Logistic regression model

Logistic Regression Model

- ✓ Target is categorical.
- ✓ P(y=1 | X) ➔ the probability of the variable being 1 given the values of X (the predictors).

Logistic Regression Model

$$P(y=1 \mid X) = \frac{1}{1+ e^{-(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n)}}$$

- X are the independent variables.
- Y is the target, which is class target.

Logistic Regression Model

$$P(y=1 \mid X) = \frac{1}{1+ e^{-(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n)}}$$

The logistic function (or sigmoid function) is used to restrict the outcome to a value between 0 and 1.

Logistic Regression Model

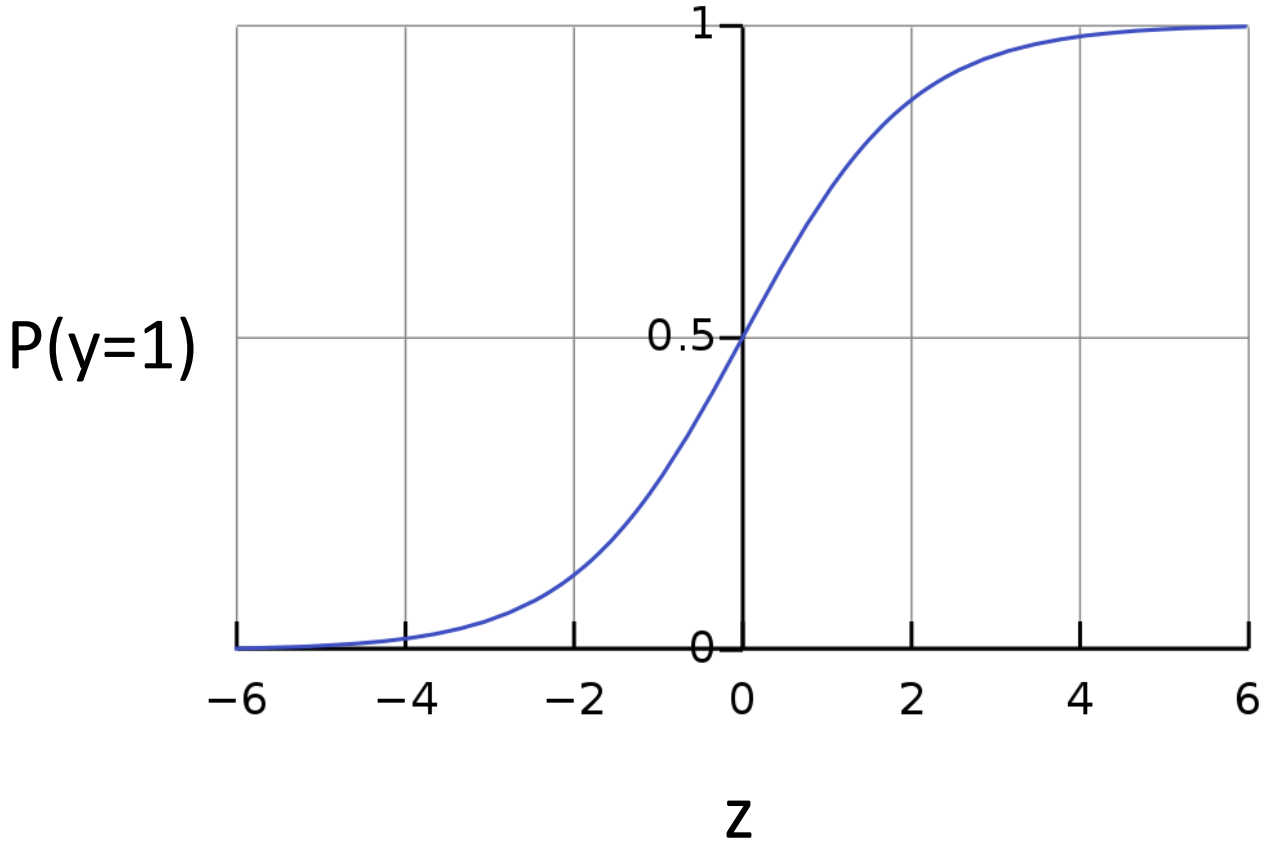
$$P(y=1 \mid X) = \frac{1}{1+ e^{-(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n)}}$$

$$z = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n$$

$$P(y=1 \mid X) = \frac{1}{1+ e^{-z}}$$

Logistic function

- Positive values of z (z > 0) are predictive of class 1.
- Negative values of z (z < 0) are predictive of class 0.



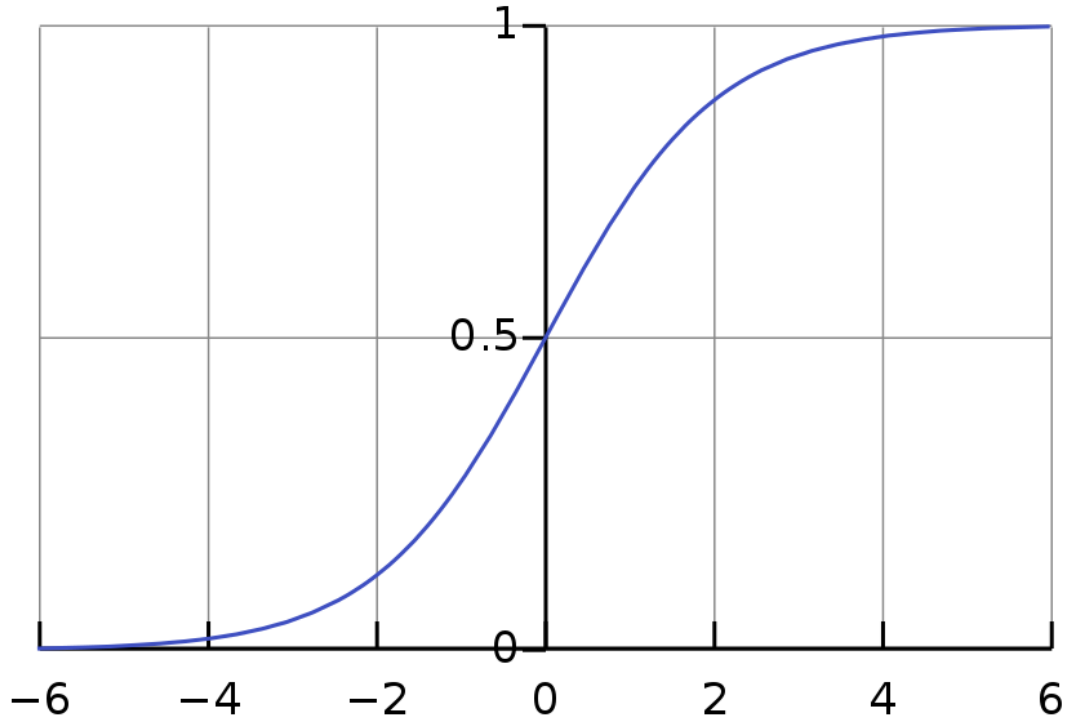
Logistic function

Y = 1, when z > 0

…

$$(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n) > 0$$

P(y=1)

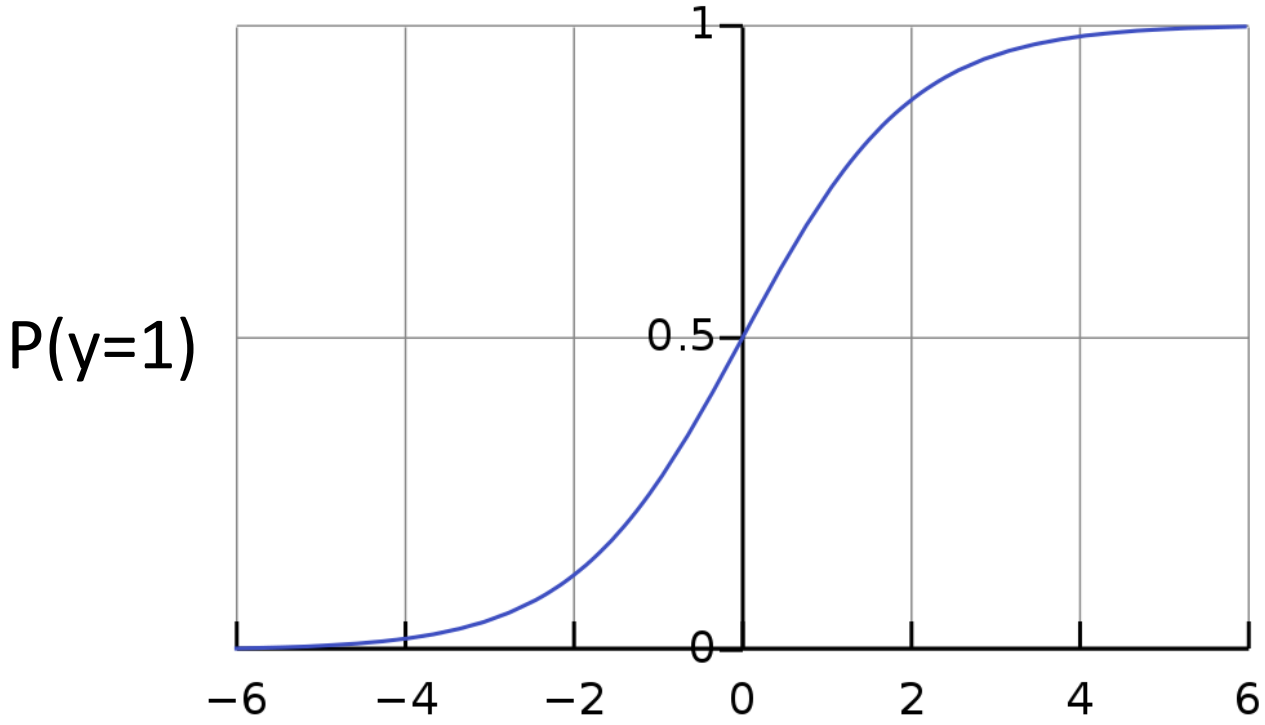


$$(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n)$$

Logistic function

$$(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n) > 0$$

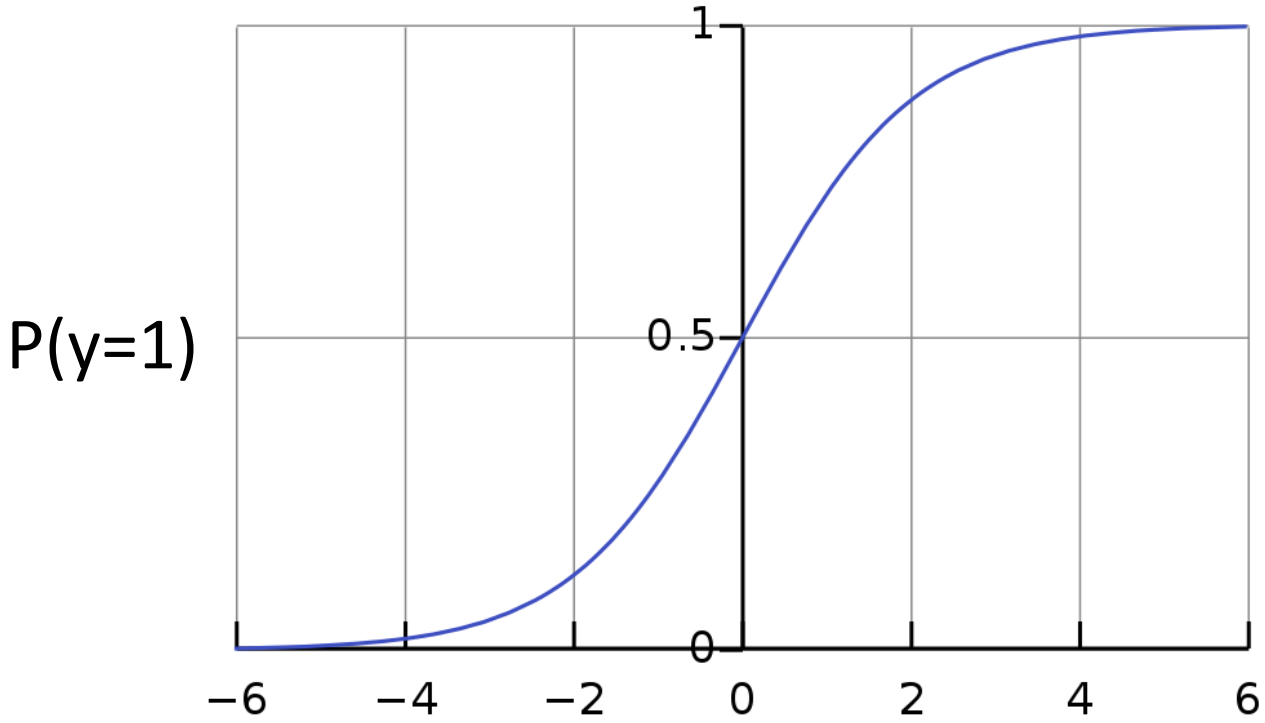
- If $\beta = 0$, the feature does NOT affect the probability of the outcome.
- Positive values of β increase the probability of the outcome.
- Negative values of β decrease the probability of the outcome.



Logistic function

The coefficients (β) are selected to predict:

- High probability when y =1.
- Low probability when y = 0.



$$(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n)$$

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THANK YOU

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