Machine Learning

Assignment 1

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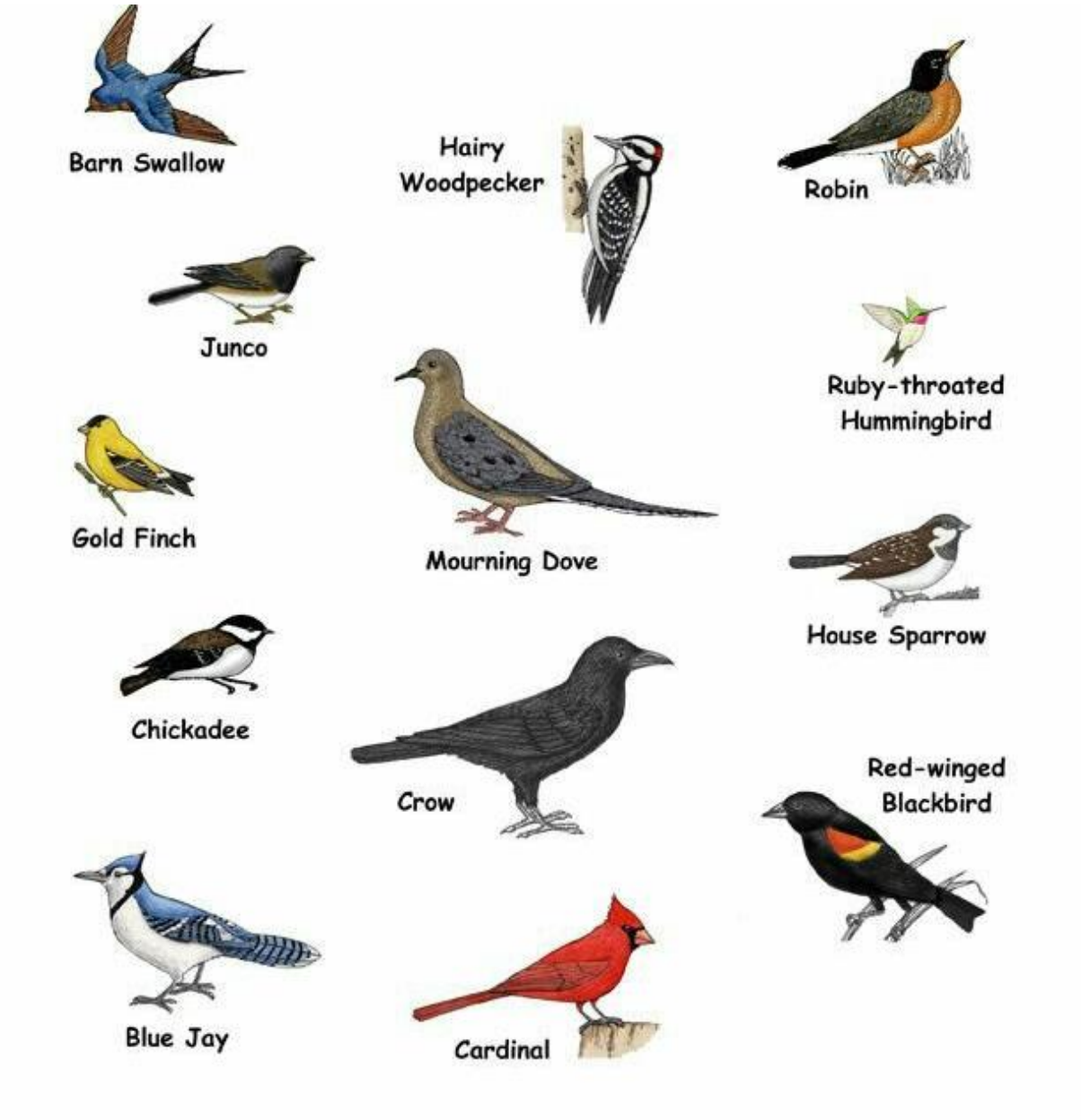
CONCEPT OF A BIRD

DATA:

Images:



VIDEO: https://youtu.be/jF0Id-hH9y4?feature=shared

TEXT: https://en.wikipedia.org/wiki/Bird

Considering bird learning problem

- Input: Text, Image, Video
- Output: Bird or not a Bird
  - ➢ true for 'Bird' and false for 'Not a Bird'

Representation of Input

Input is represented as a set of three attributes: Legs, Beak, Feathers

ATTRIBUTES

- Attribute 'Legs' possible values: 'Two' or 'More'.
- Attribute 'Beak' possible values: 'Yes' or 'No'
- Attribute 'Feathers' possible values: 'Yes' or 'No'

Representation of Output

'Bird' possible values: 'Yes' or 'No'

INSTANCE SPACE:

In bird learning concept

- Three attributes: Legs, Beak, Feathers
- Each of the attributes has two possible values.
- Size of instance space, |X| = 2*2*2=8

X	BEAK	LEGS	FEATHERS	BIRD
x1	Yes	Two	Yes	-
x2	Yes	Two	No	-
X3	Yes	More	Yes	-
X4	Yes	More	No	-
X5	No	Two	Yes	-
X6	No	Two	No	-
X7	No	More	Yes	-
X8	No	More	No	-

CONCEPT SPACE:

$|C| = 2^{|X|}$

- |X| represents the size of instance space (X)
- |C| represents the size of the concept space (C)

In bird learning concept

- $|C| = 2^{|X|} = 2^{|8|} = 256$
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X	BEAK	LEGS	FEATHERS	BIRD
x1	Yes	Two	Yes	C(1x)
x2	Yes	Two	No	C (2)
X3	Yes	More	Yes	C (3)
X4	Yes	More	No	C (4)
X5	No	Two	Yes	C (5)
X6	No	Two	No	C (6)
X7	No	More	Yes	C (7)
X8	No	More	No	C (8)

POSSIBLE CONCEPTS:

- C = < Beak = yes And Legs = Two and Feathers = yes >

X	BEAK	LEGS	FEATHERS	BIRD
x1	Yes	Two	Yes	1
x2	Yes	Two	No	0
X3	Yes	More	Yes	0
X4	Yes	More	No	0
X5	No	Two	Yes	0
X6	No	Two	No	0
X7	No	More	Yes	0
X8	No	More	No	0

- C = < Beak = yes And Legs = More And Feathers = yes >

X	BEAK	LEGS	FEATHERS	BIRD
x1	Yes	Two	Yes	0
x2	Yes	Two	No	0
X3	Yes	More	Yes	1
X4	Yes	More	No	0
X5	No	Two	Yes	0
X6	No	Two	No	0
X7	No	More	Yes	0
X8	No	More	No	0

- C = < Beak = no And Legs = Two And Feathers = no >

X	BEAK	LEGS	FEATHERS	BIRD
x1	Yes	Two	Yes	0
x2	Yes	Two	No	0
X3	Yes	More	Yes	0
X4	Yes	More	No	0
X5	No	Two	Yes	0
X6	No	Two	No	1
X7	No	More	Yes	0
X8	No	More	No	0

- C = < Beak = yes And Legs = Two And Feathers = no OR Beak = no And Legs = Two And Feathers = no >

X	BEAK	LEGS	FEATHERS	BIRD
x1	Yes	Two	Yes	0

x2	Yes	Two	No	1
X3	Yes	More	Yes	0
X4	Yes	More	No	0
X5	No	Two	Yes	0
X6	No	Two	No	1
X7	No	More	Yes	0
X8	No	More	No	0

- C = < Beak = no And Legs = Two And Feathers = yes OR Beak = yes And Legs = Two And Feathers = yes >

X	**BEAK**	**LEGS**	**FEATHERS**	**BIRD**
x1	Yes	Two	Yes	1
x2	Yes	Two	No	0
X3	Yes	More	Yes	0
X4	Yes	More	No	0
X5	No	Two	Yes	1
X6	No	Two	No	0
X7	No	More	Yes	0
X8	No	More	No	0

- There are three attributes, and each can have two values.
- 2^3 = 256 unique combinations
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C (1)	C (2)	C (3)	C (4)
C (5)	C (6)	C (7)	C (8)

0	0	0	0		1	0	0	0
0	0	0	0		0	0	0	0

0	0	1	0		0	0	0	0
0	0	0	0		0	1	0	0

0	1	0	0		1	0	0	0
0	1	0	0		1	0	0	0

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0	0	1	0		1	1	1	1
1	1	0	0		1	1	1	1