MEET PATEL 60004200104 B-1

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AI

Assignment - 2

Q 1)

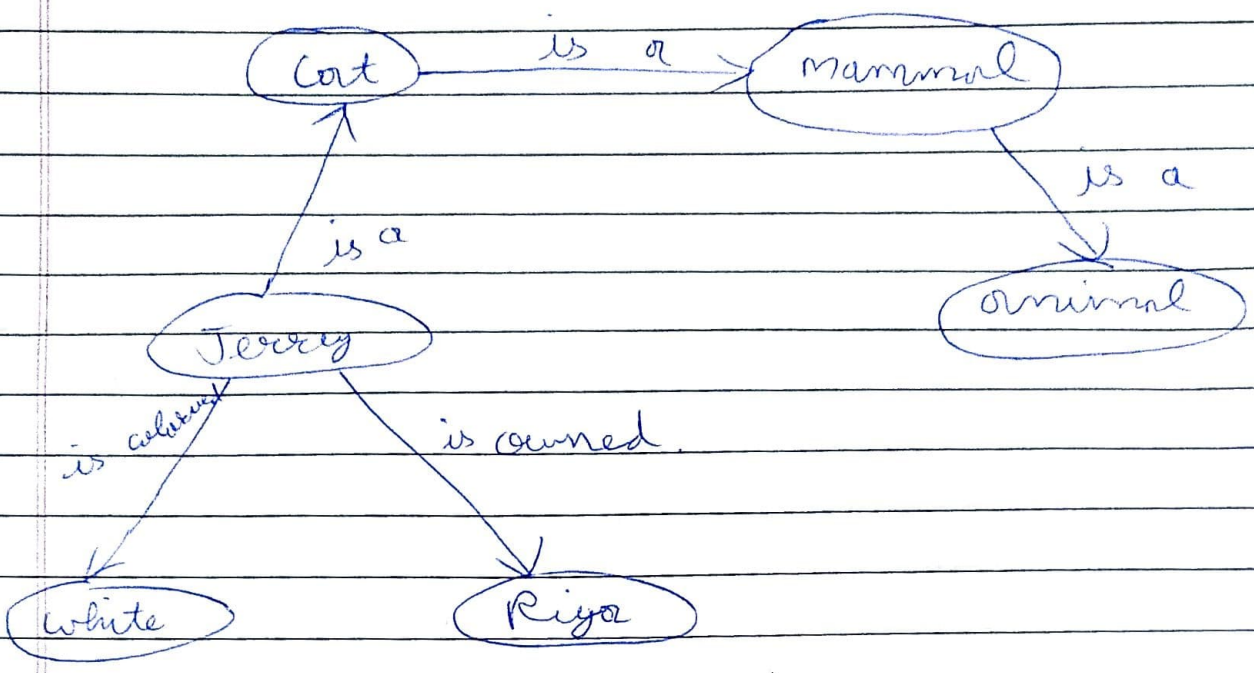
Ans i) Semantic Networks:

A semantic network is a graphic notation for representation knowledge in patterns of interconnected nodes. It became popular in patterns of popular in Artificial Intelligence and Natural Language Processing only because it knowledge or support reasoning These acts as another alternation for predicate logic in a form of knowledge representation.

This network consists of nodes representing objects and arc which describe the relationship between these objects. which describe the semantic network categorize in different forms and can also link these objects. This network are easy to understand and can be easily extended.

Example

- Jerry is cat
- Jerry is mammal
- Jerry is owned by Riya
- Jerry is white coloured
- All mammals are animal



ii) The semantic web makes use of RDF and OWL which occur in 2 layers as follows.

RDF is acronym for Resource Description Frame which is special type of frame work found online that is dedicated with representation of online exchange of data

OWL is acronym for Ontology Web Language which is special language used in description of ontologies online

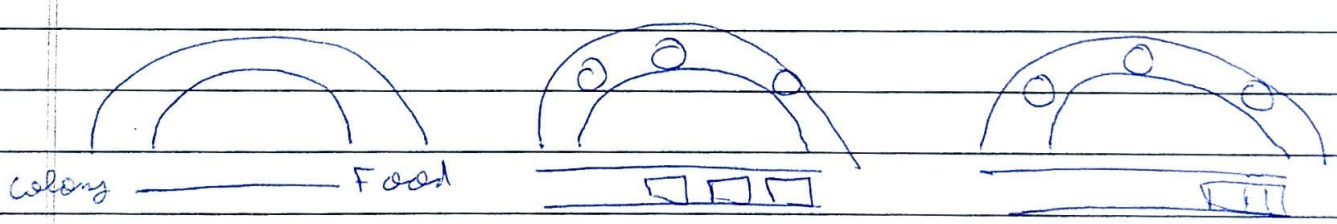
RDF allows expression of relationship between things while OWL is similar but bigger better and broader. Some other major differences are Vocabulary, logical consistency and Annotations / metadata OWL gives such variety of annotation unlike RDF, which OWL satisfies

all metadata modelling needs.

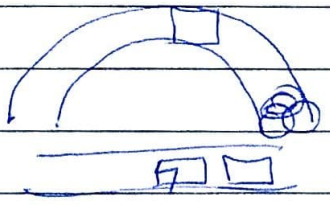
Q 2)

Ans Ant colony optimization is a population based metaheuristic that can be used to find approximate solutions to difficult optimization problems.

In ant colony optimization a set of software agents called artificial ants search for good solutions to given optimization problem. These ants incrementally build solutions by moving on weight. The solution construction process is clockwise and is based by pheromone model, that is, set of parameters associated with graph components



Stages : 1 2 3



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Ants all are in nest. There is no pheromone contention environment. Ants begin

to search with equal probability. More ants return via shorter path - Therefore whole colony gradually uses shorter path.

Q 3)

Ans Unification is process of making 2 different logical atomic expressions identical by finding a substitution. It depends on substitution process.

It takes literals as inputs and makes them identical using substitution

Let ψ_1 & ψ_2 are 2 atomic sentences that $\psi_1 \sigma = \psi_2 \sigma$ then it can be expressed as

Unify (ψ_1, ψ_2)

For example:

Find MGU for Unify (King (x), King (John))

Let ψ_1 = king(x) ψ_2 = king(John)

substitution θ = {John/x} is a unifier for these atoms and applying this substitution and both expression will be identical. Unification is key component of all first order inference. It returns fail if expression dont match with each other. Substitution variables are called as Most general unifier MGU.

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Q4)

Ans Bayesian belief network is key computer technology for dealing with probabilistic events to solve a problem which has uncertainty.

A Bayesian Network can be defined as follows:

'A probabilistic graphical model which represents set of variables and their conditional dependencies using a directed acyclic graph'

Bayesian network are probabilistic because these network are built from a probability distribution and also are probability theory for prediction and anomaly detection.

It can also be used in various tasks including prediction, diagnostic, automated, insights, reasoning, time series prediction and decision making under uncertainty.

Bayesian network can be used for building models for data and experts opinions.

It consist 2 parts:

Directed Acyclic graph.

Table of Acyclic Conditional Probability

The generalized form of Bayesian network. represents and solves problems under certain knowledge is called Influence diag.

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Q5)

Ans Fuzzy refers to something that is vague. Here Fuzzy set is a set where every key is associated with value which is between 0 to 1 based on uncertainty. This value is often called as degree of membership. Fuzzy set is denoted with a double sign on top of the normal set.

Fuzzy set operations:

1) Union:

degree-of-membership (U) = max (degree-of-membership (A), degree-of-membership (B))

For example:

A = {'a': 0.2, 'b': 0.3, 'c': 0.6}

B = {'a': 0.9, 'b': 0.9, 'c': 0.4}

U = {'a': 0.9, 'b': 0.9, 'c': 0.6}

2) Insertion:

degree-of-membership (I) = min (degree of membership of x and y)

For example:

A = {'a': 0.2, 'b': 0.3}

B = {'a': 0.9, 'b': 0.9}

I = {'a': 0.2, 'b': 0.3}

3) Complement

degree_of_membership (4) = 1 - degree_of_membership (A)

For example:

A = {'a': 0.2, 'b': 0.3}

4 = {'a': 0.8, 'b': 0.7}

4) Difference:

degree_of_membership (4) = min (degree_of_membership (A), 1 - degree_of_membership (B))

For example:

A = {'a': 0.2, 'b': 0.3}

B = {'a': 0.9, 'b': 0.9}

4 = {'a': 0.1, 'b': 0.1}