Higher Dimensions

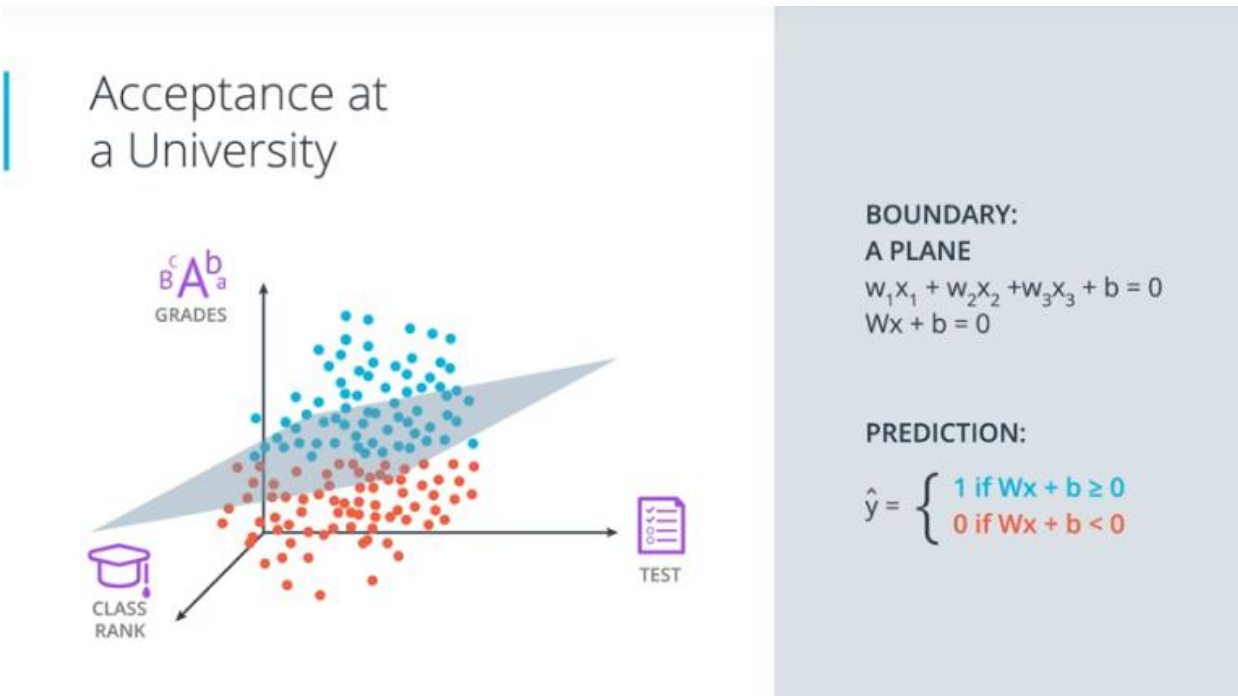
Now, you may be wondering what happens if we have more data columns so not just testing grades, but maybe something else like the ranking of the student in the class.

How do we fit three columns of data? Well the only difference is that now, we won't be working in two

we'll be working in three. So now, we have three axis: x_1 for the test, x_2 for the grades and x_3 for the class ranking. And our data will look like this, like a bunch of blue and red points flying around in 3D.

On our equation won't be a line in two dimension, but a plane in three dimensions with a similar equation as before.

Now, the equation would be w1x1 + w2x2 + w3x3 + b = 0, which will separate this space into two regions. This equation can still be abbreviated by Wx plus b equals zero, except our vectors will now have three entries instead of two. And our prediction will still be y head equals one if Wx plus b is greater than or equal to zero, and zero if Wx plus b is less than zero.



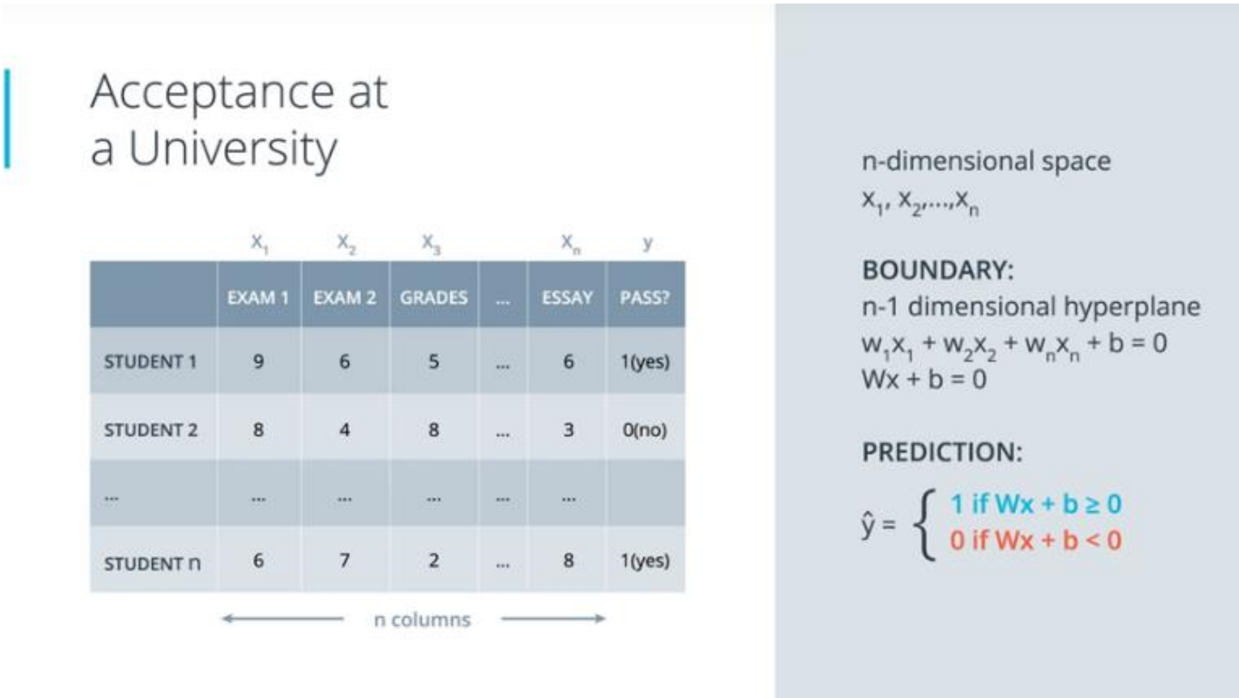
And what if we have many columns like say n of them? Well, it's the same thing. Now, our data just leaps in n-dimensional space. Now, I have trouble picturing things in more than three dimensions.

But if we can imagine that the points are just things with n coordinates called x1, x2, x3 all the way up to xn with our labels being y, then our boundaries just an n-1 dimensional hyperplane,

which is a high dimensional equivalent of a line in 2D or a plane in 3D.

And the equation of this n-1 dimensional hyperplane is going to be w1x1 + w2x2 + wnxn + b = 0, which we can still abbreviate to Wx + b = 0, where our vectors now have n entries.

And our prediction is still the same as before. It is y head equals one if Wx plus b is greater than or equal to zero and y head equals zero if Wx plus b is less than zero.



Quiz Question

Given the table in the video above, what would the dimensions be for input features (x), the weights (W), and the bias (b) to satisfy (Wx + b)?

a. W: (nx1), x: (1xn), b: (1x1)
b. W: (1xn), x: (1xn), b: (nx1)
c. W: (1xn), x: (nx1), b: (1x1)
d. W: (1xn), x: (nxn), b: (1xn)

Answer: c