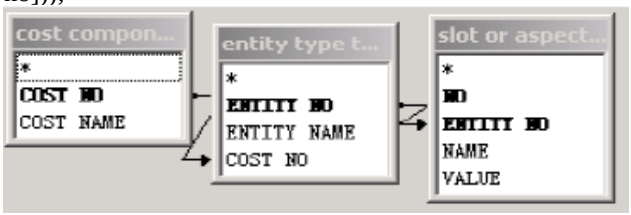

Figure3. Knowledge representation database and reasoning join for cost reduction

IV. CONCLUSION

Knowledge Representation based on different techniques. Focused is on FRS. This term is very general and encompasses a large number of artificial-intelligence techniques. FRSs are a subset of knowledge-representation systems, which in turn are used to build knowledge-based systems. But FRS have some problems. Which is, Discussed and an effective way to remove it is suggested. Validity and Completeness knowledge effected to a Quality of frame structure. Some quality of knowledge representation is mentioned for improving the design of FRS. And also discussed the benefits of FRS design for any real time entity.

Such as, mining the data of product knowledge by FRS. Cost reduction of product knowledge through FRS is a complex target throughout the whole product design process. Design restriction must be guaranteed when reducing cost. How to reduce cost is the conclusion drew from the Expert System and KBS. Knowledge representation is the basis of the KBS and knowledge reasoning. According to the characteristic of the cost reduction knowledge, this paper presented frame structure to represent it. In future, this research help to improve the quality of Knowledge Representation.

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