TRAINING DATA

for instance tuples of
already labeled data:
(genom, protein expression)

DATA TO BE CLASSIFIED

in our example of the form:
(genom1)
(genom2)
(genom3)
...
...

parameter tuning:

- optimal error rate
- but also good generalization to unknown data

MACHINE LEARNING ALGORITHM

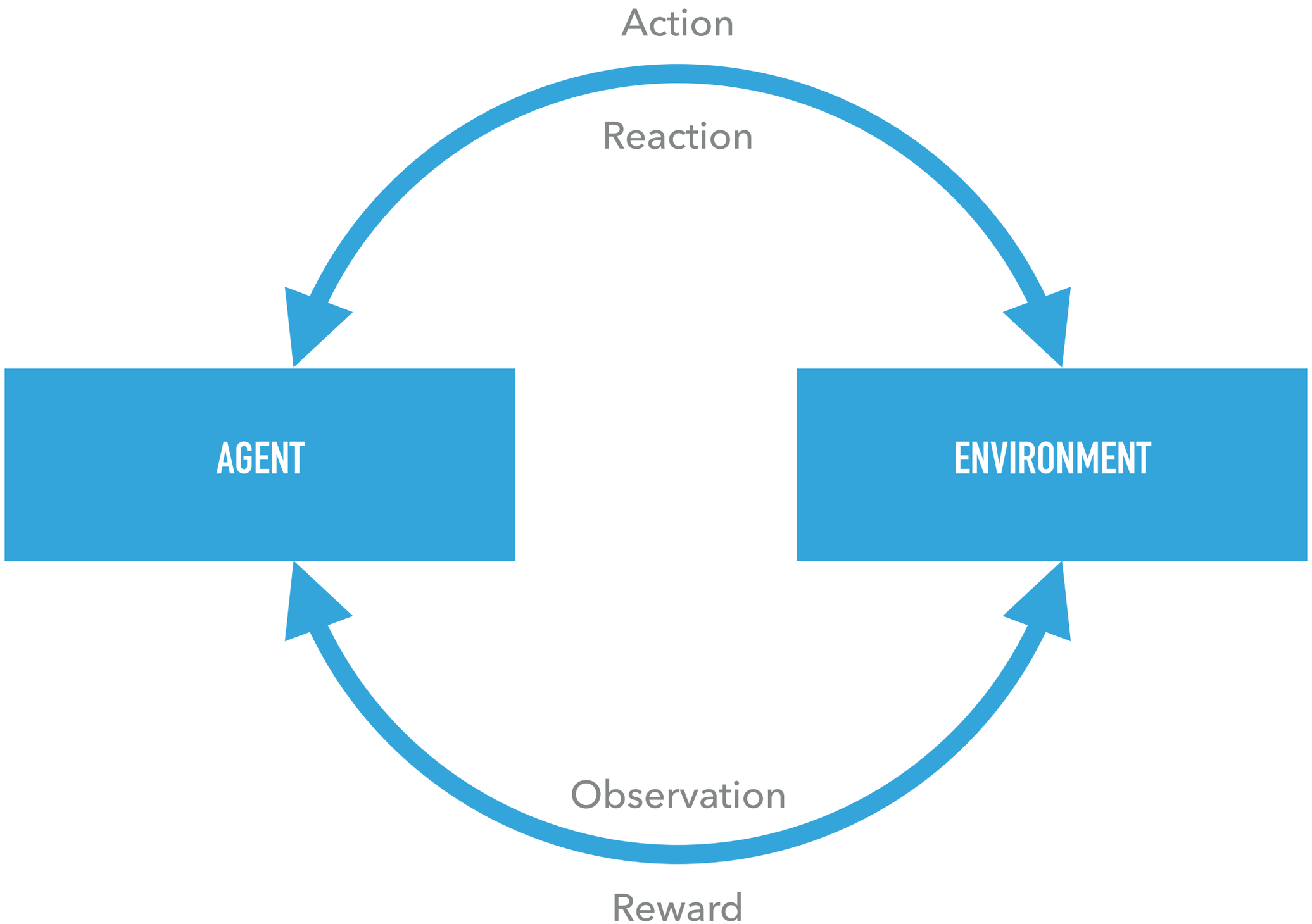
allows for certain parameters to be tuned according to training data

PREDICTION

prediction of labels
of the form
(expression1)
(expression2)
(expression3)
...
...

DATA CLASSIFICATION

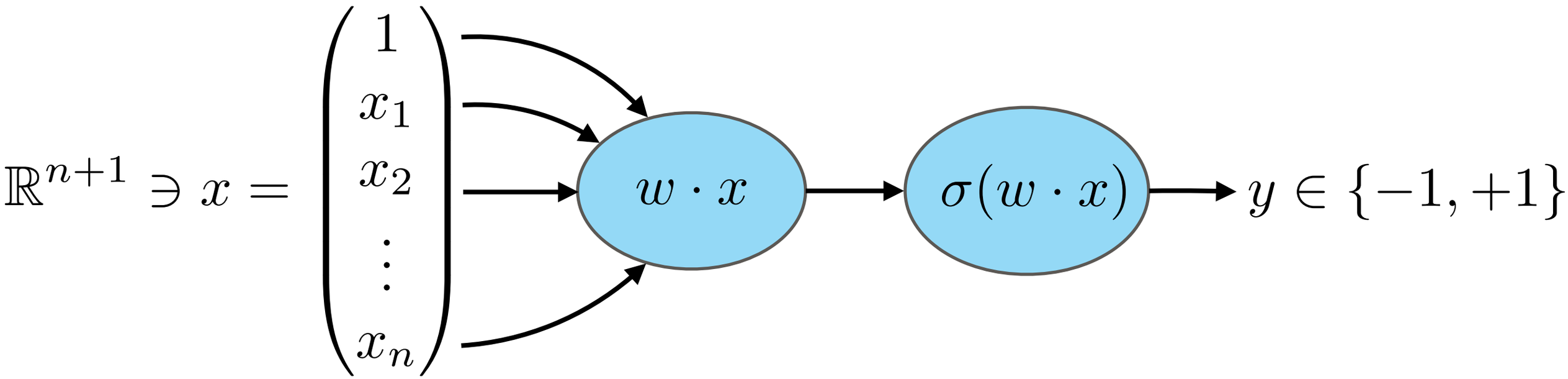
(genom1, expression1)
(genom2, expression2)
(genom3, expression3)
...
...


Action
Reaction
AGENT
ENVIRONMENT
Observation
Reward

Input signals

weighted sum

activation function



weight vector

$w \in \mathbb{R}^{n+1}$

signum function

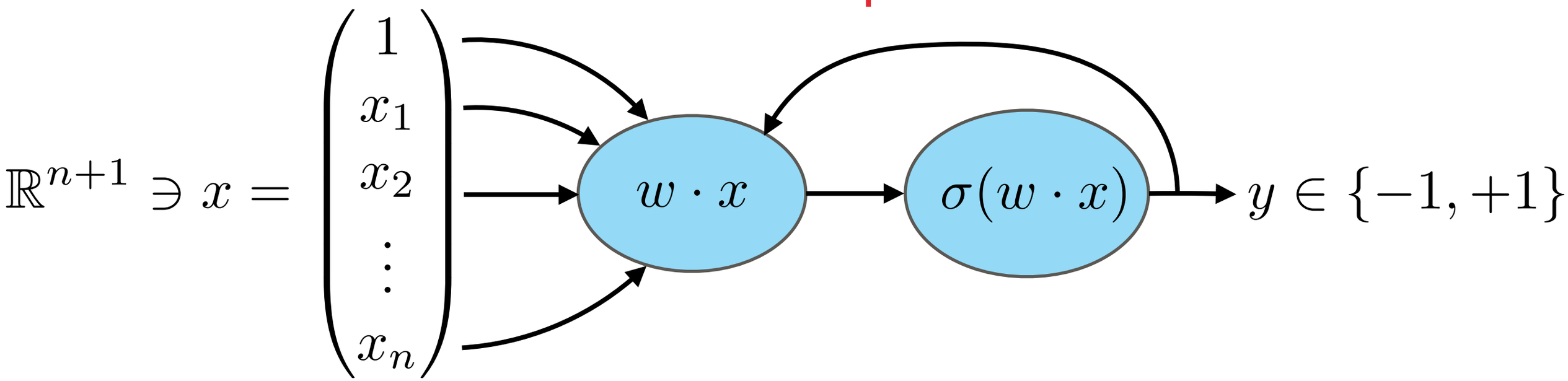
$$\sigma(z) := \begin{cases} +1 & \text{for } z \geq 0 \\ -1 & \text{for } z < 0 \end{cases}$$

Input signals

weighted sum

activation function

feedback for update rule



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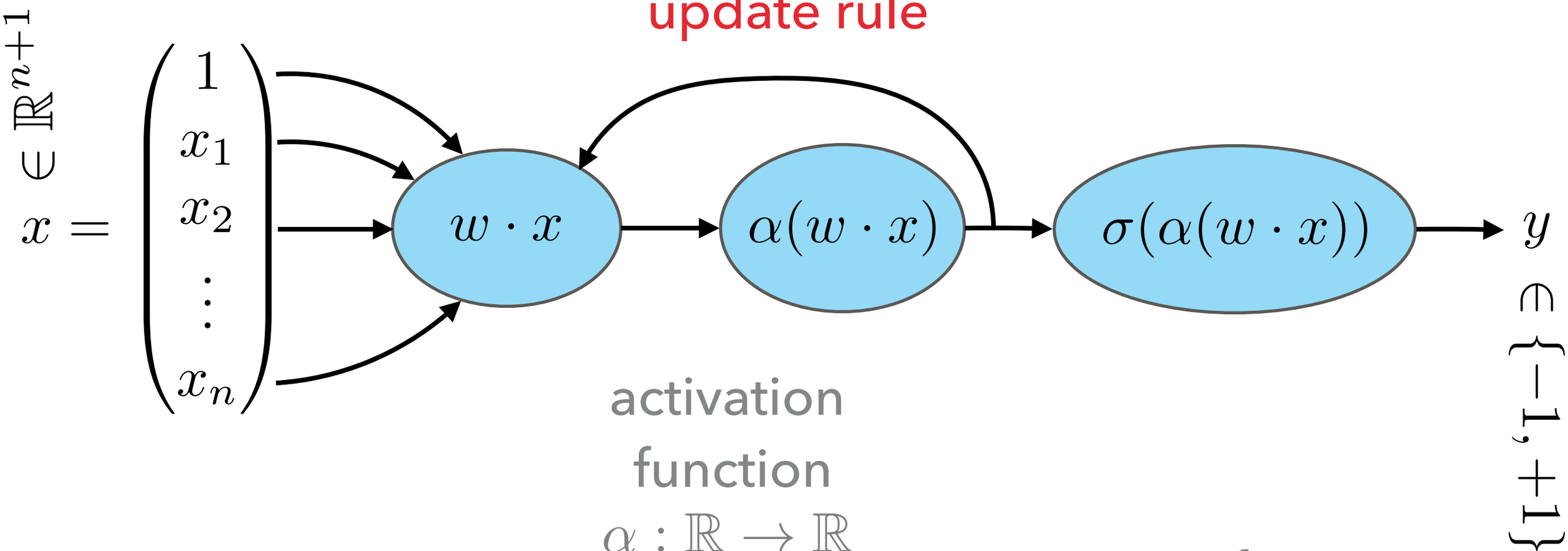

activation function

$\alpha : \mathbb{R} \to \mathbb{R}$

weight vector

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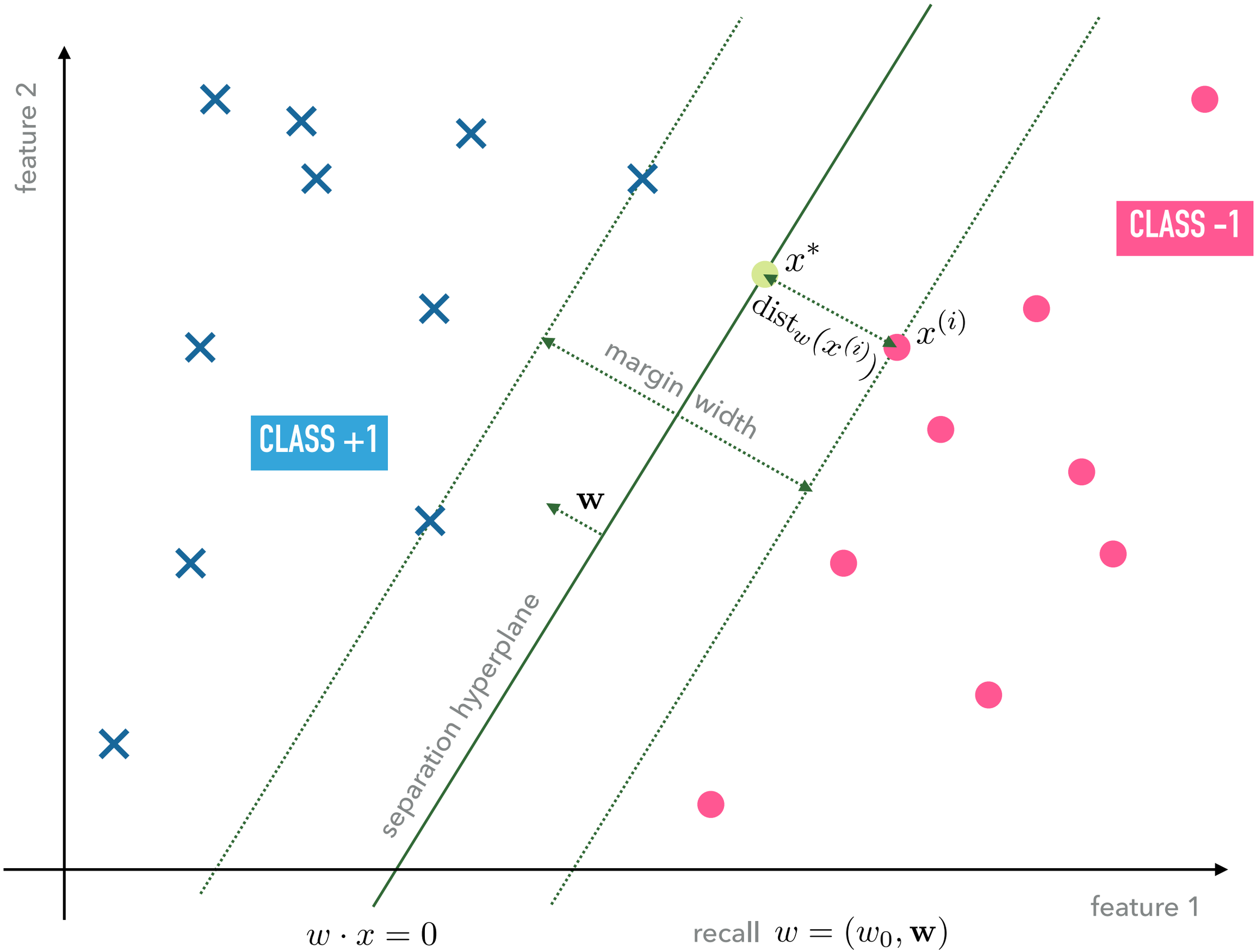
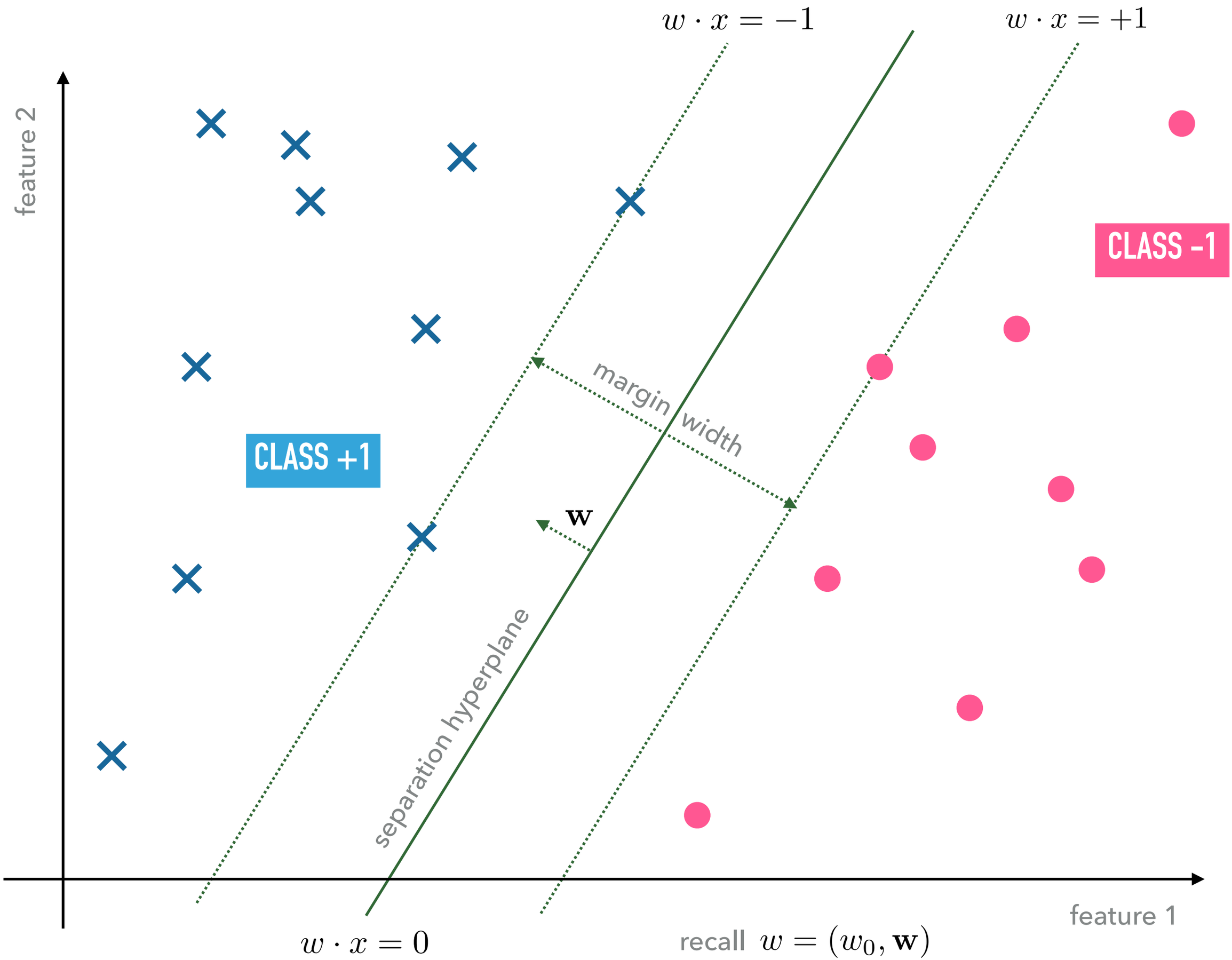

feature 2
CLASS +1
CLASS -1
x^*
$\text{dist}_w(x^{(i)})$
$x^{(i)}$
margin width
$\mathbf{w}$
separation hyperplane
feature 1
$w \cdot x = 0$
recall $w = (w_0, \mathbf{w})$


$w \cdot x = -1$
$w \cdot x = +1$
feature 2
CLASS +1
CLASS -1
margin width
w
separation hyperplane
$w \cdot x = 0$
feature 1
recall $w = (w_0, \mathbf{w})$

$w \cdot x = -1$

$w \cdot x = +1$

feature 2

CLASS +1

CLASS -1

margin width

$\mathbf{w}$

separation hyperplane

feature 1

$w \cdot x = 0$

recall $w = (w_0, \mathbf{w})$

$w \cdot x = -1$

$w \cdot x = +1$

feature 2

CLASS +1

CLASS -1

margin width

$\mathbf{w}$

$x^{(i)}$

η

p

separation hyperplane

$w \cdot x = 0$

recall $w = (w_0, \mathbf{w})$

feature 1