

LAB7

check entailment :

CODE:

```
# Function to check entailment based on user input
def check_entailment():
    print("Welcome to the Entailment Checker!")

    # Step 1: Gather user input for facts (Premises)
    alice_is_mother_of_bob = input("Enter the fact: Alice is the mother of Bob. (e.g., 'Alice is the mother of Bob')\n")
    bob_is_father_of_charlie = input("Enter the fact: Bob is the father of Charlie. (e.g., 'Bob is the father of Charlie')\n")
    father_is_parent = input("Enter the fact: A father is a parent. (e.g., 'A father is a parent')\n")
    mother_is_parent = input("Enter the fact: A mother is a parent. (e.g., 'A mother is a parent')\n")
    all_parents_have_children = input("Enter the fact: All parents have children. (e.g., 'All parents have children')\n")
    parents_children_are_siblings = input("Enter the fact: Parents' children are siblings. (e.g., 'Parents' children are siblings')\n")
    alice_is_married_to_david = input("Enter the fact: Alice is married to David. (e.g., 'Alice is married to David')\n")

    # Step 2: Entailment reasoning process
    if ('Alice is the mother of Bob' in alice_is_mother_of_bob and
        'Bob is the father of Charlie' in bob_is_father_of_charlie and
        'A father is a parent' in father_is_parent and
        'A mother is a parent' in mother_is_parent and
        'All parents have children' in all_parents_have_children and
        'Parents' children are siblings' in
parents_children_are_siblings and
        'Alice is married to David' in alice_is_married_to_david):

        # Conclusion: Check if Charlie is a sibling of Bob
        print("\nSince Alice is Bob's mother and Bob is Charlie's father, Charlie and Bob are siblings.")
        print("Conclusion: Charlie is a sibling of Bob. The hypothesis is entailed by the knowledge base.")
    else:
        print("\nThe information provided does not fully support the conclusion.")

# Run the function
check_entailment()
```

output:

```
➡ Welcome to the Entailment Checker!  
Enter the fact: Alice is the mother of Bob. (e.g., 'Alice is the mother of Bob')  
Alice is the mother of Bob  
Enter the fact: Bob is the father of Charlie. (e.g., 'Bob is the father of Charlie')  
Bob is the father of Charlie  
Enter the fact: A father is a parent. (e.g., 'A father is a parent')  
A father is a parent  
Enter the fact: A mother is a parent. (e.g., 'A mother is a parent')  
A mother is a parent  
Enter the fact: All parents have children. (e.g., 'All parents have children')  
All parents have children  
Enter the fact: Parents' children are siblings. (e.g., 'Parents' children are siblings')  
Parents' children are siblings  
Enter the fact: Alice is married to David. (e.g., 'Alice is married to David')  
Alice is married to David  
  
Since Alice is Bob's mother and Bob is Charlie's father, Charlie and Bob are siblings.  
Conclusion: Charlie is a sibling of Bob. The hypothesis is entailed by the knowledge base.
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Observation book

LAB-7.

Knowledge Base:

1. Alice is the mother of Bob.
2. Bob is the father of Charlie.
3. A father is a parent.
4. A mother is a parent.
5. All parents have children.
6. ~~Any~~ If someone is a parent, their children are siblings.
7. Alice is married to David.

Hypothesis

- Charlie is a sibling of Bob.

Premises - logical form

1. $P_1: A \rightarrow B$
2. $P_2: C \rightarrow D$
3. $P_3: F \rightarrow P$
4. $P_4: M \rightarrow P$
5. $P_5: P \rightarrow S$
6. $P_6: P \rightarrow S$
7. $P_7: A \rightarrow D$

From Knowledge base

- $$\begin{aligned}
 &A \rightarrow B \\
 &B \rightarrow C \\
 &F \rightarrow P \\
 &M \rightarrow P \\
 &P \rightarrow S \\
 &A \wedge B \rightarrow D
 \end{aligned}$$

- Premise 1: $A \rightarrow B$ (if Alice is mother of Bob and Bob is father of Charlie)
- Premise 2: $A \wedge B$ (if Alice & Bob are parents their are siblings)

Entailment.

1. if A (Alice is mother of Bob) is true $\rightarrow B$ must be true (since $A \rightarrow B$)
2. $\neg B$ is true \rightarrow must be true $\left(\begin{matrix} F \rightarrow P \\ M \rightarrow P \end{matrix} \right)$
 $\rightarrow M$ must be true
3. If both Alice and Bob are parents

4. Since S is true.

$\rightarrow a$ is true.

Conclusion :-

the hypothesis "Charles is a sibling of b" is true. Therefore the hypothesis is entailed by the knowledge e & b are

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