Reading Material
Lab Exercise 7: Example game of Pangolins

Your input is prefixed by ‘>’, and the computer’s output is in bold text.

1 The Pangolins Game - 1st round

Assume that, initially, the computer only knows about one object: a pangolin. Suppose you were, rather boringly, actually thinking of a pangolin.

1 OK, please think of something
2 Is it a pangolin?
3 > Yes
4 Good. That was soooo easy.

Figure 1: 1st round

2 The Pangolins Game - 2nd round

At the end of every round, the computer asks you if you want to play again or stop:

Would you like to play again?

Let’s play again, but more interestingly this time - imagine you are thinking of Pete.
Figure 2: 2nd round

Now the computer can improve its knowledge base, by incorporating a new object (Pete) It can put objects and questions together into a single data structure, a binary decision tree:

Trees consist of “leaf nodes” that don’t point to any other nodes (in this game they are always the names of objects) and “non-leaf nodes” that point to one or more other nodes (in this game they are always questions, and they always point to two other nodes, one for “yes” and one for “no”). The start of the tree is usually called the “root” of the tree.
3 The Pangolins Game - 3rd round

Would you like to play again?
> Yes
Does it have a tail?
> No
Is it Pete?
> No
Oh. Well you win then — What were you thinking of?
> a pizza
Please give me a question about a pizza, so I can tell the difference between a pizza and Pete
> Is it flat, round and edible?
What is the answer for a pizza?
> Yes
Thanks

Figure 3: 3rd round

Now the computer can distinguish Pete from a pizza. It has had to make a fairly simple change to its decision tree:

```
Does it have a tail?

  yes
   / 
  /   
pangolin

no

  / 
 Is it flat, round and edible?

   yes
   / 
  /     
a pizza

no

   / 
     
Pete
```

3
4 The Pangolins Game - 4th round

Would you like to play again?
> Yes
Does it have a tail?
> No
Is it flat, round and edible?
> Yes
Is it a pizza?
> No
Oh. Well you win then — What were you thinking of?
> a biscuit

Please give me a question about a biscuit, so I can tell the difference between a biscuit and a pizza
> Can you dip it in your tea?
> Yes

What is the answer for a biscuit?
> Yes
Thanks

Figure 4: 4th round

Now the computer can distinguish a biscuit from a pizza.
It has had to make another fairly simple change to its decision tree:

```
Does it have a tail?
  yes  no
  pangolin  Is it flat, round and edible?
    yes  no
    Can you dip it in your tea?  Pete
      yes  no
      a biscuit  a pizza
```
5 The Pangolins Game - 5th round

Would you like to play again?
> Yes
Does it have a tail?
> Yes
Is it a pangolin?
> No
Oh. Well you win then — What were you thinking of?
> A Cat
Please give me a question about a Penguin, so I can tell the difference between Cat and a pangolin
> Does it like to chase mice?
What is the answer for a Cat?
> Yes
Thanks
Would you like to play again?
> No

Figure 5: 5th round

Now the computer can distinguish a cat from a pangolin. And its decision tree looks like this:

Does it have a tail?
   yes
   no

Does it like to chase mice?
   yes
   no

A Cat

Is it flat, round and edible?
   yes
   no

Can you dip it in your tea?
   yes
   no

Pete

Can you dip it in your tea?
   yes
   no

a biscuit

What were you thinking of?
> A Cat

The computer accumulates the information about objects in the form of a 'yes/no' decision tree. Successive rounds of the game cause the tree to grow as more questions and objects are added.