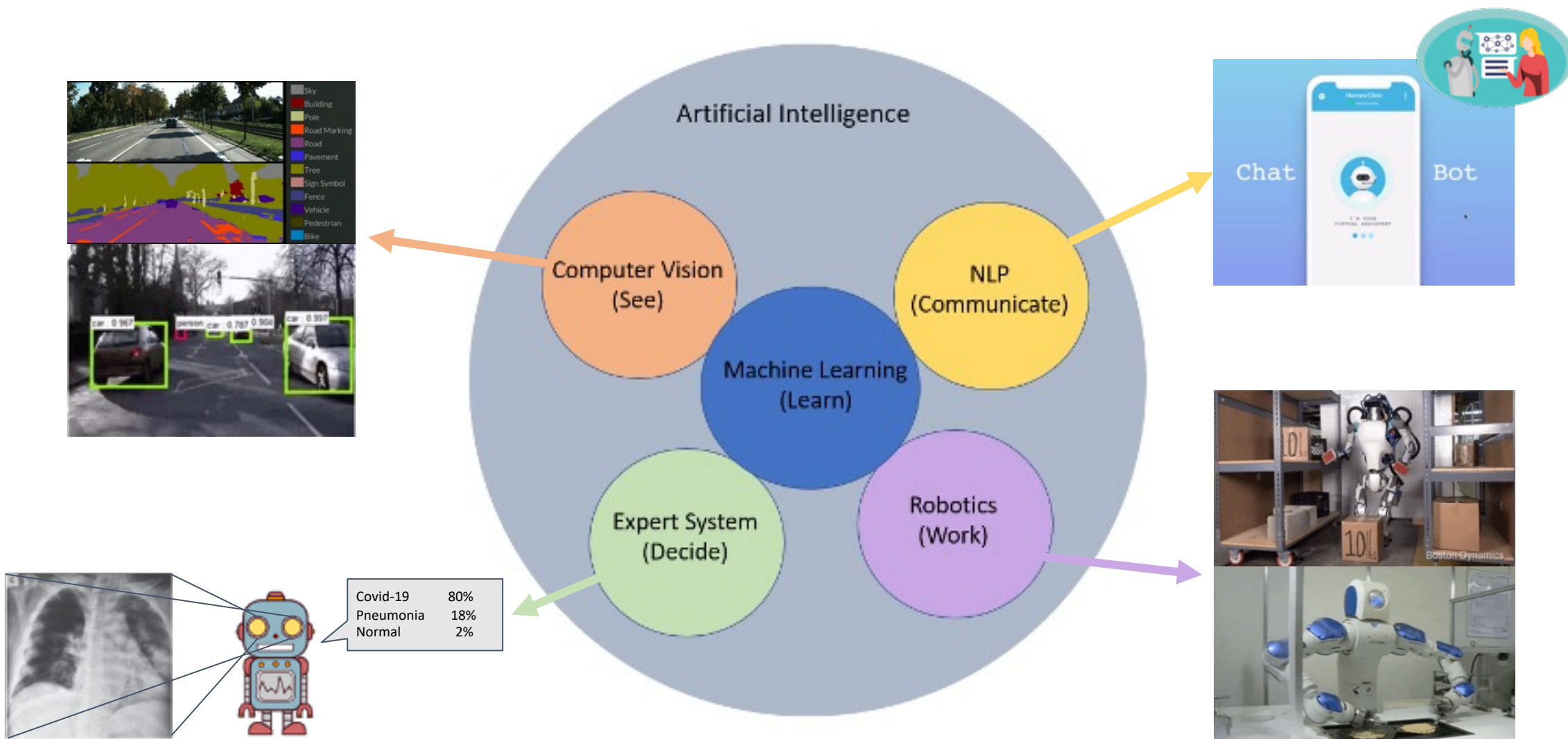


**AI**

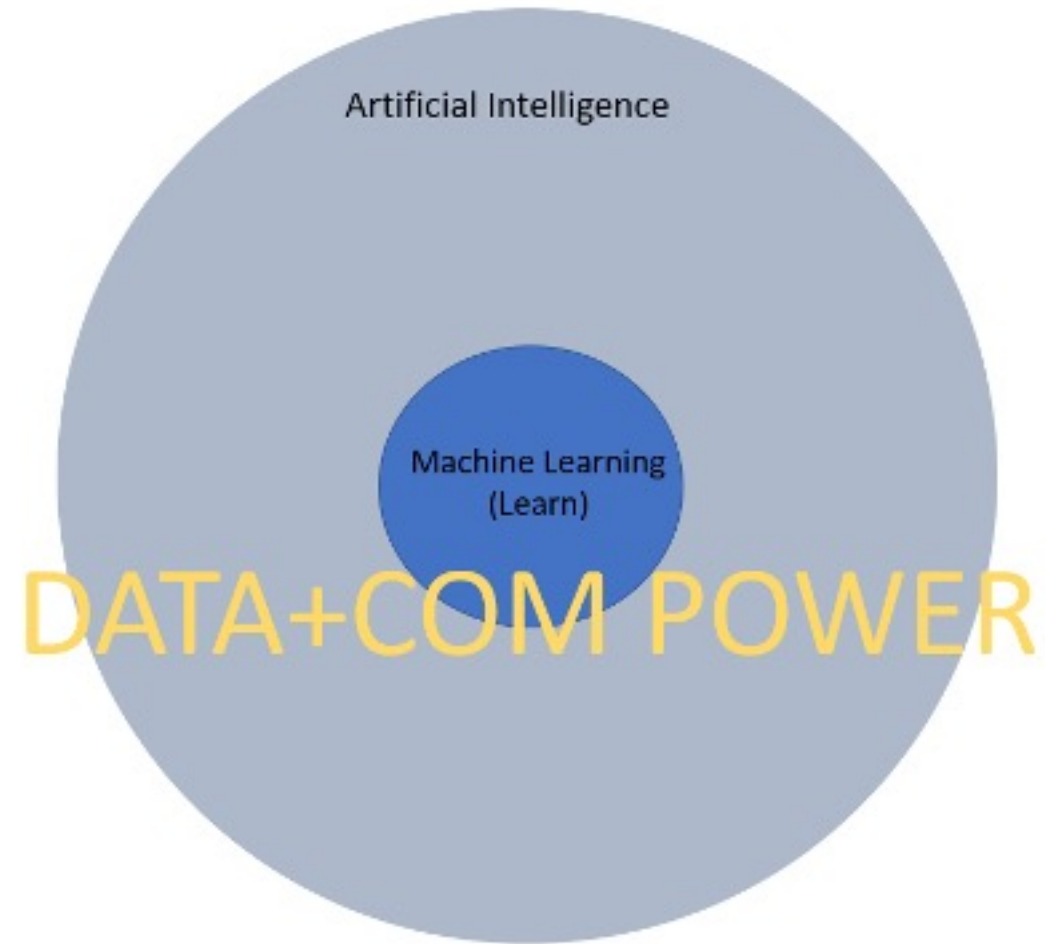


# What is Artificial Intelligence?

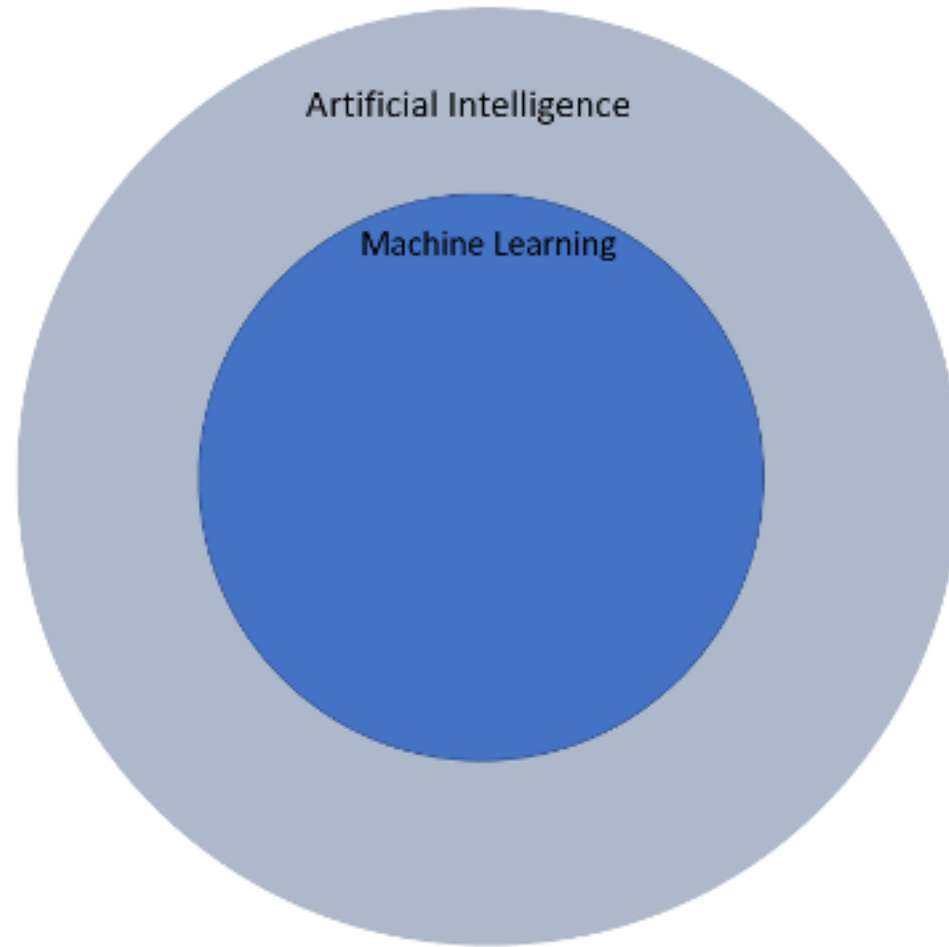


# Artificial Intelligence

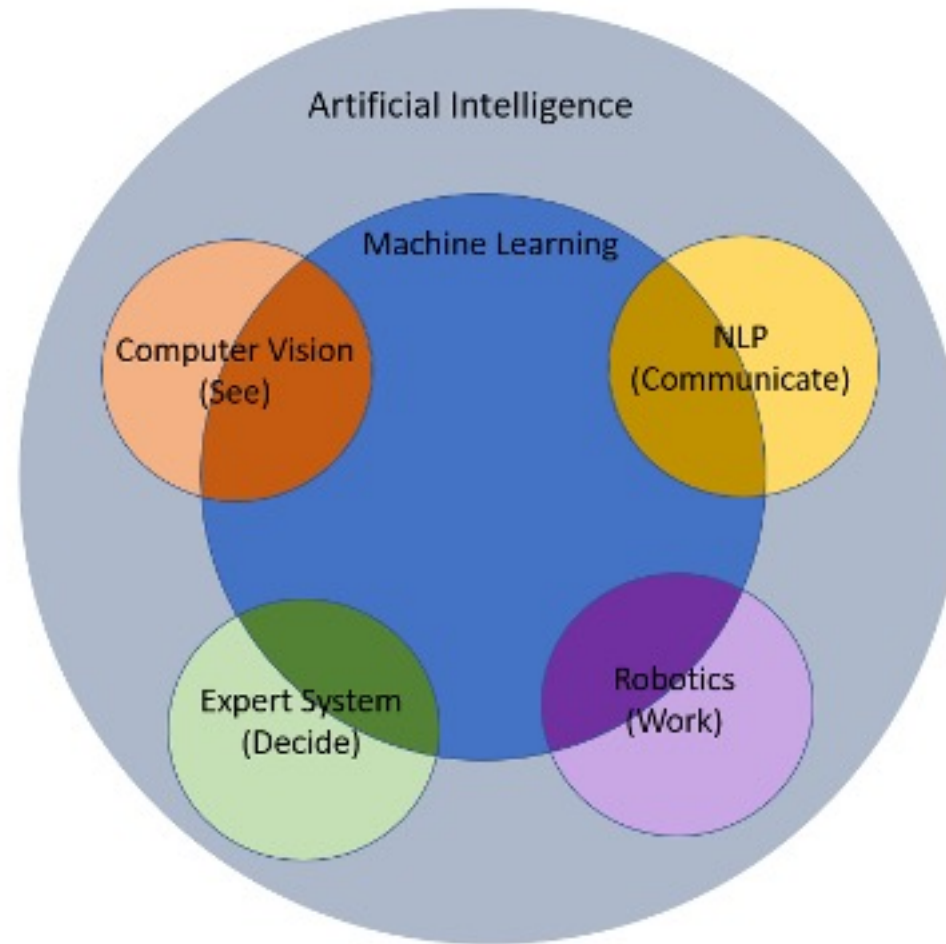
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# Artificial Intelligence



# Artificial Intelligence

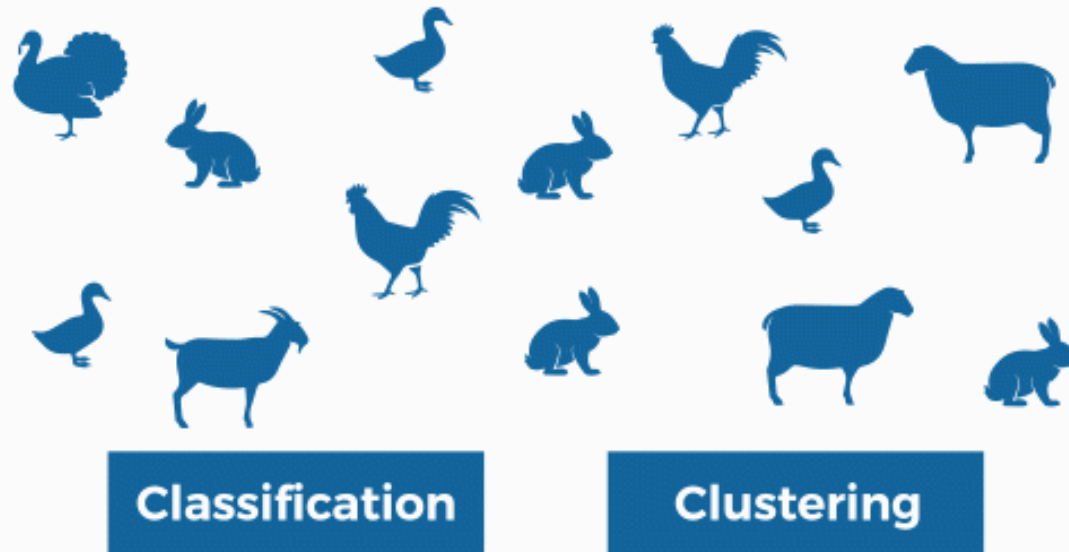


The graphic features a blue silhouette of a human head in profile on the left. Inside the head, a complex network of blue circuit lines and dots is visible. To the right of the head, a large, faint, light blue wireframe sphere is centered. The entire composition is set against a light blue background with a subtle pattern of a hand holding a tablet. A large, rounded rectangular frame with a blue border encloses the central text and the wireframe sphere.

# Machine Learning

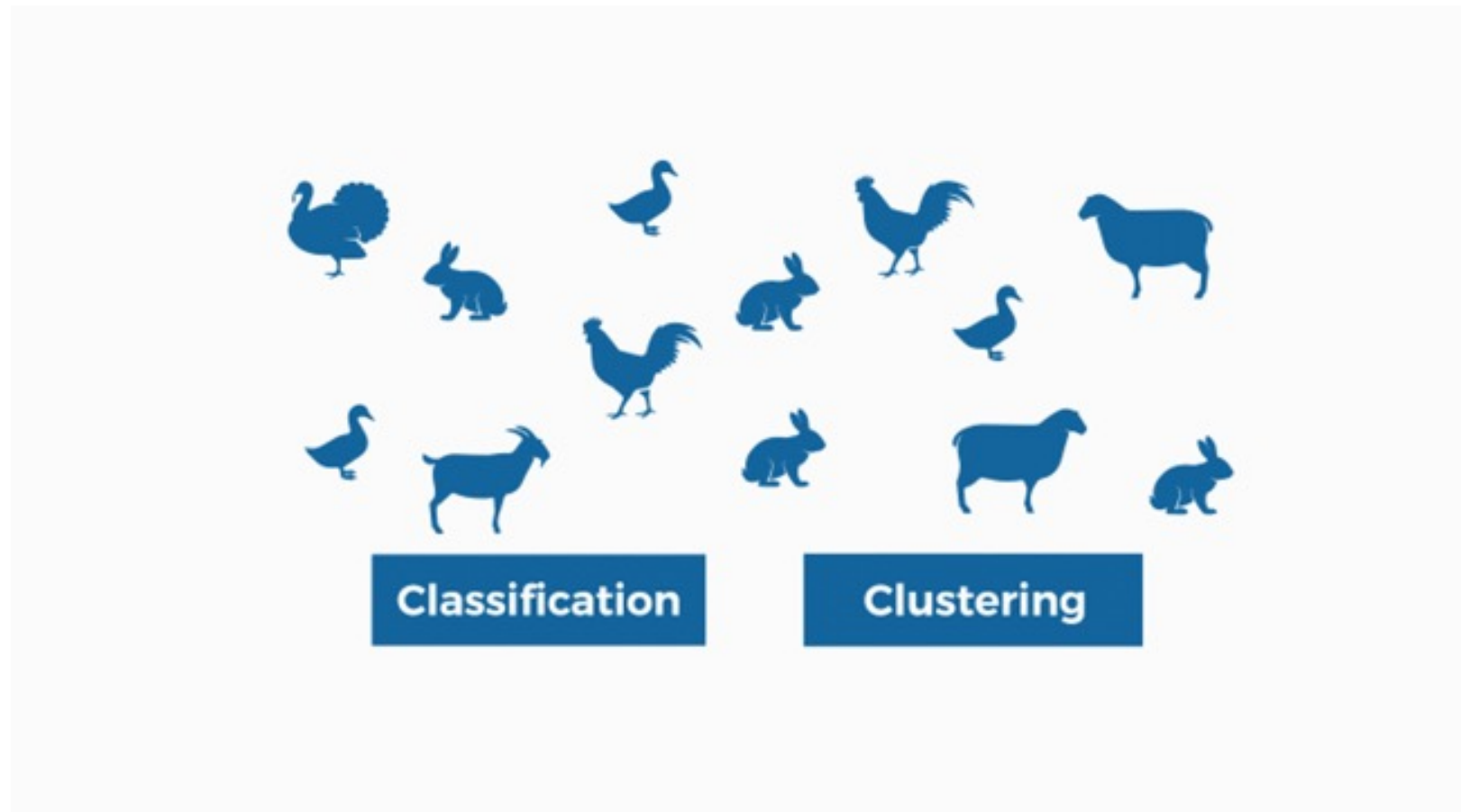


# AI Classification VS Clustering





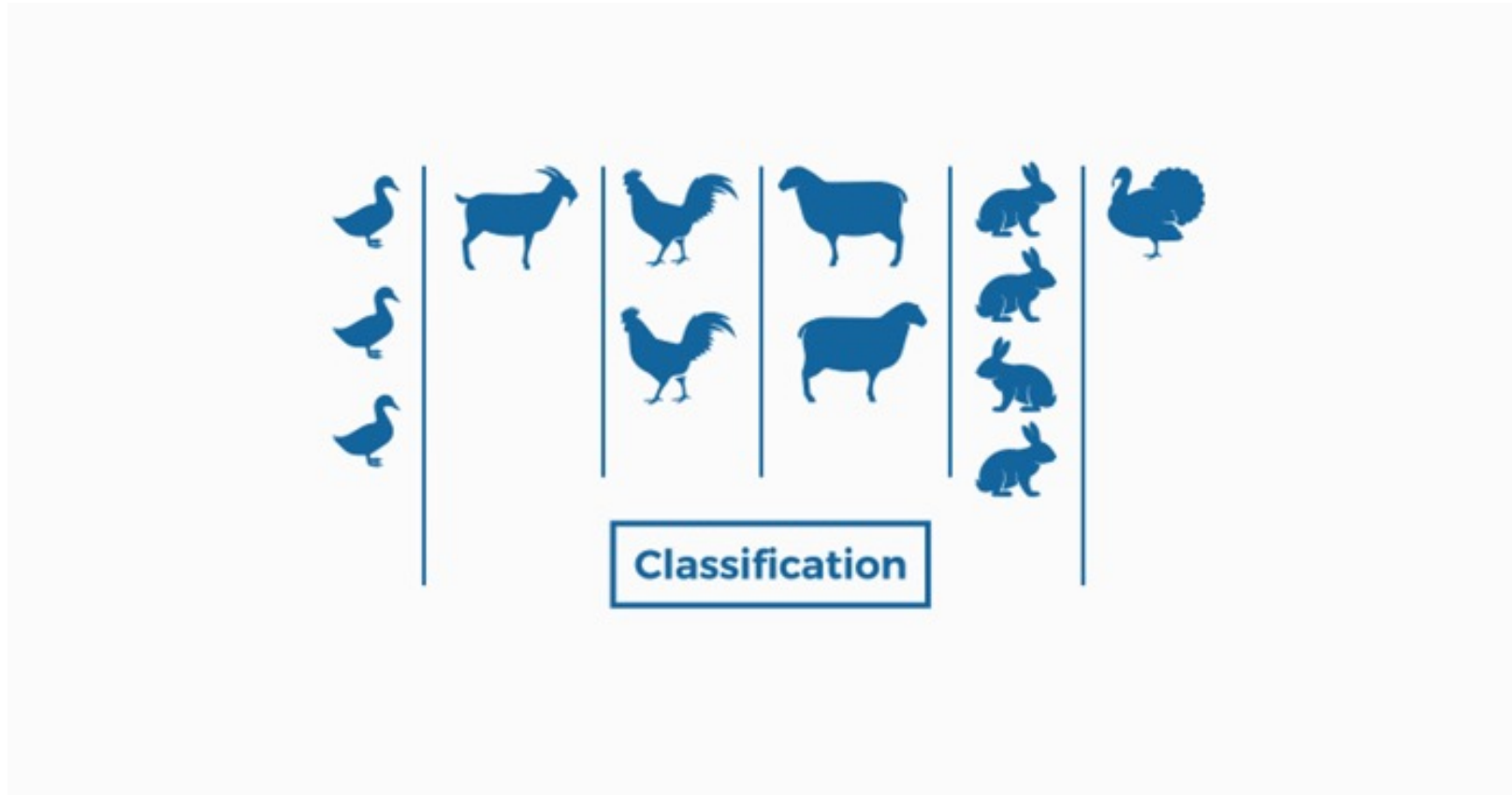
# Classification VS Clustering





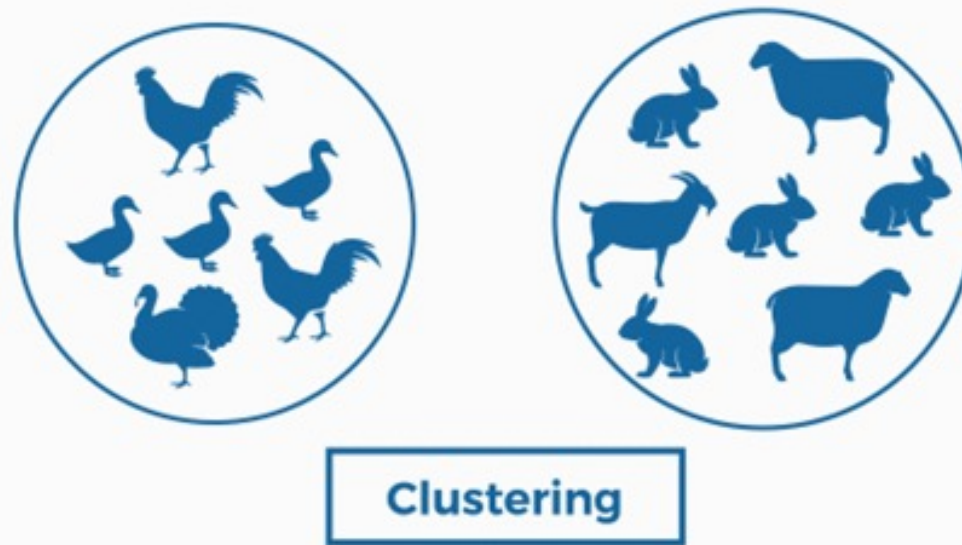


# Classification VS Clustering



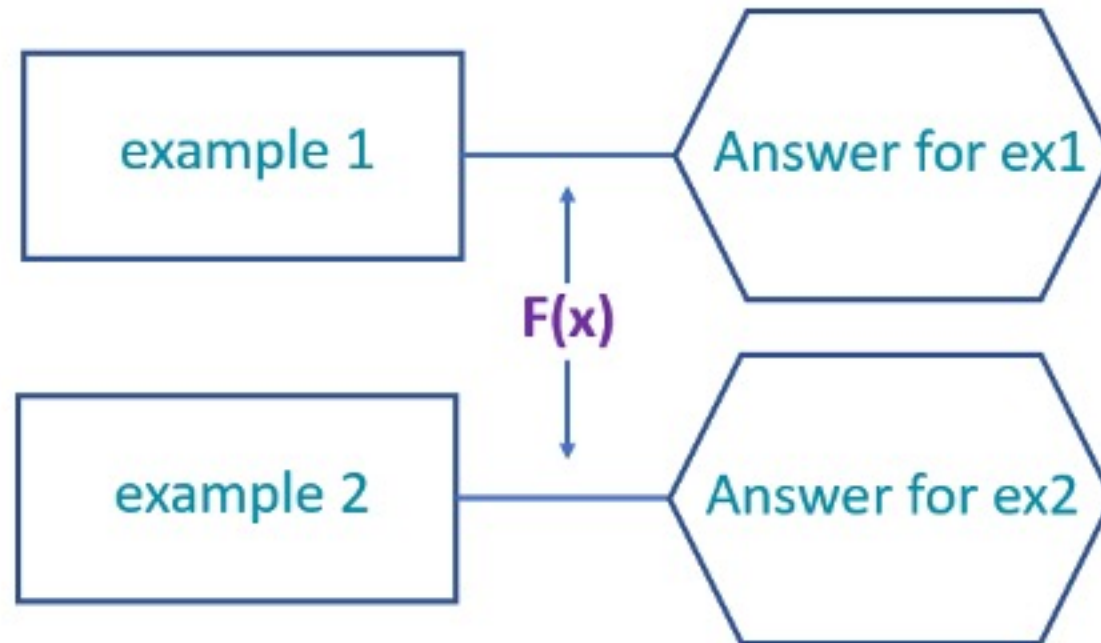


# Classification VS Clustering



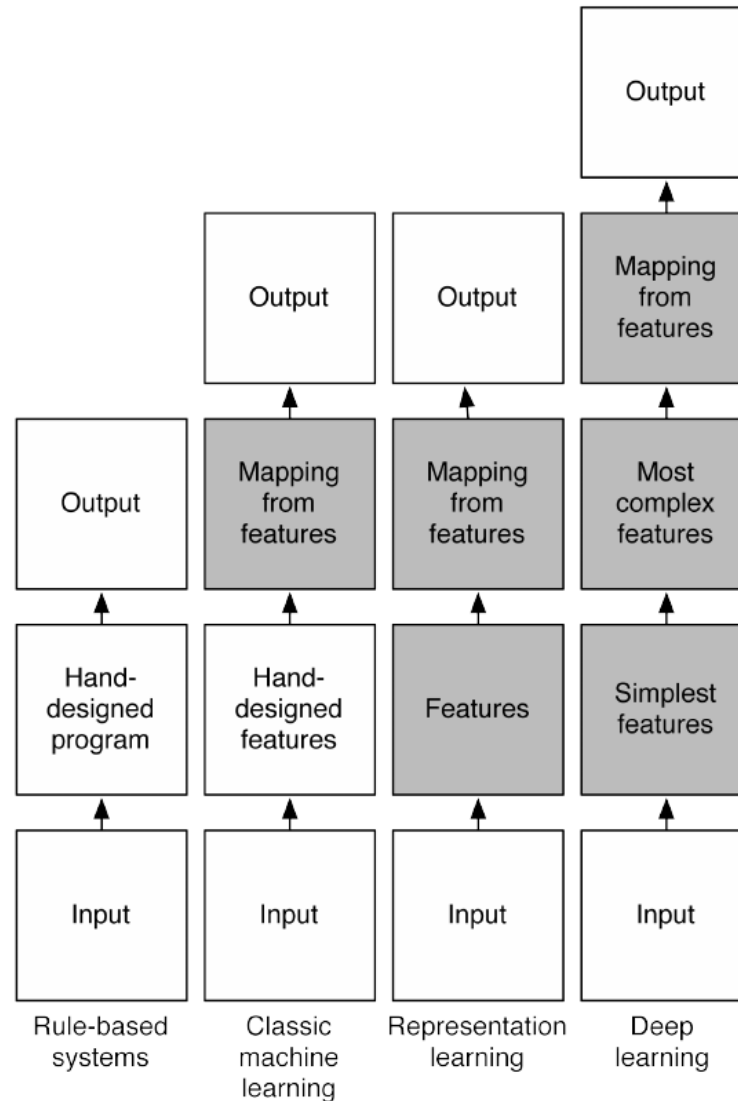
# Classification

to Learn from examples

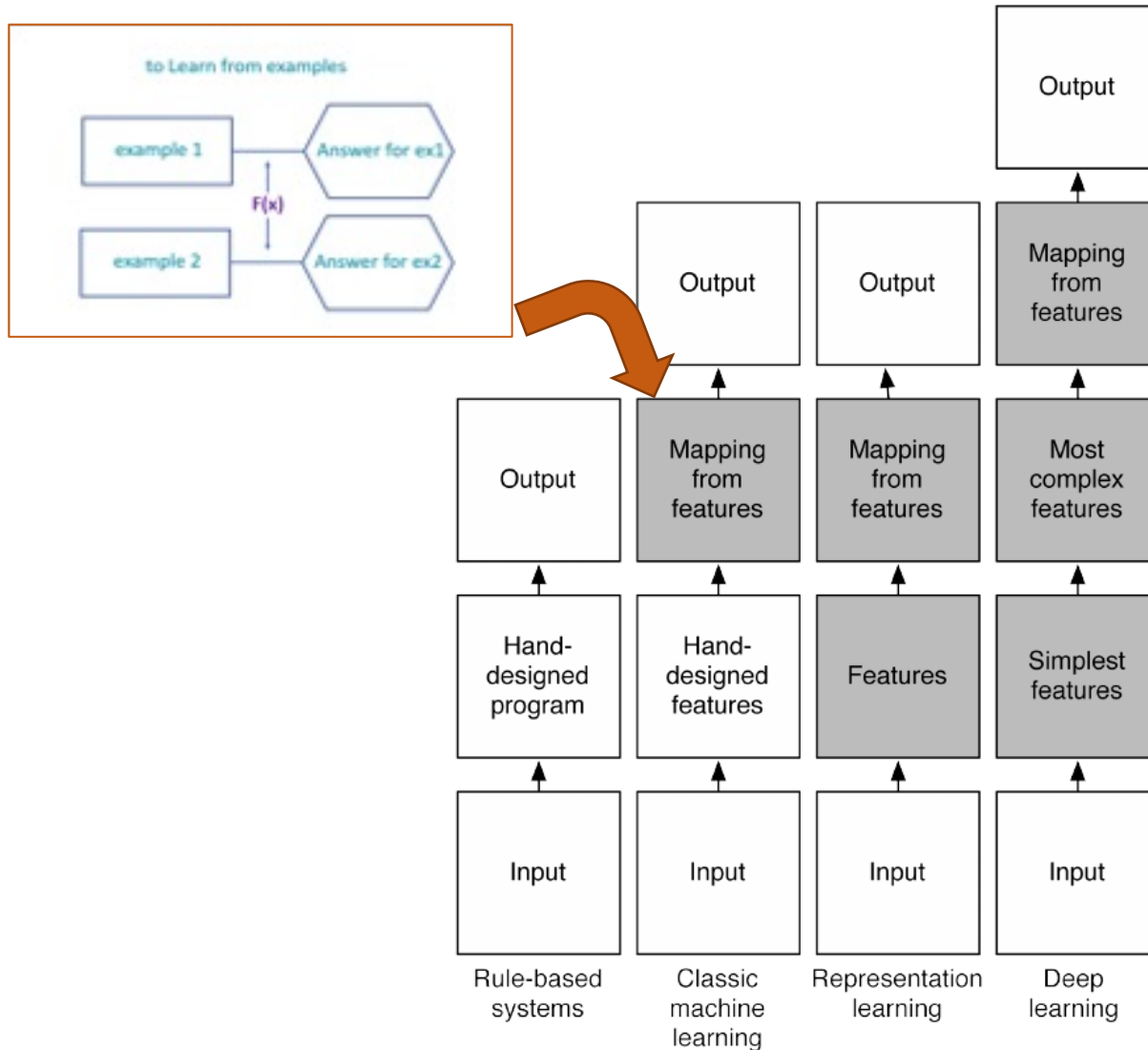




# Classification Evolution

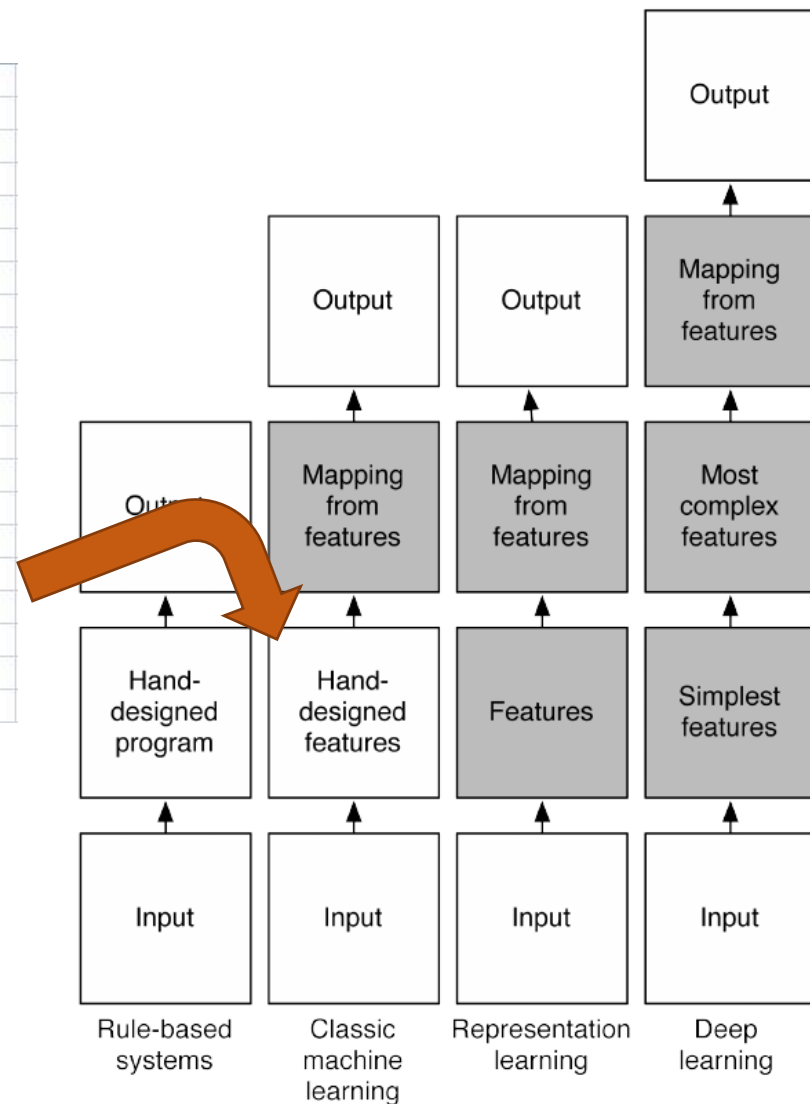


# A What we are focusing on



# A What we are focusing on

Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
1	5.1	3.5	1.4	0.2	Iris-setosa
2	4.9	3	1.4	0.2	Iris-setosa
3	4.7	3.2	1.3	0.2	Iris-setosa
4	4.6	3.1	1.5	0.2	Iris-setosa
5	5	3.6	1.4	0.2	Iris-setosa
6	5.4	3.9	1.7	0.4	Iris-setosa
7	4.6	3.4	1.4	0.3	Iris-setosa
8	5	3.4	1.5	0.2	Iris-setosa
9	4.4	2.9	1.4	0.2	Iris-setosa
10	4.9	3.1	1.5	0.1	Iris-setosa
11	5.4	3.7	1.5	0.2	Iris-setosa
12	4.8	3.4	1.6	0.2	Iris-setosa
13	4.8	3	1.4	0.1	Iris-setosa
14	4.3	3	1.1	0.1	Iris-setosa
15	5.8	4	1.2	0.2	Iris-setosa
16	5.7	4.4	1.5	0.4	Iris-setosa
17	5.4	3.9	1.3	0.4	Iris-setosa
18	5.1	3.5	1.4	0.3	Iris-setosa
19	5.7	3.8	1.7	0.3	Iris-setosa







# The data

features						label
data point data point . . . data point	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
	1	5.1	3.5	1.4	0.2	Iris-setosa
	2	4.9	3	1.4	0.2	Iris-setosa
	3	4.7	3.2	1.3	0.2	Iris-setosa
	4	4.6	3.1	1.5	0.2	Iris-setosa
	5	5	3.6	1.4	0.2	Iris-setosa
	6	5.4	3.9	1.7	0.4	Iris-setosa
	7	4.6	3.4	1.4	0.3	Iris-setosa
	8	5	3.4	1.5	0.2	Iris-setosa
	9	4.4	2.9	1.4	0.2	Iris-setosa
	10	4.9	3.1	1.5	0.1	Iris-setosa
	11	5.4	3.7	1.5	0.2	Iris-setosa
	12	4.8	3.4	1.6	0.2	Iris-setosa
	13	4.8	3	1.4	0.1	Iris-setosa
	14	4.3	3	1.1	0.1	Iris-setosa
	15	5.8	4	1.2	0.2	Iris-setosa
	16	5.7	4.4	1.5	0.4	Iris-setosa
	17	5.4	3.9	1.3	0.4	Iris-setosa
	18	5.1	3.5	1.4	0.3	Iris-setosa
19	5.7	3.8	1.7	0.3	Iris-setosa	



# Iris Dataset

**iris setosa**



petal

sepal

**iris versicolor**



petal

sepal

**iris virginica**



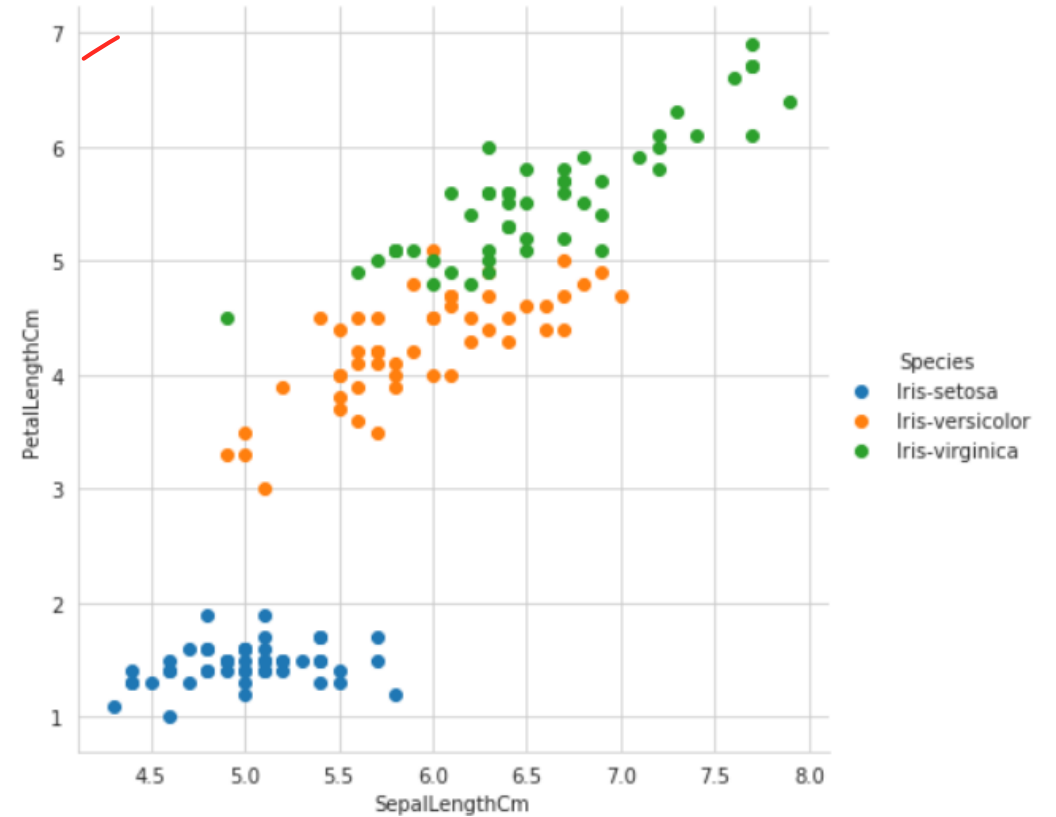
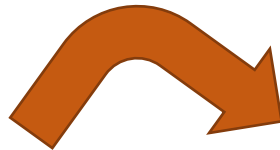
petal

sepal

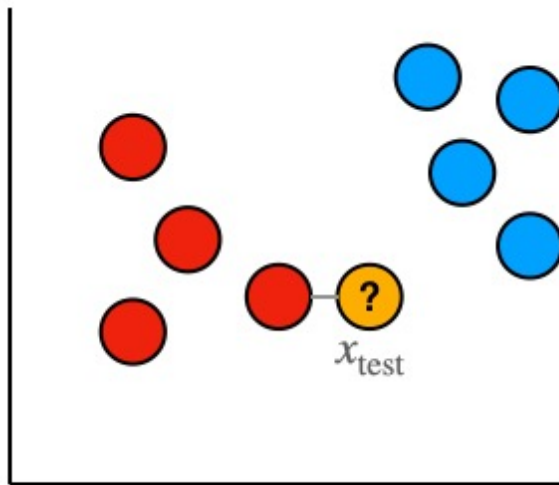
Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
1	5.1	3.5	1.4	0.2	Iris-setosa
2	4.9	3	1.4	0.2	Iris-setosa
3	4.7	3.2	1.3	0.2	Iris-setosa
4	4.6	3.1	1.5	0.2	Iris-setosa
5	5	3.6	1.4	0.2	Iris-setosa
6	5.4	3.9	1.7	0.4	Iris-setosa
7	4.6	3.4	1.4	0.3	Iris-setosa
8	5	3.4	1.5	0.2	Iris-setosa
9	4.4	2.9	1.4	0.2	Iris-setosa
10	4.9	3.1	1.5	0.1	Iris-setosa
11	5.4	3.7	1.5	0.2	Iris-setosa
12	4.8	3.4	1.6	0.2	Iris-setosa
13	4.8	3	1.4	0.1	Iris-setosa
14	4.3	3	1.1	0.1	Iris-setosa
15	5.8	4	1.2	0.2	Iris-setosa
16	5.7	4.4	1.5	0.4	Iris-setosa
17	5.4	3.9	1.3	0.4	Iris-setosa
18	5.1	3.5	1.4	0.3	Iris-setosa
19	5.7	3.8	1.7	0.3	Iris-setosa

# A The data

SepalLengthCm	PetalLengthCm
5.1	1.4
4.9	1.4
4.7	1.3
4.6	1.5
5	1.4
5.4	1.7
4.6	1.4
5	1.5
4.4	1.4
4.9	1.5
5.4	1.5
4.8	1.6
4.8	1.4
4.3	1.1
5.8	1.2
5.7	1.5
5.4	1.3
5.1	1.4
5.7	1.7

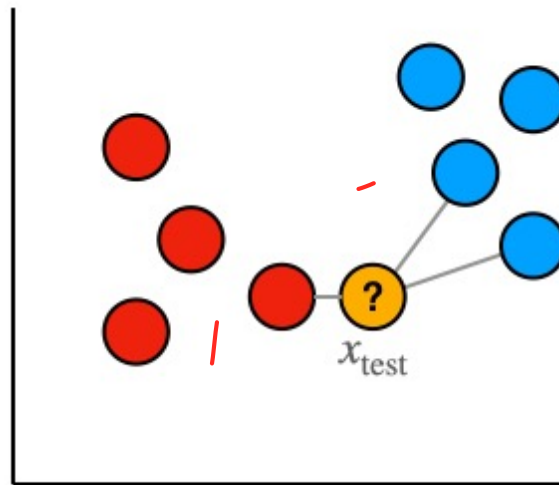


# A First Classification



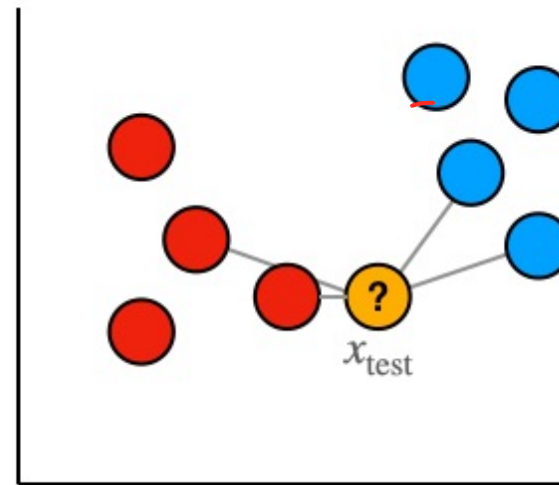
$k = 1$

Nearest point is **red**, so  $x_{\text{test}}$  classified as **red**



$k = 3$

Nearest points are {**red**, **blue**, **blue**} so  $x_{\text{test}}$  classified as **blue**

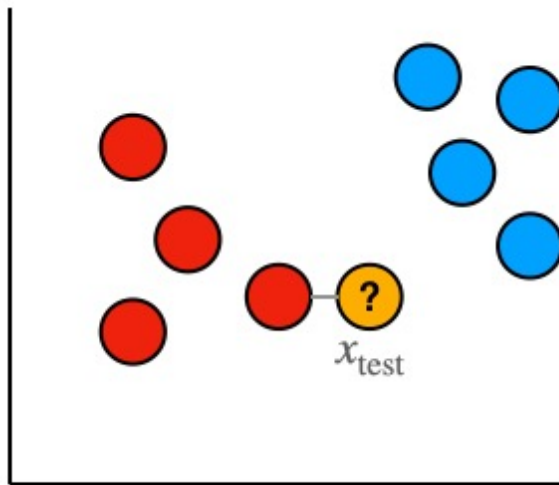


$k = 4$

Nearest points are {**red**, **red**, **blue**, **blue**} so classification of  $x_{\text{test}}$  is not properly defined

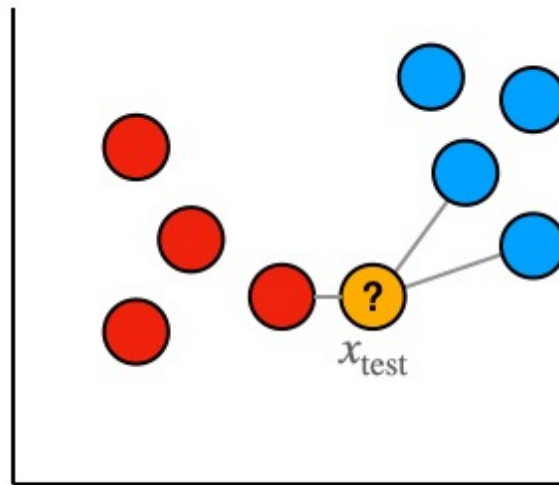


# A KNN-K Nearest Neighbour



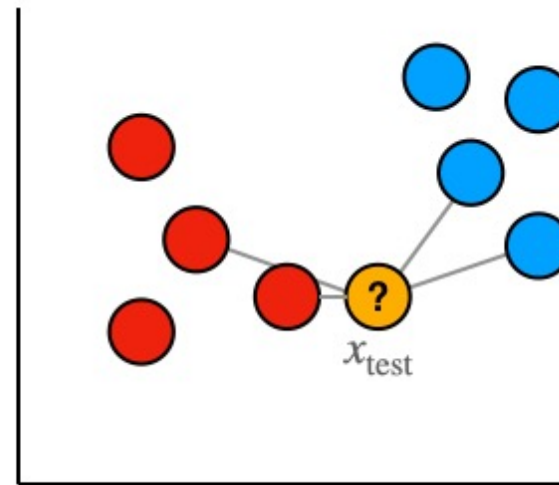
$k = 1$

Nearest point is **red**, so  $x_{\text{test}}$  classified as **red**



$k = 3$

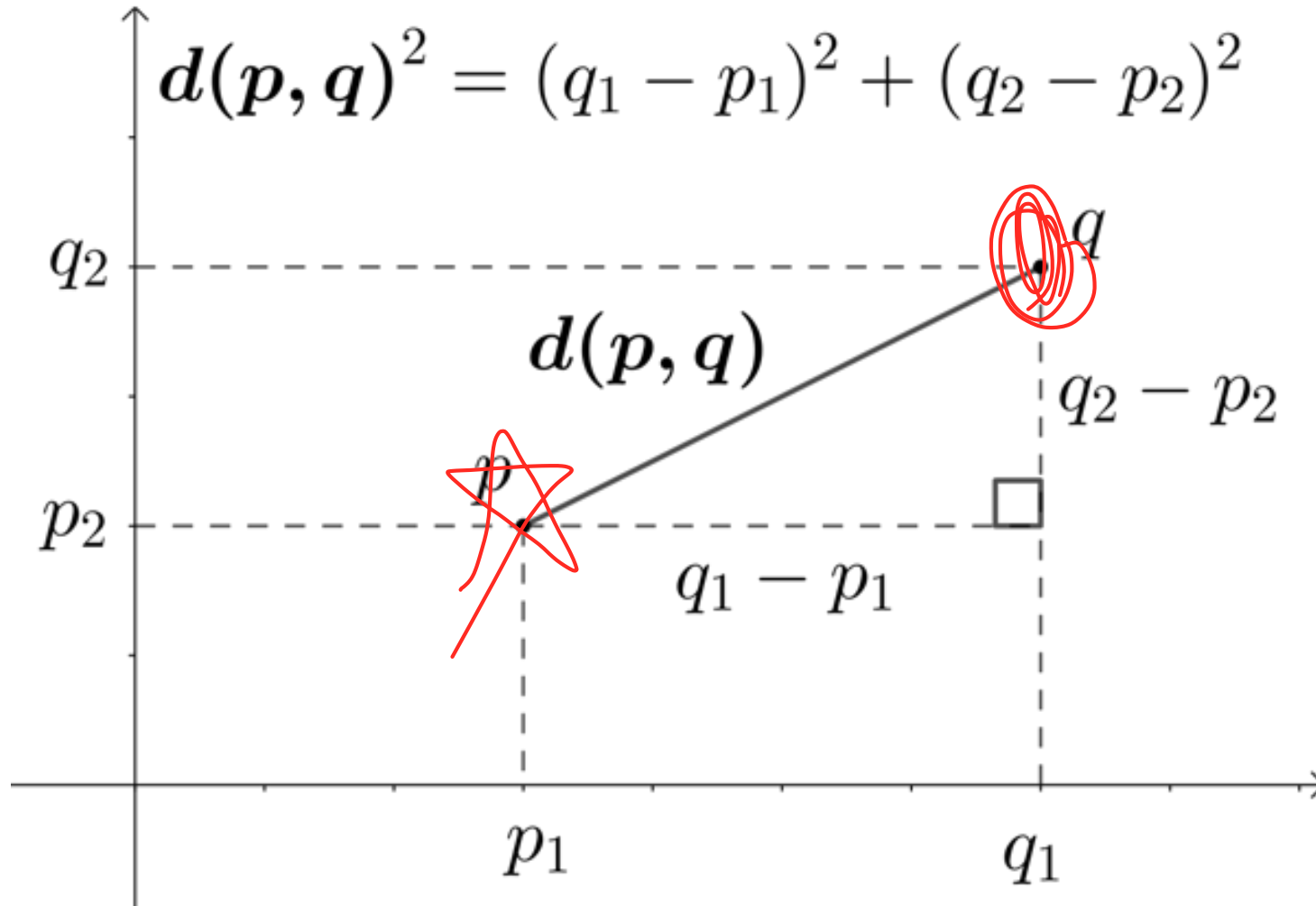
Nearest points are {**red**, **blue**, **blue**} so  $x_{\text{test}}$  classified as **blue**

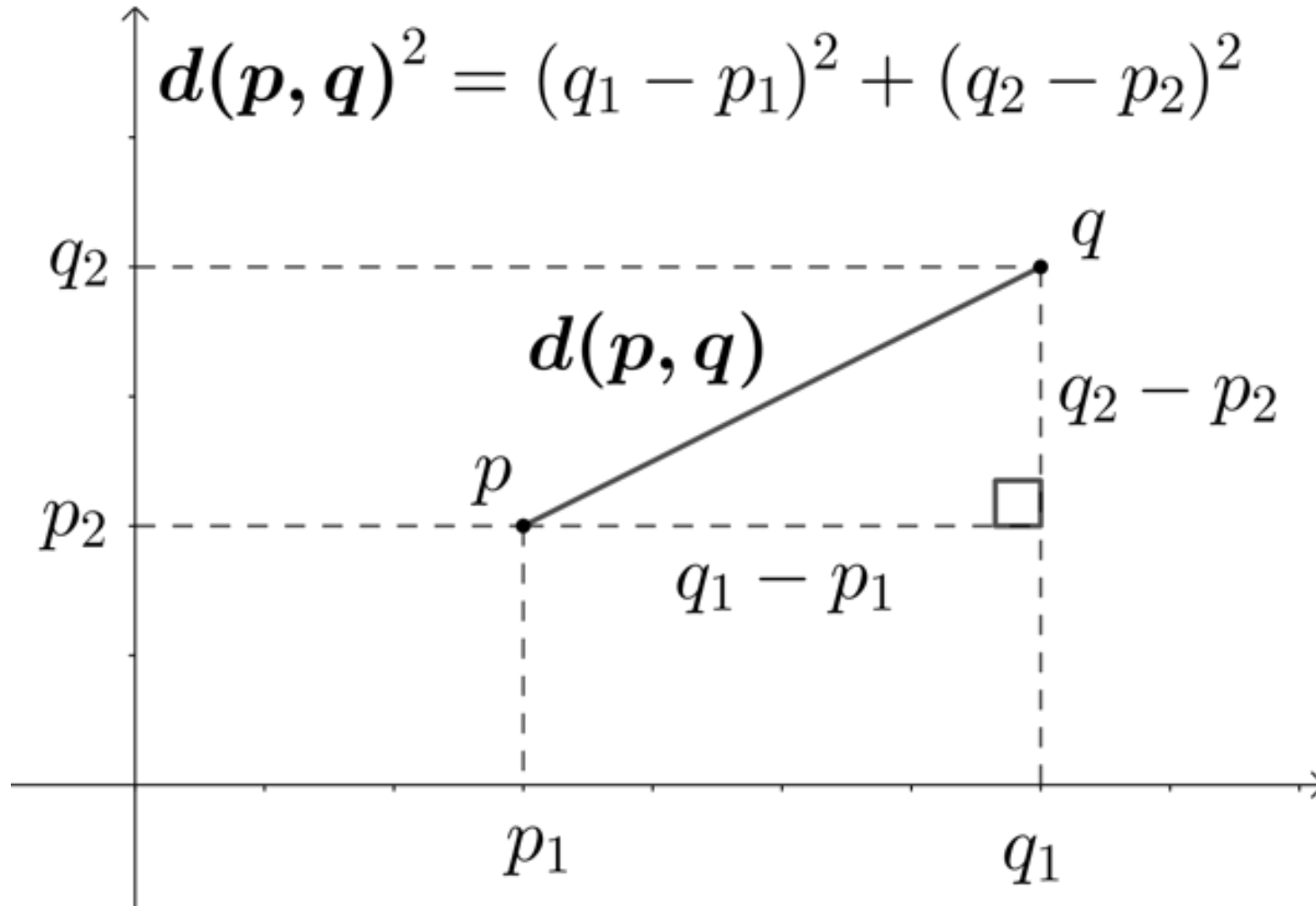


$k = 4$

Nearest points are {**red**, **red**, **blue**, **blue**} so classification of  $x_{\text{test}}$  is not properly defined







Euclidean Distance

# Coding Exercise

# Coding Exercise