3.5 Semantic Networks

Semantic networks are alternatives to predicate logic for knowledge representation.

In semantic networks, we can represent our knowledge in the form of graphical networks.

This network consists of nodes representing objects and arcs which describe the relationship between those objects.

Semantic networks can categorize objects in different forms and can also link those objects.

Semantic networks are easy to understand and can be easily extended.

A semantic network is a simple representation scheme that uses a graph of labeled nodes and labeled directed arcs to encode knowledge:

Node – objects, concepts, events

Arcs – relationships between nodes

Graphical depiction associated with semantic networks is a big reason for their popularity.

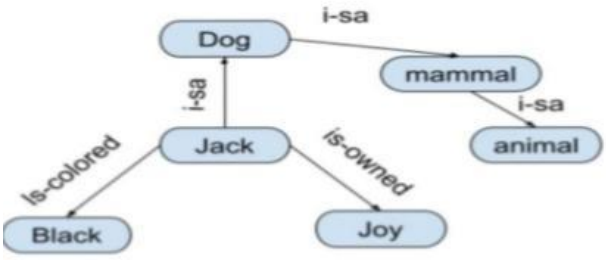
This representation consists of mainly two types of relations:

IS-A relation (Inheritance)

Kind-of-relation

Example

Statements



Jack is a dog.

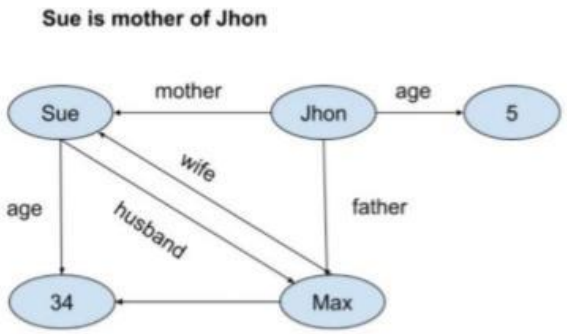
Jack is a mammal.

Jack is owned by Joy.

Jack is black colored.

All mammals are animals.

Nodes and Arcs



Mother (jhon, sue)

Agr (jhon, 5)

Wife (sue, max)

Age (max, 34)

Arcs define binary relations which hold between objects denoted by the nodes.

Advantages of Semantic Networks

Semantic networks are a natural representation of knowledge.

They convey meaning transparently.

These networks are simple and easily understandable.

They can help represent events and natural language sentences.

The semantics, i.e. real-world meanings, are identifiable.

Drawbacks of Semantic Networks

Semantic networks take more computational time at runtime as we need to traverse the complete network tree to answer some questions.

They try to model human-like memory to store the information, but in practice, it is not possible to build such a vast semantic network.

These types of representations are inadequate as they do not have any equivalent quantifier, e.g., for all, for some, none, etc.

Semantic networks do not have any standard definition for the link names.

These networks are not intelligent and depend on the creator of the system.