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CLASS & SEC : AI&DS - 'FD'

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EX NO: 6

DATE: 17-05-2025

EXP NAME : IMPLEMENTATION OF UNIFICATION AND RESOLUTION ALGORITHM

PROGRAM :

```python
import re
def unify(x, y, theta={}):
    if theta is None:
        return None
    elif x == y:
        return theta
    elif isinstance(x, str) and x.islower():  # x is a variable
        return unify_var(x, y, theta)
    elif isinstance(y, str) and y.islower():  # y is a variable
        return unify_var(y, x, theta)
    elif isinstance(x, list) and isinstance(y, list) and len(x) == len(y):
        return unify(x[1:], y[1:], unify(x[0], y[0], theta))
    else:
        return None
def unify_var(var, x, theta):
    if var in theta:
        return unify(theta[var], x, theta)
    elif x in theta:
        return unify(var, theta[x], theta)
    else:
```

```python
            theta[var] = x
        return theta
def resolution(kb, query):
    for clause in kb:
        theta = unify(clause[0], query, {})
        if theta is not None:
            new_kb = clause[1:]
            if not new_kb:
                return True
            else:
                return resolution(kb, new_kb[0])
    return False
knowledge_base = [
    [["Human", "John"], ["Mortal", "John"]],
]
fact = ["Human", "John"]
query = ["Mortal", "John"]
if resolution(knowledge_base, query):
    print("Query is resolved: John is Mortal")
else:
    print("Query could not be resolved")
```

OUTPUT:

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```python
import re

def unify(x, y, theta={}):
    if theta is None:
        return None
    elif x == y:
        return theta
    elif isinstance(x, str) and x.islower():   # x
        return unify_var(x, y, theta)
    elif isinstance(y, str) and y.islower():   # y
        return unify_var(y, x, theta)
    elif isinstance(x, list) and isinstance(y, lis
        return unify(x[1:], y[1:], unify(x[0], y[0
    else:
        return None

def unify_var(var, x, theta):
    if var in theta:
        return unify(theta[var], x, theta)
    elif x in theta:
        return unify(var, theta[x], theta)
    else:
        theta[var] = x
        return theta

def resolution(kb, query):
    for clause in kb:
        theta = unify(clause[0], query, {})
        if theta is not None:
            new_kb = clause[1:]
            if not new_kb:
                return True
            else:
                return resolution(kb, new_kb[0])
    return False

knowledge_base = [
    [["Human", "John"], ["Mortal", "John"]],
]

fact = ["Human", "John"]
query = ["Mortal", "John"]

if resolution(knowledge_base, query):
    print("Query is resolved: John is Mortal")
else:
    print("Query could not be resolved")
```

IDLE Shell 3.13.2

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```
Python 3.13.2 (tags/v3.13.2:4f8bb39, Feb  4 2025, 15:23:48) [MSC v.1942 64 bit (
AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: C:/Users/tarru/AppData/Local/Programs/Python/Python313/t.py =====
Query could not be resolved
>>>
```

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