29/12/20

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1BM18CS030

Write - Up

AI Lab-Test 2

Program No. 5

Code

```
import re

def isVariable(x):
    return len(x)==1 and x.islower() and x.isalpha()


def getAttributes(string):
    expr = '\([^)]+\)'
    matches = re.findall(expr,string)
    return matches

def getPredicates(string):
    expr = '([a-zA-Z~]+)\([^&|]+\)'
    matches
    return re.findall(expr,string)


class Fact:

    def __init__(self,expression):
        self.expression = expression
        predicate,params = self.splitExpression(expression)
        self.predicate = predicate
```


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```
        self.params = params
        self.result = any(self.getConstants())

    def splitExpression(self, expression):
        predicate = getPredicates(expression)[0]
        params = getAttributes(expression)[0].strip('(').split(',')
        return [predicate, params]

    def getResult(self):
        return self.result

    def getConstants(self):
        return [None if isVariable(c) else c for c in self.params]

    def getVariables(self):
        return [ v if isVariable(v) else None for v in self.params]

    def Substitute(self, constants):
        c = constants.copy()
        f = f"{self.predicate}({','.join([constants.pop(0) if isVariable(p)
                else p for p in self.params])})"
        return Fact(f)
```


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AI Lab Test-2

```
class Implication:
    def __init__(self, expression):
        self.expression = expression
        l = expression.split('=>')
        self.lhs = [Fact(f) for f in l[0].split('&')]
        self.rhs = Fact(l[1])

    def evaluate(self, facts):
        constants = {}
        new_lhs = []
        for fact in facts:
            for val in self.lhs:
                if val.predicate == fact.predicate:
                    for i, v in enumerate(val.getVariables()):
                        if v:
                            constants[v] = fact.getConstants()[i]
                    new_lhs.append(fact)
        predicate, attributes = getPredicates(self.rhs.expression)[0],
                                str(getAttributes(self.rhs.expression)[0])
        for key in constants:
            if constants[key]:
                attributes = attributes.replace(key, constants[key])
        expr = f'{predicate}({attributes})'
        return Fact(expr) if len(new_lhs) and all([f.getResult() for f
                in new_lhs]) else None
```


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```
class KB:

    def __init__(self):
        self.facts = set()
        self.implications = set()

    def tell(self, e):
        if '⇒' in e:
            self.implications.add(Implications(e))
        else:
            self.facts.add(Fact(e))
        for i in self.implications:
            res = i.evaluate(self.facts)
            if res:
                self.facts.add(res)

    def ask(self, e):
        facts = set([f.expression for f in self.facts])
        i = 1
        print(f'Querying {e}:')
        for f in facts:
            if Fact(f).predicate == Fact(e).predicate:
                print(f'\t{i}.{f}')
                i += 1
```


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