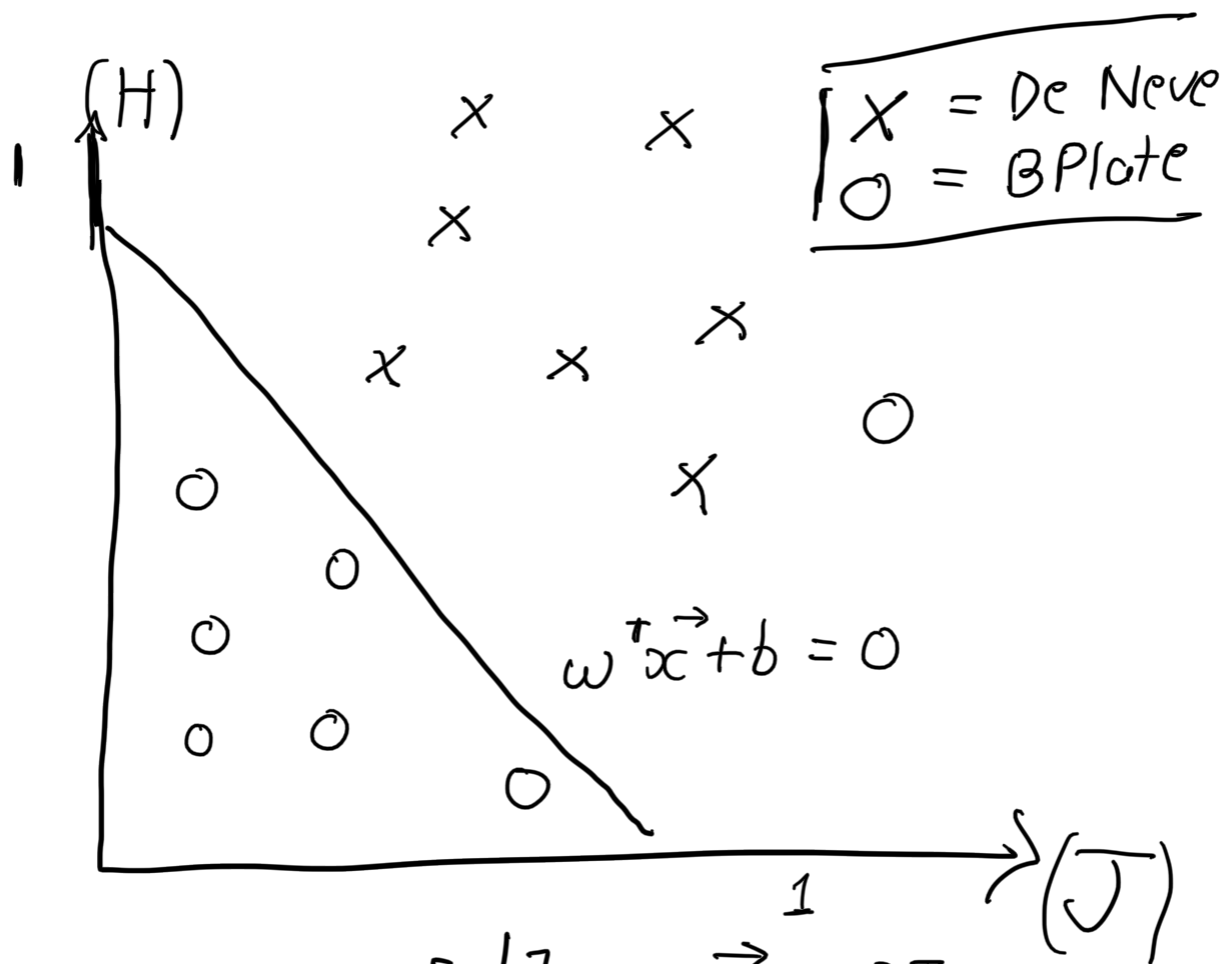


Suppose that some (almost) omnipotent entity wants to predict whether a student is going to have dinner at De Neve or Bplate (assume the other menus are trash and that it has nothing better to do)

Being basically omnipotent, it knows what they've eaten so far, their biology, their mood, their bitcoin private keys, a lot. It's able to condense all this info (features) into 2 scores (this is called dimensionality reduction):

- 1) $H \rightarrow$ range $[0,1]$ measuring how hungry they feel
- 2) $J \rightarrow$ range $[0,1]$ measuring how "junky" they feel

Using previous data on eating patterns, it's able to learn a classifier on these 2 derived features using one of the algorithms we covered:



where $w = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$, $\vec{x} = \begin{bmatrix} J \\ H \end{bmatrix}$
and $b = -0.85$

Answer the following Qs:

1. What would the classifier predict on the following unseen points:

a) $(0.1, 0.3)$

b) $(0.1, 1)$

c) $(0.6, 0.7)$

d) $(0.5, 0.5)$

e) $(1, 0.1)$

2. Would the perceptron algorithm have converged on this data? why or why not?

3. Suppose it makes the following pattern of predictions:

Truth

Prediction

Ne Neve

De Neve
De Neve
BPlate
BPlate
BPlate
De Neve
De Neve
BPlate
De Neve
BPlate

De Neve
De Neve
BPlate
De Neve
BPlate
De Neve
BPlate
BPlate
BPlate
De Neve

Calculate the:

- a) Accuracy
 - b) Precision
 - c) Recall
 - d) F1-score
- of the model. Treat De Neve as the positive class