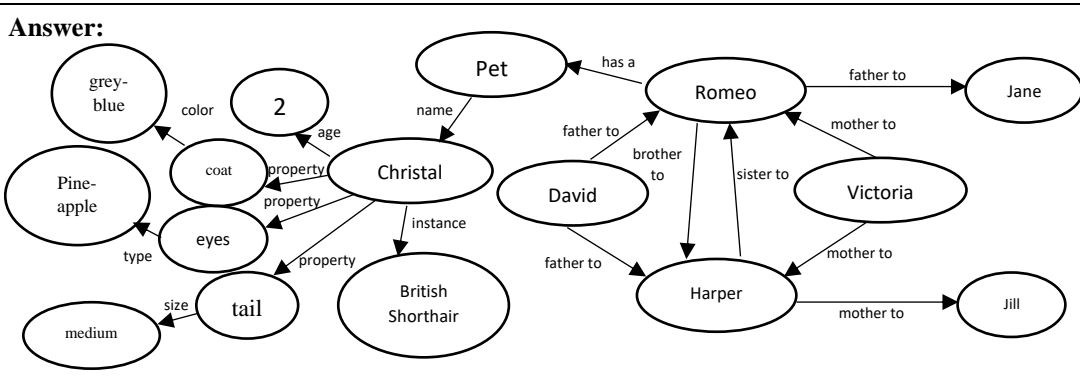


Tutorial 5

- Semantic network is a knowledge base that represents semantic relations between concepts in a network. Draw a semantic network for the following facts and relations.

"David and Victoria are the parents of Romeo and Harper. Romeo and Harper are brother and sister. Jane is the child of Romeo, and Jill is the child of Harper. Romeo has a pet called 'Christal,' a British Shorthair. Christal is 2 years old now and has a grey-blue coat, pineapple eyes, and a medium-sized tail."

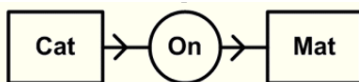


- How are semantic networks different from Conceptual Graph? Explain your answer with the help of **ONE (1)** diagram for each of the methods based on the following statement:

"A cat is on a mat."

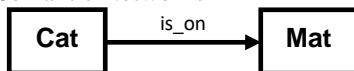
Answer:

Conceptual Graph



- The nodes of the graph are either concepts or conceptual relations.
- Do not use labeled arcs

Semantic Networks



- The nodes of the graph are either concepts, events, or action.
- Labeled arcs to show the relationships

- The following statements are given.

Albert is a human.
Pepper is a robot.
The construction of human is biological, while robot is mechanical.
Both human and robot are autonomous system.
The behaviours of autonomous system are mobile and adaptive.

- Between semantic network and frames, justify which knowledge representation tool you would use to represent the information above.
- Discuss **ONE (1)** limitation of the knowledge representation tool that is selected in Question 3(a) above.

- c) Illustrate the representation of the given statements above using the knowledge representation tool that you selected in Question 3(a) above.

Answer:

a)

Semantic network as it is more suitable to describe the relationship between objects and overall concepts. Or

Frames as frames are suitable to show the details of objects and their relationship.

Not description on syntax/semantic of a sentence, etc “bank”

b)

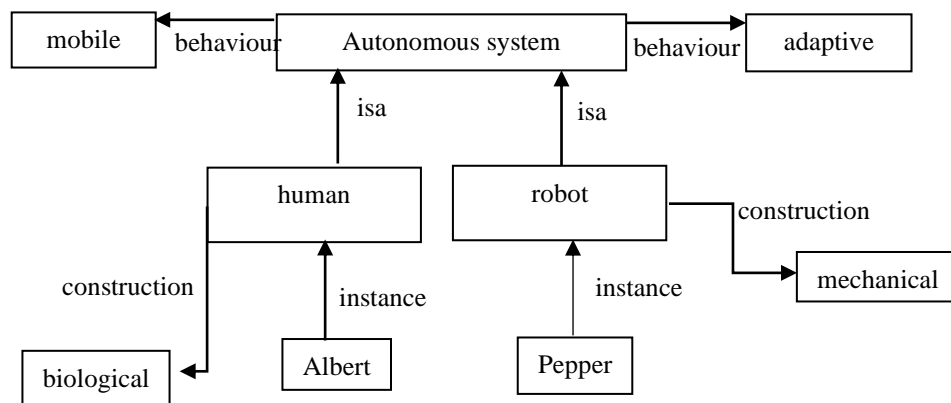
Semantic network is less organized and difficult to view the relationship between a rule and another.

Frames are only able to represent stereotyped objects, but are not able to represent events

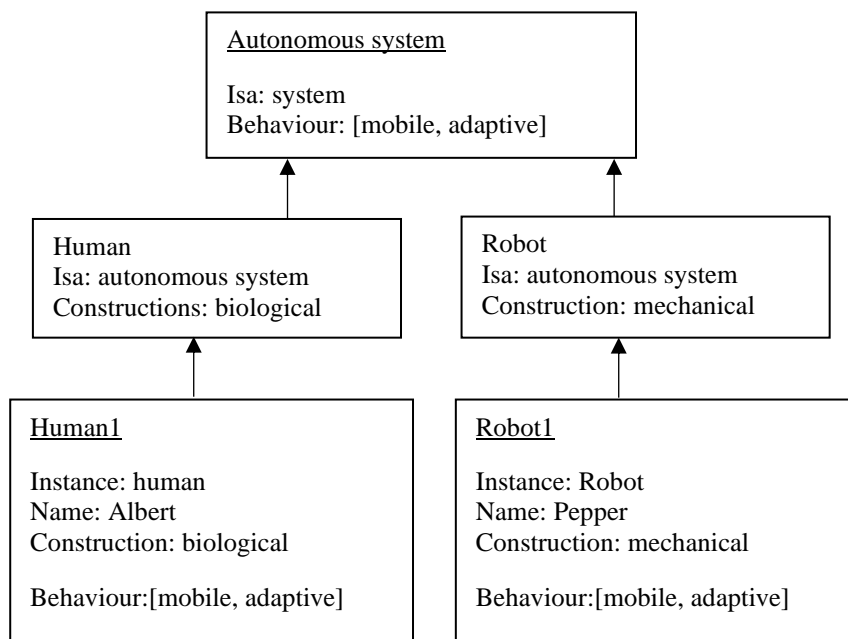
A generalized picture of a person, created without taking the whole person into account; to make such a generalization. Context: When we stereotype a group of people, we depict all of the individuals within that group as having the same characteristics.

Semantic shows height/weight/carry heavy load/size but frame is not able to represent it

Semantic Network



Frames



4. The following statements are given.

Bird is a living being that builds nest.
Insect is an invertebrate living being.
Ant is a kind of insects that builds nest.
Both dragonfly and fly are insects that have wings.

- Between semantic network and frames, justify which knowledge representation tool you would use to represent the information above.
- Discuss **ONE (1)** limitation of the knowledge representation tool that is selected in Question 4(a) above.
- Illustrate the representation of the given statements above using the knowledge representation tool that you selected in Question 4(a) above.

Answer:

a)

Semantic network as it is more suitable to describe the relationship between objects and overall concepts. Semantic network is not intelligent, it depends on the creator. If the creator is not intelligent enough, the connection will become choosy. Or

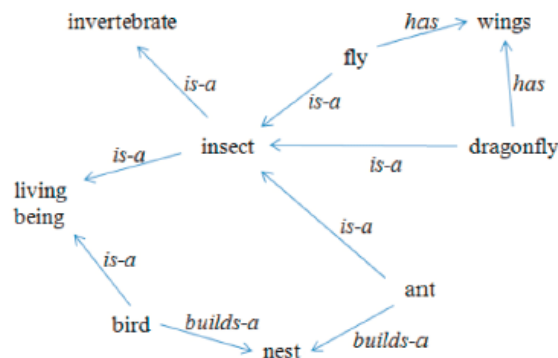
Frames as frames are suitable to show the details of objects and their relationship.

b)

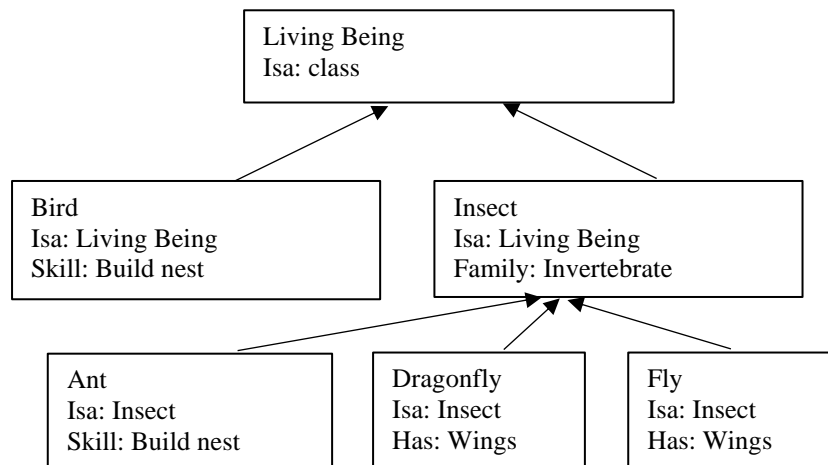
Semantic network is less organized and difficult to view the relationship between a rule and another. In semantic network representations, there is no formal semantics, no agreed-upon notion of what a given representational structure means. For example, the system is limited by the user's understanding of the meanings of the links in a semantic network. Or

Frames are only able to represent stereotyped objects, but are not able to represent events

Semantic Network



Frames



5. Suggest and describe a real-life application where semantic network is applied.

Answer:

Open-ended question. Students find sample applications online (please remind them to place the reference). Sample can obtain from Wikipedia.

1) The real-life application is WordNet, a lexical database of English that has been used by major search engines and IR research projects for many years. It groups English words into sets of synonyms called synsets, provides short, general definitions, and records the various semantic relations between these synonym sets. Some of the most common semantic relations defined are meronymy (A is a meronym of B if A is part of B), holonymy (B is a holonym of A if B contains A), hyponymy or troponymy (A is subordinate of B; A is kind of B), hypernymy (A is superordinate of B), synonymy (A denotes the same as B) and antonymy (A denotes the opposite of B). WordNet properties have been studied from a network theory perspective and compared to other semantic networks created from Roget's Thesaurus and word association tasks. From this perspective the three of them are a small world structure.

2) Google search engine

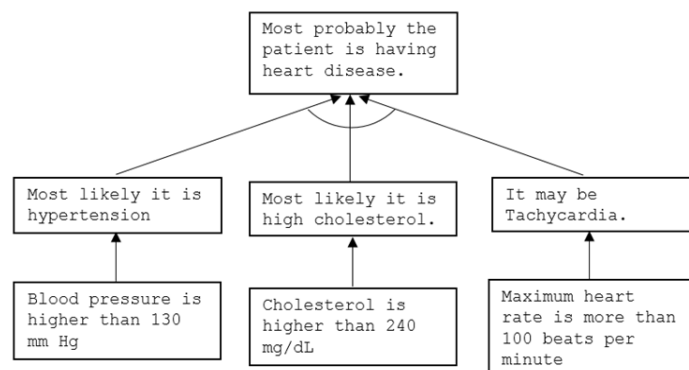
6. A rules based heart failure rule-based system is shown below.

- R1: IF Blood pressure is higher than 130 mm Hg
THEN Most likely it is hypertension.
- R2: IF Cholesterol is higher than 240 mg/dL
THEN Most likely it is high cholesterol.
- R3: IF Maximum heart rate is more than 100 beats per minute
THEN It may be Tachycardia.
- R4: IF There is hypertension
AND High cholesterol
AND Tachycardia
THEN Most probably the patient is having heart disease.

Proposed **ONE (1)** technique to represent the knowledge above. Then, represent the knowledge by using the proposed technique.

Answer:

And/OR graph (1m)



7. The information below describes the differences between a desktop and a laptop. Illustrate the information below with frames.

Laptop and desktop are the commonly used computer among students. Laptop is generally small and easily portable. It can run either on battery or main power supply. Desktop, on the other hand, is large and not portable. It only runs on main power supply. Besides that, desktop normally has more powerful processor as compared to laptop. ACER Predator Helios 500, which is a gaming laptop, however, is equipped with a powerful Intel i9 processor.

Answer:

Student's answer may be varied

