

Chapter 10

10.5

There are 38 possible slots a ball can land on in a Roulette spin, but only 2 possible faces a coin can land on in a coin toss. As the book says,

$$\begin{aligned} I[\text{Coin Toss}] &= -p(\text{heads})\log_2(p(\text{heads})) - p(\text{tails})\log_2(p(\text{tails})) \\ &= -(1/2)\log_2(1/2) - (1/2)\log_2(1/2) \\ &= 1 \text{ bit} \end{aligned}$$

The probability of landing in any given slot in a Roulette spin is $1/38$.

$$\begin{aligned} I[\text{Spin}] &= -p(\text{slot1})\log_2(p(\text{slot1})) - p(\text{slot2})\log_2(p(\text{slot2})) - \dots - p(\text{slot38})\log_2(p(\text{slot38})) \\ &= -(1/38)\log_2(1/38) - (1/38)\log_2(1/38) - \dots - (1/38)\log_2(1/38) \\ &= -(-\log_2(1/38)) \\ &= 5.248 \text{ bits} \end{aligned}$$

If the message is “not 00” then there are only two possible outcomes: landing on 00 or not.

$$\begin{aligned} I[\text{Not 00}] &= -p(00)\log_2(p(00)) - p(\text{not00})\log_2(p(\text{not00})) \\ &= -(1/38)\log_2(1/38) - (37/38)\log_2(37/38) \\ &= 0.176 \text{ bits} \end{aligned}$$

10.6

Animal	Type	Number of Legs	Lays Eggs?	Skin Type	Locomotion
Dog	Mammal	4	No	Fur	Walking
Turtle	Reptile	4	Yes	Scales	Walking
Cats	Mammal	4	No	Fur	Walking
Fly	Insect	6	Yes	Scales	Flying
Crow	Bird	2	Yes	Feathers	Flying
Lizard	Reptile	4	Yes	Scales	Walking
Dragonfly	Insect	6	Yes	Scales	Flying
Robin	Bird	2	Yes	Feathers	Flying

ID3 decision tree to find the Type of animal on following pages.

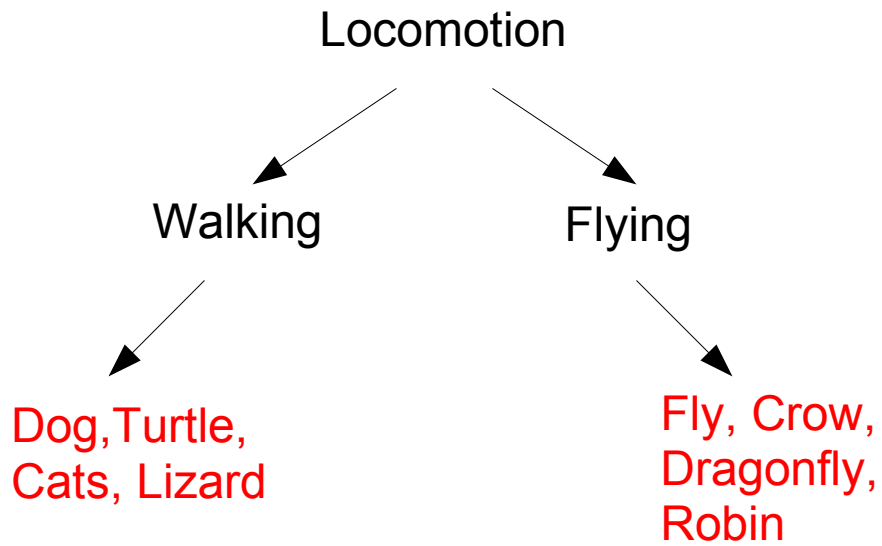
10.11

Analysis of IAC program:

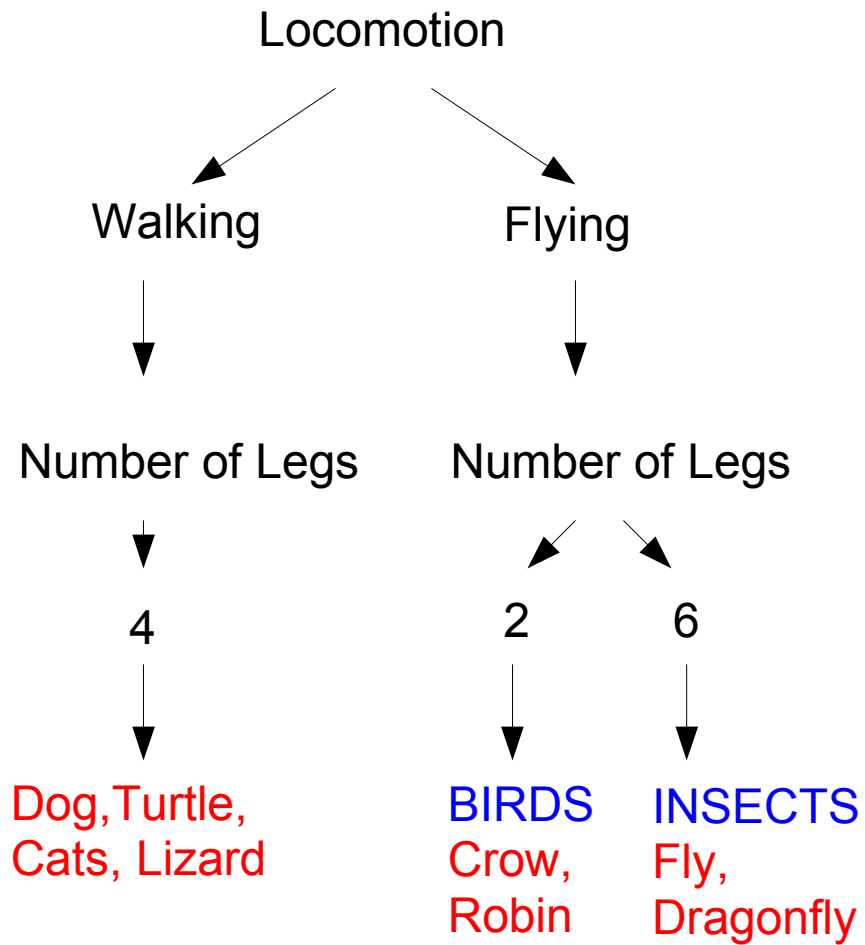
I thought it was interesting that as individuals were being strongly activated, often their corresponding name properties wouldn't be as strongly activated. For example, setting College = 1 and Jets = - 1 strongly activated _Phil, _Don, _Ned, and _Ol, who all shared these properties. It also strongly activated Married and In30's, which they also shared. However, their name properties weren't strongly activated at all. I suppose it is because the names aren't shared among all of the individuals, so they aren't as strongly activated?

The IAC model makes for an interesting database. I wonder if a large scale database could be created with this technique? It seems like it could be useful in helping you find subjects related to what you are searching for.

Properties
Number of Legs
Lays Eggs
Skin Type
Locomotion



Properties
Number of Legs
Lays Eggs
Skin Type



Properties

Lays Eggs

Skin Type

