**Machine Learning : Logistic Regression**

**Logistic regression is a classifier**

**Logistic Regression explicitly outputs a probability of a data point belonging to a particular class**

Table

Description automatically generated

**Linear regression may not make a good classifier**

* **Because the linear function can cause misclassification like the circled X**
* Diagram

  Description automatically generated

Chart, diagram, scatter chart

Description automatically generated

* **The left graph is perfect for linear regression**

Chart, line chart

Description automatically generated

* **Take the y value from linear regression and plug it into a sigmoid function**
* **Now we will be computing a probability**
* **If we solve for y and put it back into the linear regression algorithm we get another algorithm**

Diagram

Description automatically generated

A picture containing diagram

Description automatically generated

* **The point of logistic regression is to find the best fitting curve**

Diagram

Description automatically generated with medium confidence

Diagram

Description automatically generated

* **If above 0.5 we can classify it as positive**
* **Below 0.5 negative**
* **On 0.5 is up to you, can be negative or positive however you want to implement it.**

Graphical user interface, text

Description automatically generated

* **Keep adjusting until our model is accurate or a number of iterations is completed**

**The Logistic Function is a sigmoid function**

Graphical user interface, chart

Description automatically generated

* **Any real value between 0 and 1 an S curve**
* **We can use those parameters from linear function and plug it into the sigmoid function to get our S shape**
* **Learn the best values for the thetas the coefficient based on the training data**

Diagram, whiteboard

Description automatically generated

* **Linear Regression wants the bowl shape on the right, because if we pick the one on the left we could get stuck on a local minimum.**

Diagram

Description automatically generated

Diagram, whiteboard

Description automatically generated

Text

Description automatically generated

Text, letter

Description automatically generated