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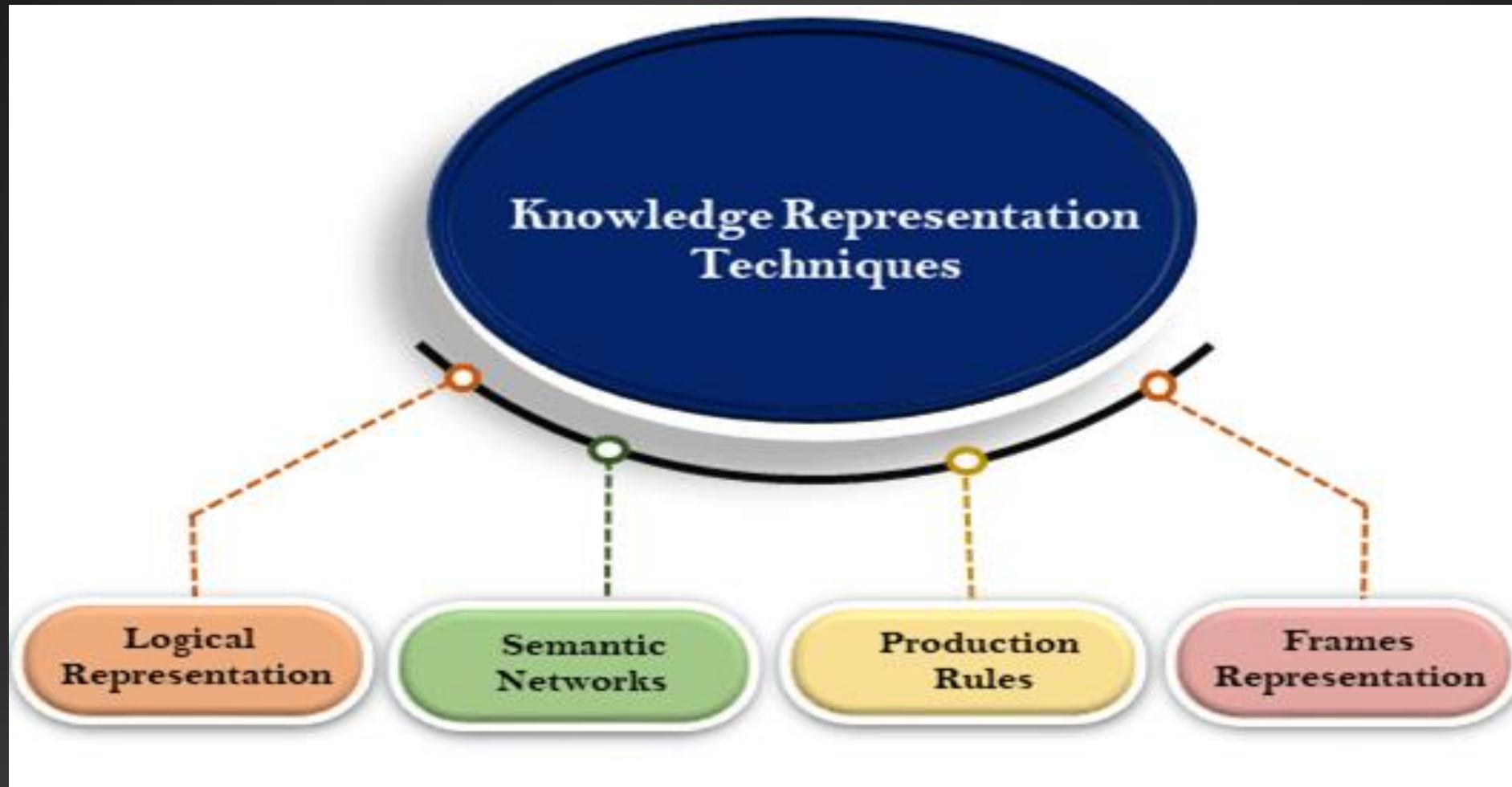
❑ **Approaches to AI**

Content:

1. Techniques of knowledge representation

Techniques of knowledge representation

There are mainly four ways of knowledge representation which are given as follows:

- ➢ Logical Representation
- ➢ Semantic Network Representation (associative network)
- ➢ Frame Representation
- ➢ Production Rules

1. Logical Representation

❖ Logical representation is a language with some concrete rules which deals with propositions and has no ambiguity in representation.

❖ Logical representation means drawing a conclusion based on various conditions.

❖ This representation lays down some important communication rules.
It consists of precisely defined syntax and semantics which supports the sound inference.

❖ Each sentence can be translated into logics using syntax and semantics.

Syntax:

- Syntaxes are the rules which decide how we can construct legal sentences in the logic.

- It determines which symbol we can use in knowledge representation.

- How to write those symbols.

Semantics:

- Semantics are the rules by which we can interpret the sentence in the logic.

- Semantic also involves assigning a meaning to each sentence.

Logical representation can be categorised into mainly two logics:

a. Propositional Logics

b. Predicate logics

Advantages of logical representation:

1. Logical representation enables us to do logical reasoning.

2. Logical representation is the basis for the programming languages.

Disadvantages of logical Representation:

1. Logical representations have some restrictions and are challenging to work with.

2. Logical representation technique may not be very natural, and inference may not be so efficient.

2. Semantic Network Representation

❖ Semantic networks are alternative of 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 arros which describe the relationship between those objects.

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

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

This representation consist of mainly two types of relations:

a. IS-A relation (Inheritance)

b. Kind-of-relation

Example: Following are some statements which we need to represent in the form of nodes and arcs.

Statements:

a. Jerry is a cat.

b. Jerry is a mammal

c. Jerry is owned by Priya.

d. Jerry is brown colored.

e. All Mammals are animal.

Semantic Networks:

Example :

Tom is a cat.

Tom caught a bird.

Tom is owned by John.
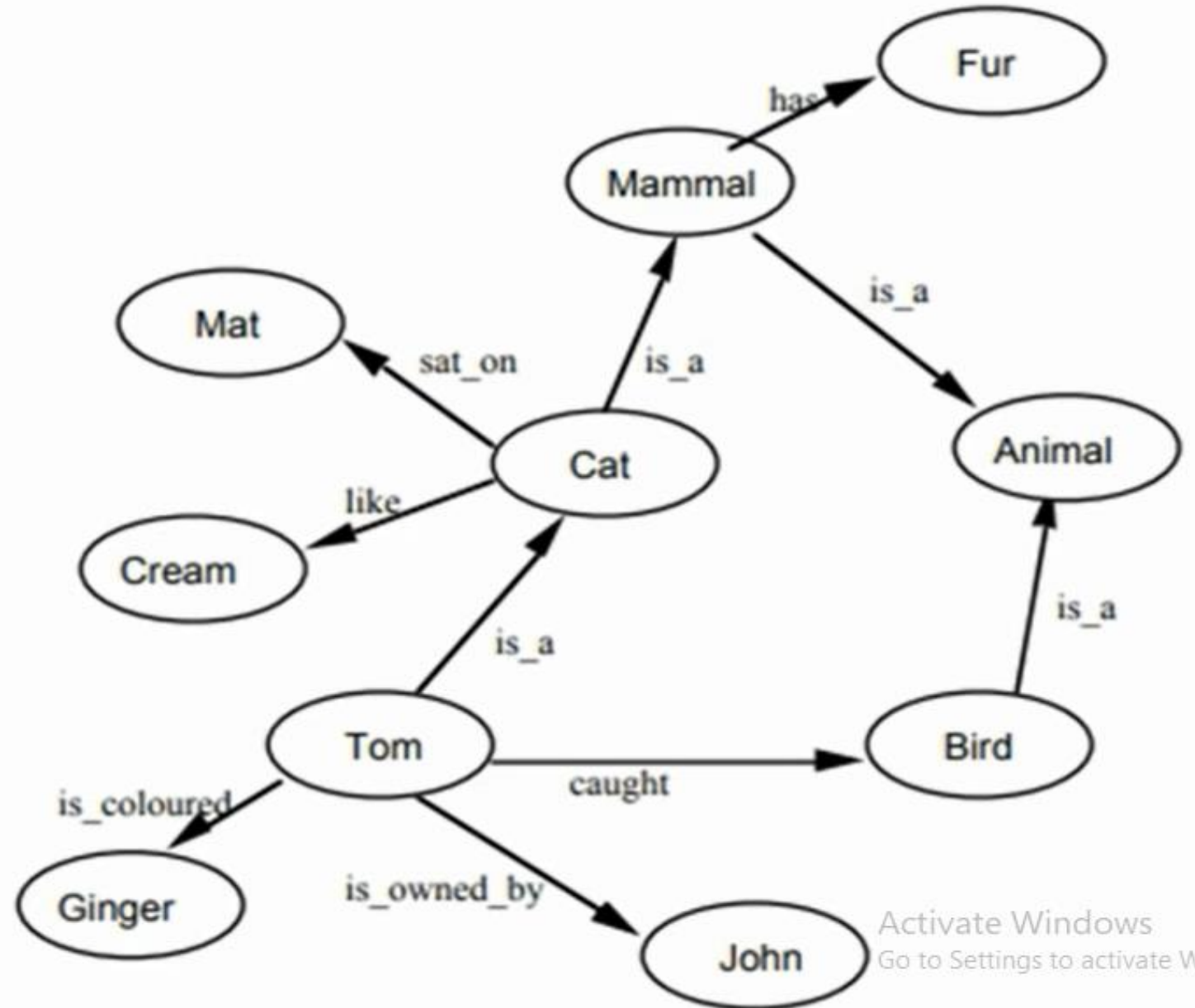
Tom is ginger in colour.

Cats like cream.

The cat sat on the mat.

A cat is a mammal.

A bird is an animal.

All mammals are animals.

Mammals have fur.

3. Frame Representation

❖ A frame is a record like structure which consists of a collection of attributes and its values to describe an entity in the world.

❖ Frames are the AI data structure which divides knowledge into substructures by representing stereotypes situations.

❖ It consists of a collection of slots and slot values.

❖ These slots may be of any type and sizes.

❖ Slots have names and values which are called facets.

❖ Frames are derived from semantic networks and later evolved into our modern-day classes and objects.

❖ A single frame is not much useful.

❖ Frames system consist of a collection of frames which are connected.

❖ In the frame, knowledge about an object or event can be stored together in the knowledge base.

❖ The frame is a type of technology which is widely used in various applications including Natural language processing and machine visions.

EXAMPLE

Slots	Filters
Title	Artificial Intelligence
Genre	Computer Science
Author	Peter Norvig
Edition	Third Edition
Year	1996
Page	1152

4. PRODUCTION RULES

❑Production rules system consist of (**condition, action**) pairs which mean, "If condition then action".

❑It has mainly three parts:

➢ The set of production rules
➢ Working Memory
➢ The recognize-act-cycle

Example:

- IF (at bus stop AND bus arrives) THEN action (get into the bus)

- IF (on the bus AND paid AND empty seat) THEN action (sit down).

- IF (on bus AND unpaid) THEN action (pay charges).

- IF (bus arrives at destination) THEN action (get down from the bus).

HOME WORK

39. What is the best method to go for the game playing problem?

a. Optimal Search

b. Random Search

c. Heuristic Search

d. Stratified Search

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