Logistic Regression

The logistic model

The log-odds of an event increase linearly with an independent variable.

$$\log \frac{p}{1-p} = ax + b$$

Example: The chance that a person buys a product depends on how many times they encounter advertising for that product.

The sigmoid function

$$\log \frac{p}{1-p} = ax + b$$

means that

$$p(x) = \frac{1}{1 + e^{-ax-b}}$$

The logistic curve

The function

$$\sigma(x) = \frac{1}{1 + e^{-x}}$$

is called the logistic function.

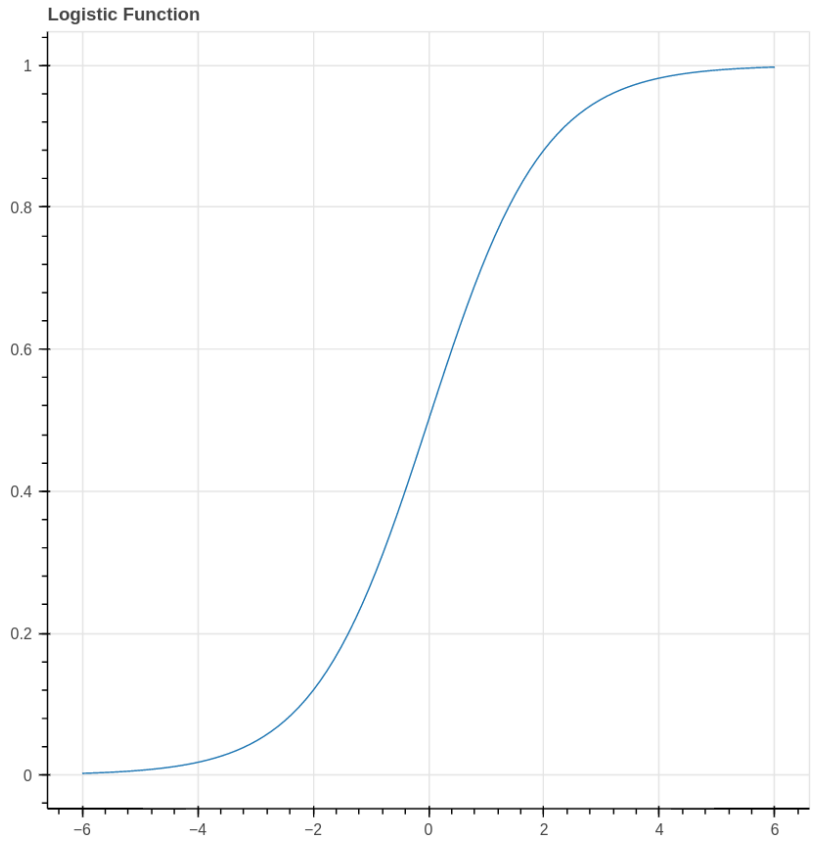

Figure 1: Logistic Curve

Sample data

Likelihood of event increases with x. Out of 100 tries:

x	-3	-2	-1	0	1	2	3
Occurrences (out of 100)	10	18	38	50	69	78	86

Two points of view

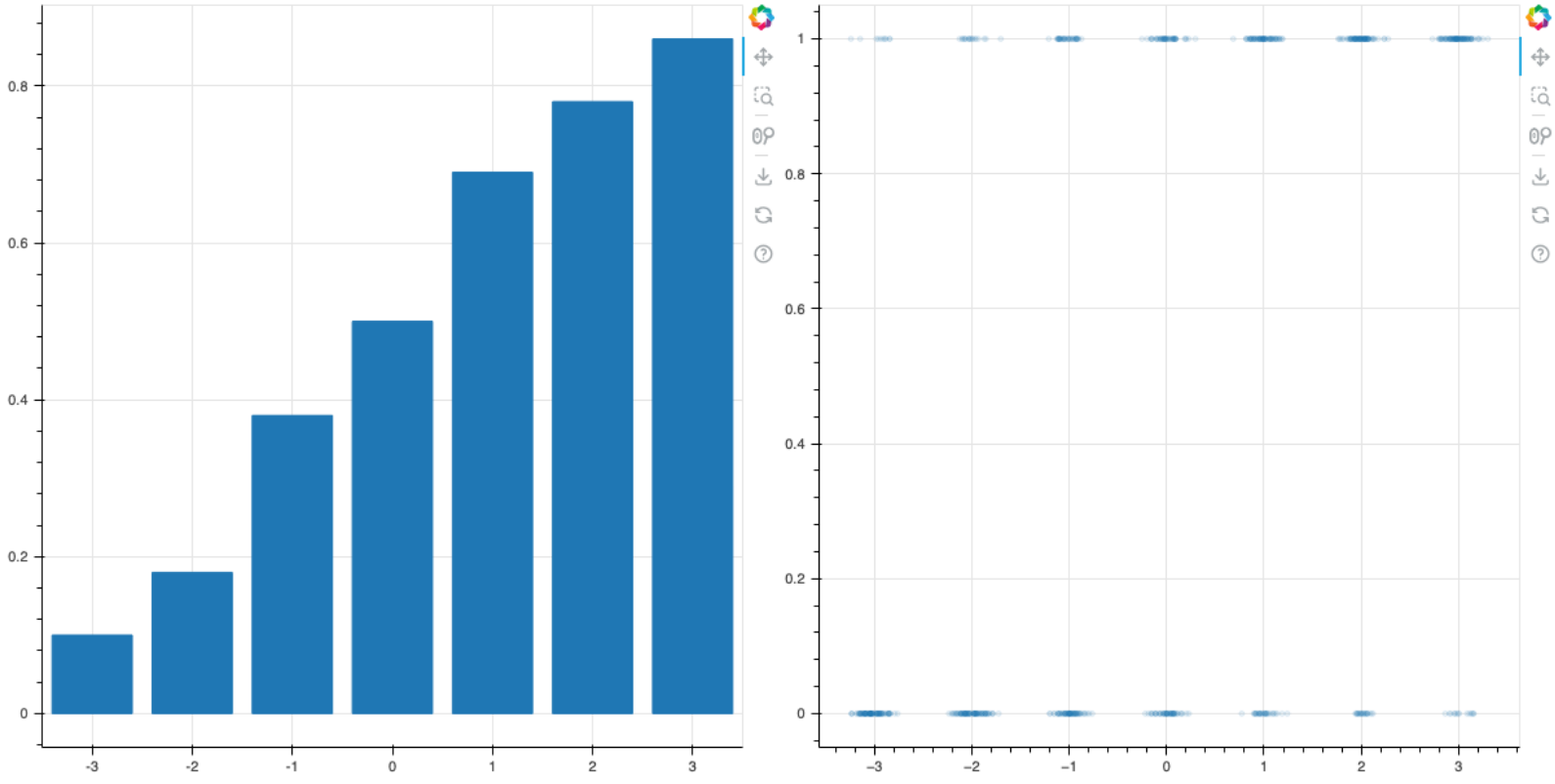

Figure 2: histogram