

# Chapter 5 Structural Knowledge Representation

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## Semantic network:

It is an alternative to predicate logic as a form of knowledge representation in structural form.

- Semantic net representation describes relationship betn concepts, objects or events in a pictorial form.
- The concepts and objects of the problem domain are represented by nodes and relationship between them are shown by directed arrows.

E.g.:

Tom is a cat.

Tom caught a ball.

Tom owned by John

Tom is ginger in color.

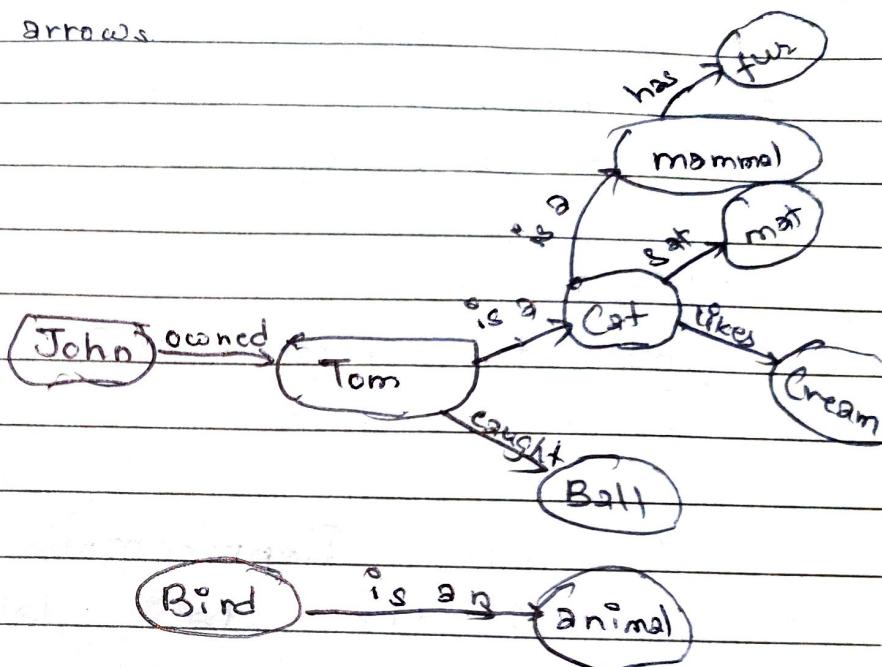
Cat likes cream

The cat sat on the mat.

A cat is a mammal.

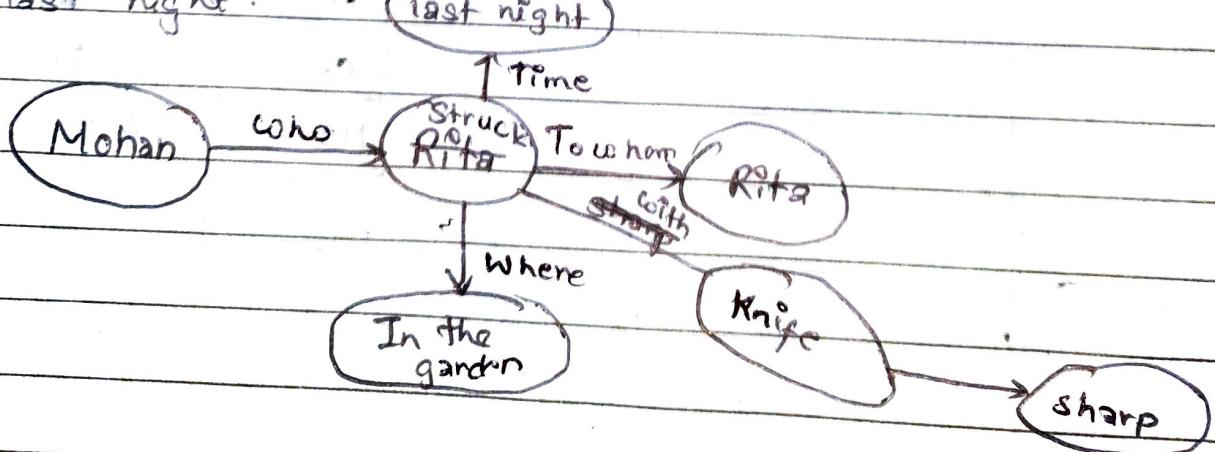
Mammal has fur.

A bird is an animal.



Eg.:

Mohan struck Rita in the garden with a sharp knife last night.



An information in semantic n/w is clustered together to relational link, knowledge required for the performance of some task. Some task is generated generally available in such an understandable form. This kind of knowledge representation is similar to human being brain.

### Advantages:

- Easy to visualize
- Efficient in space requirement
- Objects are represented as only one

### Disadvantages:

- Unable to represent negation, quantification, disjunction & inference.

### Knowledge Representation using Frame:

- Frame is the static data structure used need to represent well understood situation in a group of slot & slot fillers.
- Slot are similar to attributes in object oriented approach.

Name of frame		e.g. Ram	
Slot	Slot filter	Age	22
		Color	White
		Married	No
			!

Frame structure contain following information.

① Frame identification information (Name)

E.g: A frame which store knowledge about car

can have a name 'car'.

② Relationship of this frame to other frame.

E.g: A super class of a frame 'Car' is a frame 'vehicle'.

③ Knowledge about an attribute of an object & its value.

E.g: A frame 'car' can have an attribute 'number of wheels' with value 4.

④ Frame default information.

These are slot values that are taken to be true

when no evidence to the contrary has been found.

Frame has three types:

① Class frame:

Vehicle	
Reg No	
Model	
Producer	
Owner	

② Sub class - frame

Car class vehicle	
Reg No	
Model	
Producer	
Owner	
No. of wheels	
Engine	

③ Instance class

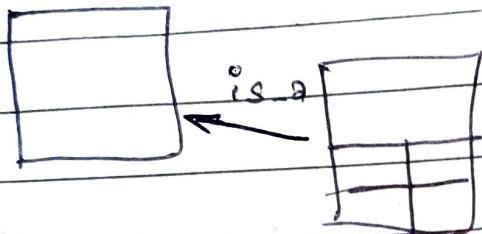
Raro's car	
Reg No.	
Model	
Producer	
Owner	
No. of wheels	
Engine	

Types of relationship.

is-a relationship:

Relates sub-class frame with a class frame or an instance frame with a subclass frame or class frame.

In this case, a sub-class frame or instance frame inherits all slots from a class frame & it can also include new slots.



part-of relationship:

If relates the slot value with another new frame

E.g.

Ram's Car()		part-of	Ram		
Reg No			Age		
owner			Height		
Model			Weight		
- -					

Semantic relationship?

If relates different object with its attributes

E.g.:

Ram's Car()		part-of	Ram		Man	
Reg NO			Age		Height	
owner			Weight		Weight	
Model						
- -						

## Frame method:

Frame methods are also called demons which is attached to slots. Demons are invoked automatically when a slot is accessed.

Standard demons are:

'IF NEEDED' is invoked when it is necessary to acquire a new slot.

'IF CHANGED' is invoked when the values of slot is changed.

'IF ADDED' is invoked when a value is added to slot.

'IF REMOVED' is invoked when the value of the slot is deleted.

## Advantages:

It makes programming easier by grouping related knowledge together.

easy to setup new slots for new property & relations  
easy to include default information.

## Disadvantages:

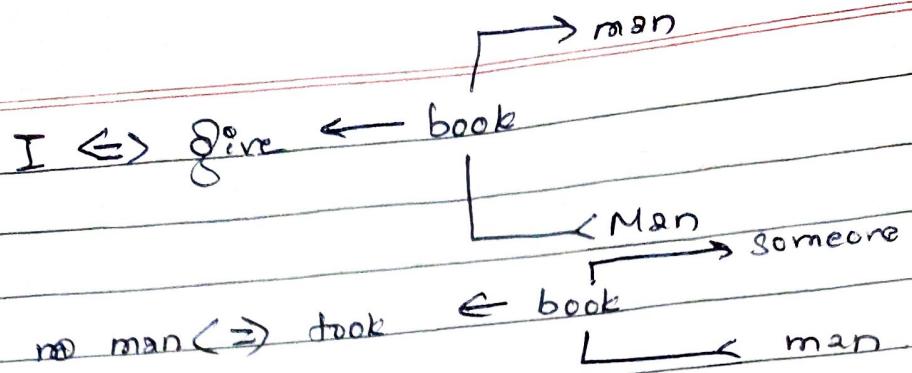
Frame for a room will be completely different for different people.

No associated reasoning or inference

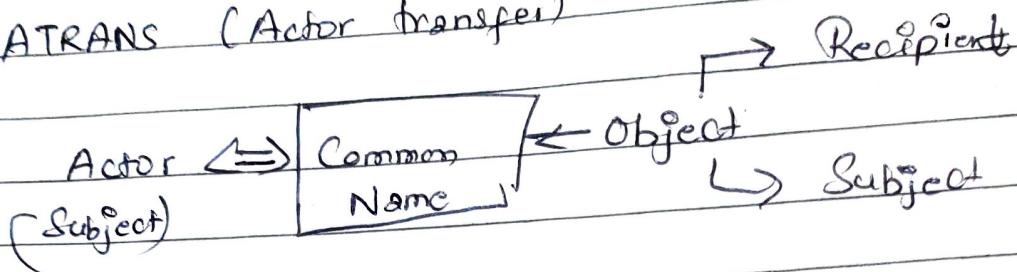
## Conceptual dependency & script:

E.g.: I gave a book to the man.

The man took a book from someone.



ATRANS (Actor transfer)



Conceptual dependency was originally developed to represent knowledge acquired from natural language input. The goal of this theory is to be independent of the words.

For two or more sentences that are identical in meaning there should be only one representation of that meaning.

Conceptual dependency defines eleven primitive actions called act.

### 1) ATRANS

- Transfer of an abstract relationship.

E.g.: give, take.

### 2) PTRANS:

- Transfer of physical relationship

E.g.: go.

### 3) PROPEL

- Application of physical force to an object.

E.g.: Push, Pull.

## MTRANS

Transfer of mental information

E.g.: tell, see.

## MBUILD

Construct new information from old

E.g.: decide, conclude.

## SPEAK:

Utter a sound

E.g.: say, talk, play.

## ATTEND:

Focus a sense of stimulus

E.g.: listen, watch.

## MOVE

movement of body parts. E.g.: Punch, kick

## GRASP

Actor grasping on object. E.g.: clutch.

## INGEST

Actor ingesting on object - E.g.: eat, drink

## EXPEL

Actor getting rid of an object from body.

E.g.: cry, sweat, etc.

## Script:

A script is a structured representation of describing in a sequence of events in a particular context. A script is a data structure which is used for interpreting stories. A script is composed of following components.

- i) Entry condition that must be true for the script to be called.
- ii.) Results or facts these are true once script has terminated.
- iii.) Props or the things that makeup the content of scripts.
- iv.) Roles are the actions that the individual participant perform
- v.) Sit Scenes which represent temporal aspect of the script.
- vi.) Track are the variation on the script. Different track may share different components of the same scripts.