

Artificial Intelligence Lab - 8

Aim : Implementation of knowledge representation schemes –
USE CASES

Algorithm :

1. Start
2. The user is expected to think of a animal and answer to the questions shown in the prompt.
3. The user answers the set of questions and the inference rule is drawn from it.
4. IF a conclusion to the premises result true it would display the name of the animal otherwise the machine learns from the given set of input.
5. Repeat step 2 to 4 if the user want to make the guess again otherwise go to step 6.
6. Stop

Identification of animal:

cheetah :- mammal,
carnivore,
verify(has_tawny_color),
verify(has_dark_spots).
tiger :- mammal,
carnivore,
verify(has_tawny_color),
verify(has_black_stripes).
giraffe :- ungulate,
verify(has_long_neck),
verify(has_long_legs).
zebra :- ungulate,
verify(has_black_stripes).

Classification rules:

```
mammal :- verify(has_hair), !.  
mammal :- verify(gives_milk).  
bird :- verify(has_feathers), !.  
bird :- verify(flys),  
verify(lays_eggs).  
carnivore :- verify(eats_meat), !.  
carnivore :- verify(has_pointed_teeth),  
verify(has_claws),  
verify(has_forward_eyes).  
ungulate :- mammal,  
verify(has_hooves), !.  
ungulate :- mammal,  
verify(chews_cud).
```

Code :

```
import sys  
  
def definiteNoun(s):  
    s = s.lower().strip()  
    if s in ['a', 'e', 'i', 'o', 'u', 'y']:  
        return "an " + s  
    else:  
        return "a " + s  
  
def removeArticle(s):  
    "Remove the definite article 'a' or 'an' from a noun."  
    s = s.lower().strip()  
    if s[0:3] == "an ": return s[3:]  
    if s[0:2] == "a ": return s[2:]  
    return s  
  
def makeQuestion(question, yes, no):  
    return [question, yes, no]  
  
def isQuestion(p):  
    "Check if node is a question (with answers), or a plain answer."  
    return type(p).__name__ == "list"  
  
def askQuestion(question):  
    print ("\r%s " % question,)  
    return sys.stdin.readline().strip().lower()
```

```

def getAnswer(question):
    if isQuestion(question):
        return askQuestion(question[0])
    else:
        return askQuestion("Were you thinking about %s?" % definiteNoun(question))

def answeredYes(answer):
    if len(answer) > 0:
        return answer.lower()[0] == "y"
    return False

def gameOver(message):
    global tries
    print ("")
    print ("\r%s" % message)
    print ("")

def playAgain():
    return answeredYes(askQuestion("Do you want to play again?"))

def correctGuess(message):
    global tries
    gameOver(message)

    if playAgain():
        print ("")
        tries = 0
        return Q
    else:
        sys.exit(0)

def nextQuestion(question, answer):
    global tries
    tries += 1

    if isQuestion(question):
        if answer:
            return question[1]
        else:
            return question[2]
    else:
        if answer:
            return correctGuess("I knew it!")
        else:
            return makeNewQuestion(question)

```

```

def replaceAnswer(tree, find, replace):
    if not isQuestion(tree):
        if tree == find:
            return replace
        else:
            return tree
    else:
        return makeQuestion(tree[0],
            replaceAnswer(tree[1], find, replace),
            replaceAnswer(tree[2], find, replace))

def makeNewQuestion(wrongAnimal):
    global Q, tries

    correctAnimal = removeArticle(askQuestion("I give up. What did you think
about?"))

    newQuestion = askQuestion("Enter a question that would distinguish %s from %s:"
        % (definiteNoun(correctAnimal), definiteNoun(wrongAnimal))).capitalize()

    yesAnswer = answeredYes(askQuestion("If I asked you this question " +
        "and you thought about %s, what would the correct answer be?" %
        definiteNoun(correctAnimal)))

    # Create new question node
    if yesAnswer:
        q = makeQuestion(newQuestion, correctAnimal, wrongAnimal)
    else:
        q = makeQuestion(newQuestion, wrongAnimal, correctAnimal)
    Q = replaceAnswer(Q, wrongAnimal, q)
    tries = 0
    return Q

def addNewQuestion(wrongAnimal, newques, correct):
    global Q
    q = makeQuestion(newques, correct, wrongAnimal)
    Q = replaceAnswer(Q, wrongAnimal, q)
    return Q

tries = 0
Q = (makeQuestion('Does it have fur?', 'Tiger', 'Penguin'))
q = addNewQuestion('Tiger', 'Does it have dark spots?', 'Leopard')
q = addNewQuestion('Leopard', 'Is it the fastest animal?', 'Cheetah')
q = addNewQuestion('Penguin', 'Can it fly?', 'Parrot')
q = Q

print ("Imagine an animal. I will try to guess which one.")

```

```
print ("You are only allowed to answer YES or NO.")
print ("")

try:
    while True:
        ans = answeredYes(getAnswer(q))
        q = nextQuestion(q, ans)
except KeyboardInterrupt:
    sys.exit(0)
except Exception:
    sys.exit(1)
```

Output :

```
Imagine an animal. I will try to guess which one.
You are only allowed to answer YES or NO.

Does it have fur?
yes
Does it have dark spots?
yes
Is it the fastest animal?
no
Were you thinking about a leopard?
yes

I knew it!

Do you want to play again?
no

Process exited with code: 0
```


Artificial Intelligence Lab

Lab-8

Aim: Implementation of Knowledge representation schemes - use cases.

Initial State

? (Make a guess)

Final State

Yes or
Learn a new concept

Problem Formulation -

Given some classification rule and some predefined clauses, guess an animal and let your machine predict it, IF the machine is unable to predict the animal, it will ask the answer and store it in its knowledge base.

Problem Solving

Imagine an Animal (You are only allowed to answer Yes or No to the next set of Questions)

→ Does it have a fur?
- Yes

→ Does it have dark spots?
- Yes

→ Is it the fastest animal?
- No

Were you thinking
of Leopard?

Yes



I Knew it!