

ASSIGNMENT 1

SUBMITTED TO: SIR DR MUHAMMAD SHARJEEL



FA21-BSE-143 MUHAMMAD MIKAAL AMJAD
MACHINE LEARNING



The features of bird which can be learned are:

- Flying
- Feathers
- Nose type
- Perching Feet
- Size

From these features let's take Feathers, Feet and Size as the attributes for identifying a bird.

Feathers has values yes/no

Perching Feet has values yes/no

Size small/medium/large

Bird yes/no

Instance Space:

Size of instance space=|X|=2x2x3=12

\mathbf{X}	Feathers	Perching Feet	Size	Bird
X1	yes	yes	large	-
X2	yes	yes	medium	-
X3	yes	yes	small	-
X4	yes	no	large	-
X5	yes	no	medium	-
X6	yes	no	small	-

X7	no	yes	large	-
X8	no	yes	medium	-
X9	no	yes	small	-
X10	no	no	large	-
X11	no	no	medium	-
X12	no	no	small	-

Concept Space size:

In Identification of bird problem we can only have two outputs, either yes or no

$$|C|=2^{|x|}=2^{12}=4096$$

C=<Feathers=yes and Perching Feet=yes and Size=large or Feathers=yes and Perching Feet=yes and Size=medium or Feathers=yes and Perching Feet=yes and Size=small or Feathers=yes and Perching Feet=no and Size=large or Feathers=yes and Perching Feet=no and Size=medium or Feathers=yes and Perching Feet=no and Size=large or Feathers=no and Perching Feet=yes and Size=large or Feathers=no and Perching Feet=yes and Size=small or Feathers=no and Perching Feet=yes and Size=small or Feathers=no and Perching Feet=no and Size=large or Feathers=no and Perching Feet=no and Size=medium or Feathers=no and Perching Feet=no and Size=small >

So using my python code I wrote to show all the possible outcomes:

1												
	x1	x2	x3	x4	x5	х6	x7	x8	x9	x10	x11	x12
2	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
3	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no
4	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
5	yes	yes	yes	yes	yes	yes	yes	γes	γes	yes	no	no
	γes	ves	ves	γes	ves	yes	yes	γes	yes	no	ves	yes
_	ves	ves	ves	yes	ves	ves	ves	ves	ves	no	ves	no
	,	/	,		,	,	,	-	,		/	
	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes
	yes	1	yes	yes	yes	yes	yes	yes	yes	no	no	no
	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes
11	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	no
12	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	no	yes
13	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	no	no
14	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes	yes
15	ves	ves	ves	ves	ves	ves	ves	ves	no	по	ves	no
	ves	yes	yes	yes	yes	yes	yes	yes	no	no	no	yes
-	ves	yes	yes	ves	yes	yes	yes	yes	no	no	no	no
	ves	ves		ves	yes		yes	-	yes			
			yes			yes	_	no		yes	yes	yes
	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	no
_	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	no	yes
21	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	no	no
22	yes	yes	yes	yes	yes	yes	yes	no	yes	по	yes	yes
23	yes	yes	yes	yes	yes	yes	yes	no	yes	no	yes	no
24	yes	yes	yes	yes	yes	yes	yes	no	yes	no	no	yes
1	x1	x2	хЗ	×4	x5	x6	x7	x8	x9	10		x12
4075										×10	×11	XIZ
	no	no	no	no	no	no	no	yes	no	yes	yes	no
4076												
	no	no	no	no	no	no	no	yes	no	yes	yes	no
4077	no	no no	no no	no no	no no	no no	no no	yes yes	no no	yes yes	yes no	no yes
4077 4078	no no no	no no	no no no	no no no	no no no	no no no	no no no	yes yes yes	no no	yes yes yes	yes no no	no yes no
4077 4078 4079	no no no	no no no no	no no no	no no no no	no no no no	no no no no	no no no no	yes yes yes yes	no no no	yes yes yes no	yes no no yes	no yes no yes
4077 4078 4079 4080 4081	no no no no no no	no no no no	no no no no	no no no no no no	no no no no	no no no no	no no no no	yes yes yes yes yes	no no no no	yes yes yes no no	yes no no yes yes	no yes no yes no
4077 4078 4079 4080 4081 4082	no no no no no no	no no no no no no no	no no no no no no no	no no no no no no no	no no no no no no no	no no no no no no no	no no no no no no no	yes yes yes yes yes yes yes yes no	no no no no no	yes yes no no no no yes	yes no no yes yes no no yes	no yes no yes no yes no yes
4077 4078 4079 4080 4081 4082 4083	no no no no no no no	no no no no no no no no	no no no no no no no no	no	no no no no no no no no	no no no no no no no no	no no no no no no no no	yes yes yes yes yes yes yes no	no no no no no no no no yes	yes yes yes no no no no yes yes	yes no no yes yes no no yes yes yes	no yes no yes no yes no yes
4077 4078 4079 4080 4081 4082 4083	no no no no no no no	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes no no	no no no no no no no no yes yes	yes yes no no no no yes yes yes	yes no no yes yes no no yes no no yes	no yes no yes no yes no yes no yes
4076 4077 4078 4079 4080 4081 4082 4083 4084	no no no no no no no no	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes no no no	no no no no no no no no yes yes yes yes	yes yes no no no no yes yes yes yes	yes no no yes yes no no yes no no yes yes no no yes	no yes no yes no yes no yes no yes no yes
4077 4078 4079 4080 4081 4082 4083 4084 4085	no no no no no no no no no no no	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes no no no no	no no no no no no no no yes yes yes yes yes	yes yes no no no no yes yes yes yes yes	yes no no yes yes no no yes yes no no yes yes yes no no yes	no yes
4077 4078 4079 4080 4081 4082 4083 4084 4085 4086	no n	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes yes no no no no	no no no no no no no no no yes yes yes yes yes yes yes	yes yes no no no no yes yes yes yes yes no no	yes no no yes yes no no yes yes no no yes yes yes yes yes yes yes yes	no yes no
4077 4078 4079 4080 4081 4083 4084 4085 4086 4087 4088	no n	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes yes no no no no no	no no no no no no no no yes yes yes yes yes yes yes	yes yes no no no no yes yes yes yes yes no no	yes no no yes yes no no yes yes no no yes yes yes no no yes yes no	no yes no yes no yes no yes no yes no yes no yes
4077 4078 4079 4080 4081 4082 4083 4084 4085 4086 4087 4088	no n	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes no no no no no no	no no no no no no no no no yes yes yes yes yes yes yes yes	yes yes no no no no yes yes yes yes no	yes no no yes yes no no yes yes no no yes yes no no no yes yes no no	no yes no
4077 4078 4079 4080 4081 4082 4083 4084 4085 4086 4087 4088	no n	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes no no no no no no no	no no no no no no no no no yes	yes yes no no no no yes yes yes yes yes yes no no no yes	yes no no yes yes no no yes yes no no no yes yes no no yes yes yes yes	no yes no yes no yes no yes no yes no yes no yes no yes no yes
4077 4078 4079 4080 4081 4082 4083 4084 4085 4086 4087 4088 4089 4090	no n	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes yes no	no yes yes yes yes yes yes yes no	yes yes no no no no yes	yes no no yes yes no no yes yes no no yes yes no no no yes yes yes yes yes	no yes no
4077 4078 4079 4080 4081 4082 4083 4084 4085 4086 4087 4088 4089 4090 4091	no n	no n	no n	no n	NO	no n	no n	yes yes yes yes yes yes no	no yes yes yes yes yes yes yes no no	yes yes no no no no yes yes yes no no no yes yes yes yes yes no no no yes yes	yes no no yes no no yes no no yes yes yes no no yes yes yes yes no no yes yes no	no yes
4077 4078 4079 4080 4081 4082 4083 4084 4085 4086 4087 4088 4090 4091 4092 4093	no n	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes no	no no no no no no no no no yes yes yes yes yes yes yes yes no	yes yes no no no yes	yes no no yes yes yes no no no yes no no no	no yes no
4077 4078 4079 4080 4081 4082 4083 4084 4085 4086 4087 4088 4089 4090 4091 4092 4093 4094	no n	no n	no n	no n	NO NO NO NO NO NO NO NO	no n	no n	yes yes yes yes yes yes no	no no no no no no no no no yes yes yes yes yes yes no	yes yes no no no no yes yes yes yes yes no no no yes yes yes yes yes yes no no no no no no	yes no no yes yes no no yes yes no no yes	no yes
4077 4078 4079 4080 4081 4082 4083 4084	no n	no n	no n	no n	no n	no n	no n	yes yes yes yes yes yes no	no no no no no no no no no yes yes yes yes yes yes yes yes no	yes yes no no no yes	yes no no yes yes yes no no no yes no no no	no yes no