**** **Bansilal Ramnath Agarwal Charitable Trust’s**

**Vishwakarma Institute of Information Technology, Pune-48**

**(An Autonomous Institute affiliated to Savitribai Phule Pune University)**

**Department of Computer Science and Engineering (Artificial Intelligence)**

**LAB SUBMISSION**

**Artificial Intelligence**

**CAUA31201**

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**Assignment: 3**

Aim:

1. To understand the concept of knowledge bases and how they represent information, particularly in the context of family relationships.
2. To learn how to parse a family tree structure from a knowledge base format, identifying individuals and their relationships.
3. To explore different types of family relationships, such as parent, child, sibling and extended family connections.
4. To understand how to query and extract specific information from the parsed family tree using logical reasoning or traversal techniques.
5. To apply this knowledge to real-world scenarios, demonstrating how family trees can be used for genealogy, inheritance and social networking applications.

Theory:

1. **Knowledge Base Overview:**

A knowledge base is a structured set of information that represents knowledge in a specific domain. It often uses a formal language to express relationships, facts, and rules about entities. In the context of a family tree, a knowledge base encodes relationships between family members, allowing for reasoning and querying about those relationships.

1. **Family Tree Structure:**

A family tree is a graphical representation of family relationships, showing how individuals are related through ancestry and descent. It typically includes:

* **Nodes:** Represent individuals (e.g., parents, children).
* **Edges:** Represent relationships (e.g., parent-child, sibling).

1. **Representation of Family Relationships:**

Family relationships can be expressed in various formats, including:

* **Predicate Logic:** Using predicates to express relationships, such as Parent(X, Y) meaning "X is a parent of Y".
* **Graphs:** Nodes for individuals connected by edges representing relationships.
* **XML/JSON:** Hierarchical formats where individuals are represented as objects with properties indicating relationships.
* **Example representation in predicate logic:**
* Parent(Alice, Bob)
* Parent(Alice, Carol)
* Parent(David, Bob)
* Parent(David, Carol)

1. **Parsing Process:**

Parsing involves extracting information from the knowledge base and organizing it into a usable structure, such as a tree or graph. The steps include:

* **Reading the Knowledge Base:** Accessing the file or database that contains the family relationships.
* **Extracting Relationships:** Identifying and extracting the relationships defined in the knowledge base.
* **Building the Family Tree:** Constructing the tree structure based on the extracted relationships, ensuring correct parent-child connections.

1. **Querying the Family Tree:**

Once the family tree is constructed, various queries can be performed, such as:

* Finding all children of a specific parent.
* Determining the siblings of an individual.
* Tracing ancestry back to grandparents or earlier generations.

Queries can be implemented using traversal algorithms (e.g., depth-first search or breadth-first search) to explore the relationships encoded in the family tree.

1. **Applications:**

Parsing and querying family trees have various real-world applications, including:

* **Genealogy:** Helping individuals trace their ancestry and understand their heritage.
* **Inheritance:** Determining legal heirs in estate planning and probate cases.
* **Social Networking:** Understanding family connections and building social graphs.

Conclusion:

Parsing a family tree from a knowledge base helps us organize and find information about family relationships easily. By putting these connections into a clear structure, we can quickly look up and analyze how people are related. This approach is useful for things like tracing ancestry, handling inheritance, and understanding family connections in social networks. Overall, it shows how important it is to represent and understand complex family ties.