Supervised learning: a sketch

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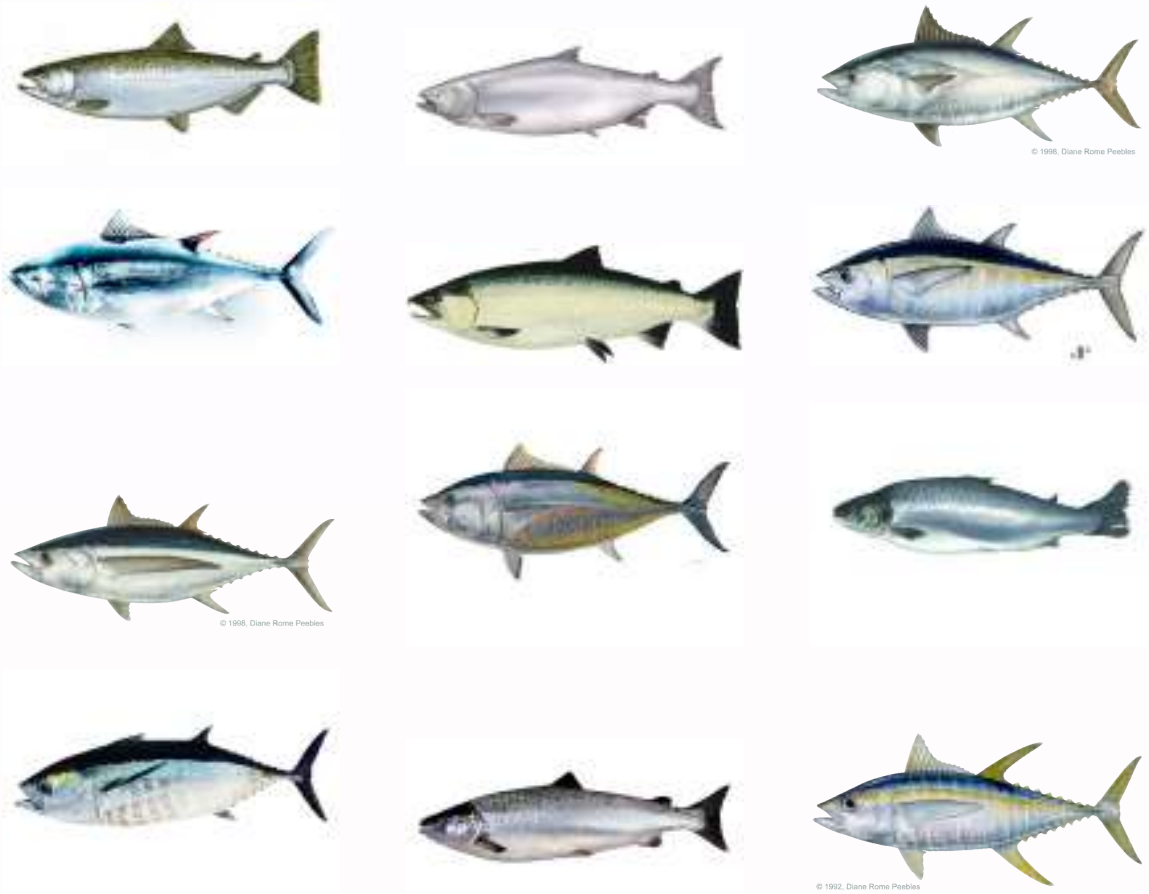
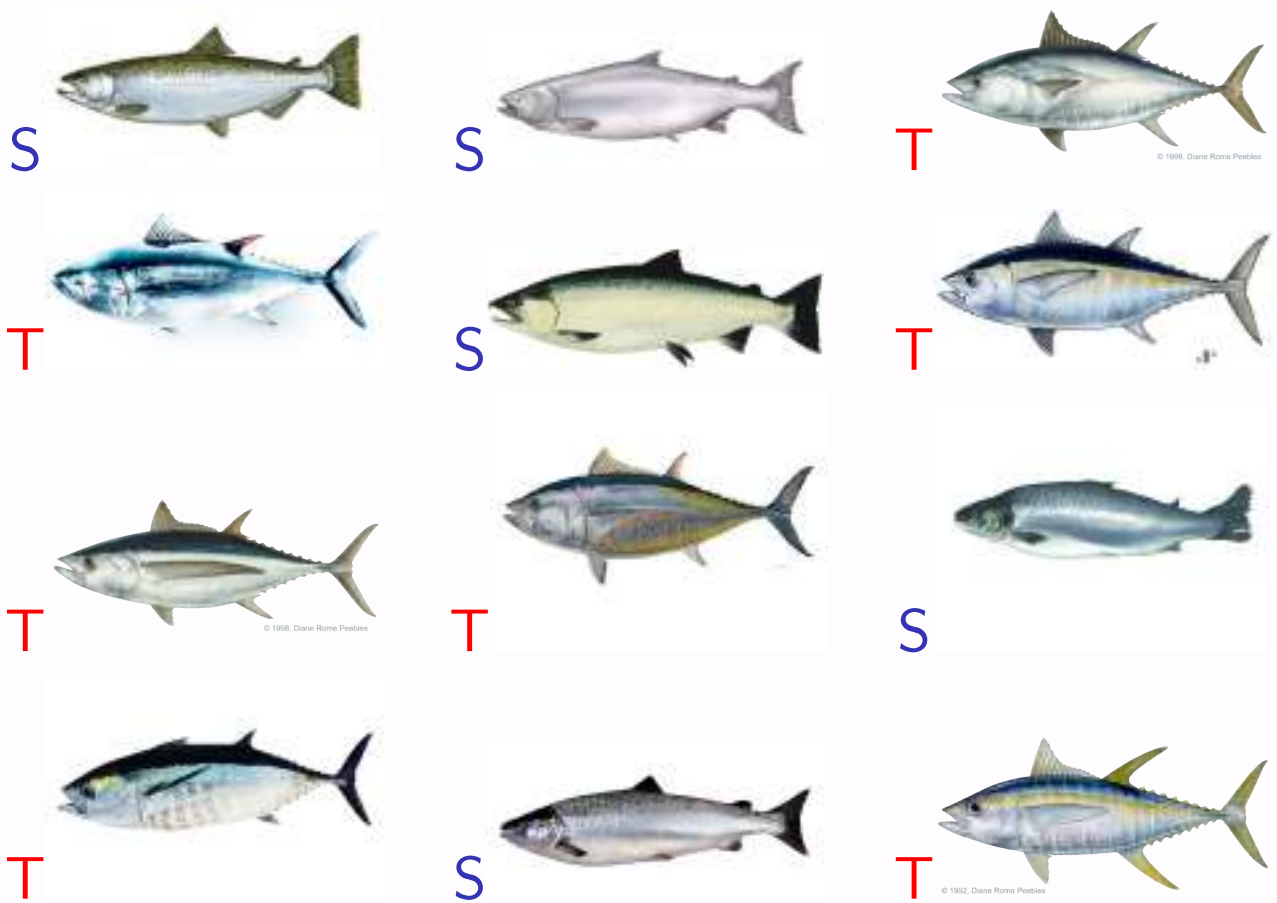
A set of objects



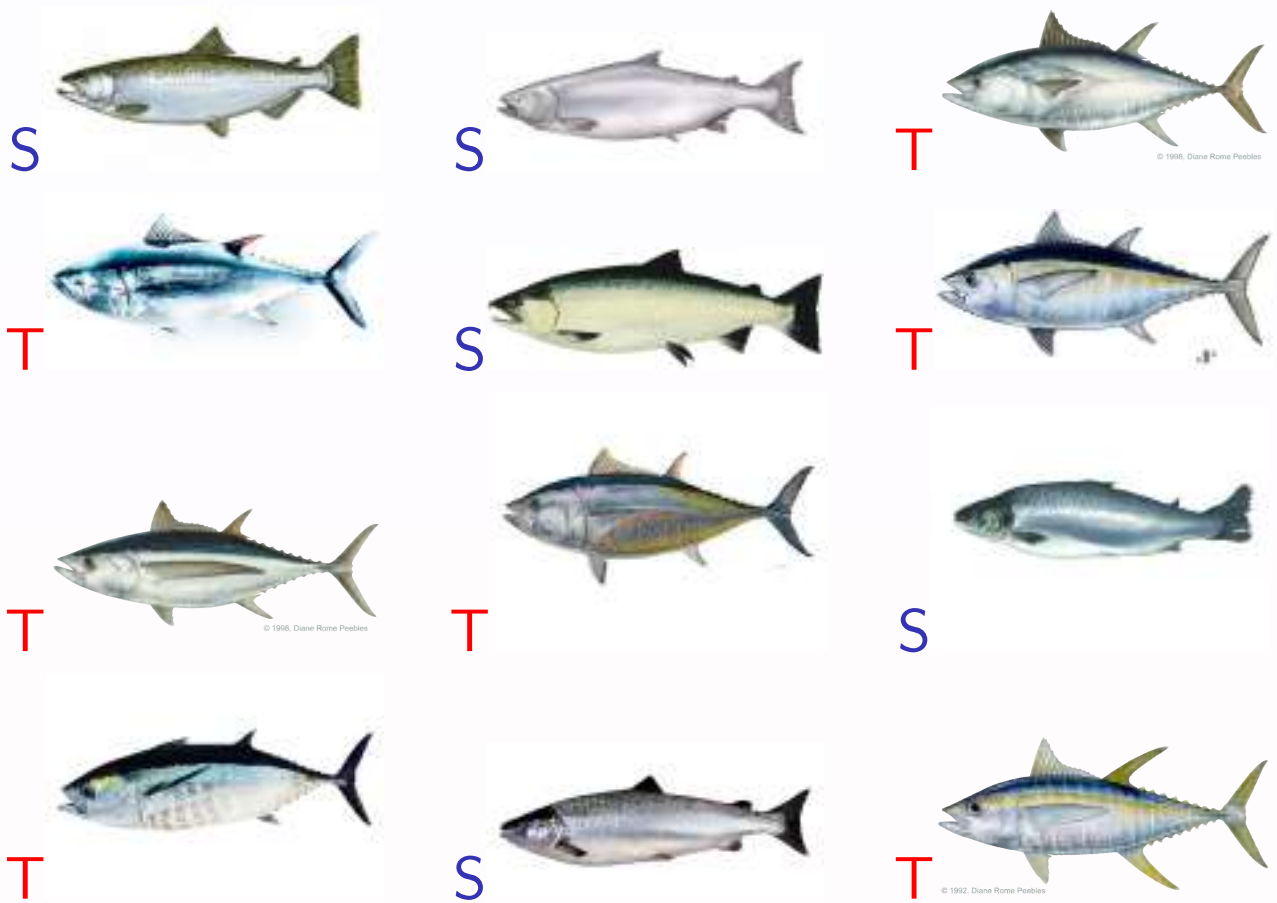
Several categories of objects



S = salmon

T = tuna

Several categories of objects



S = salmon How to make the difference ? T = tuna

Description by features

Features, attributes, characteristics

Feature :	Possible values :
length	0-500cm
width	0-100cm
color	{silver, blue, rose, yellow, multicolored}
mean length of fins	0-50cm
has open mouth?	{yes, no}
...	...

Example descriptions

length	120cm	110cm	130cm	140cm
width	50cm	48cm	70cm	71cm
color	silver	silver	silver	blue
mean length of fins	10cm	7cm	20cm	10cm
has open mouth?	yes	yes	yes	no
...	...	...	...	...

Example descriptions

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Feature vectors

Feature engineering

Example descriptions

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...	...	...	...	...

Feature vectors

Feature engineering

- Other representations are possible (trees, etc.)

Description of objects

S 

120cm
50cm
silver
10cm
yes
...

S 

110cm
48cm
silver
7cm
yes
...

T 

130cm
70cm
silver
20cm
yes
...

T 

140cm
71cm
blue
10cm
no
...

S 

...
...
...
...
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T 

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Inclusion of the category: description of the solution

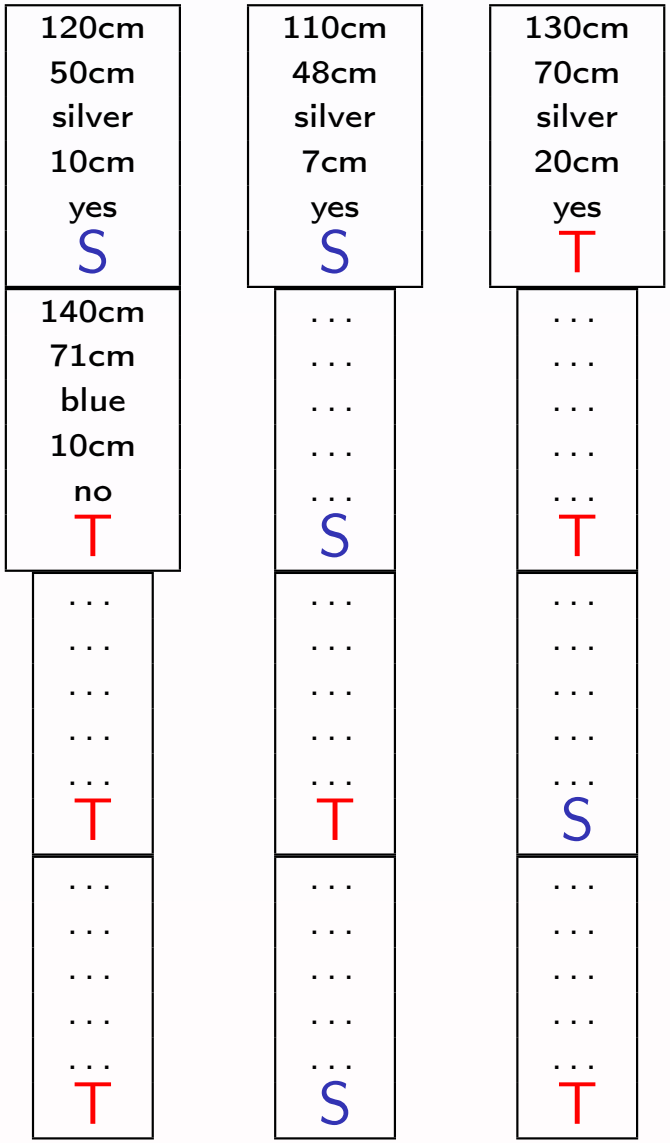
120cm	110cm	130cm
50cm	48cm	70cm
silver	silver	silver
10cm	7cm	20cm
yes	yes	yes
S	S	T

140cm	...	...
71cm	...	...
blue	...	...
10cm	...	...
no	...	...
T	S	T

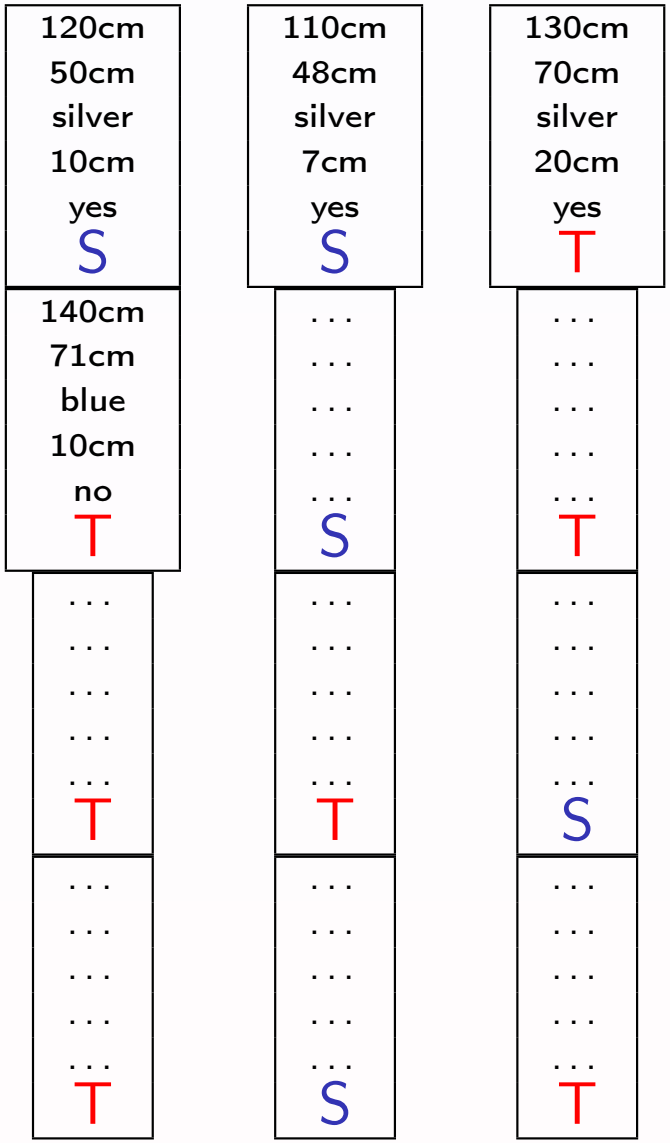
...	...	...
...	...	...
...	...	...
...	...	...
...	...	...
T	T	S

...	...	...
...	...	...
...	...	...
...	...	...
...	...	...
T	S	T

Description of the solution



Description of the solution



Examples of S,
examples of T :
labelled examples

Goal

- Given these examples of objects in two categories,
- Learn to determine the category of a new object

Goal

- Given these examples of objects in two categories,
- Learn to determine the category of a new object

Training

Build a model that relates object features to categories

...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
T	S	S	T	S

$\rightarrow$ Model

Goal

- Given these examples of objects in two categories,
- Learn to determine the category of a new object

Training

Build a model that relates object features to categories

Application ("Inference")

Apply the model to determine the category of a new object based upon its features