Logistic Regression

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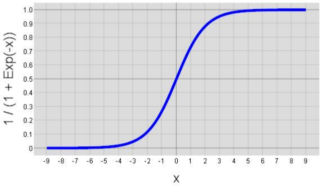
Logistic Regression

Coef	Value
β_0	0.5
β_{bark}	1.0
β_{meow}	-1.0
β_{fur}	-0.5
β_{leash}	0.5



$$P(Y=0|X) = \sigma\left(\beta_0 + \sum_i \beta_i X_i\right) \tag{1}$$

$$P(Y=1|X) = 1 - \sigma\left(\beta_0 + \sum_i \beta_i X_i\right) \tag{2}$$

Where $\sigma(z) = \frac{1}{1+exp[-z]}$

This is dog/cat classification. What is positive?

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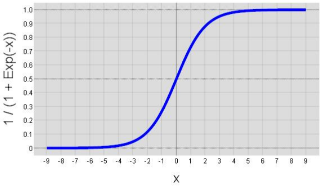

$$P(Y=0|X) = \sigma\left(\beta_0 + \sum_i \beta_i X_i\right) \quad (1)$$

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Where $\sigma(z) = \frac{1}{1+exp[-z]}$

How is an empty document classified?

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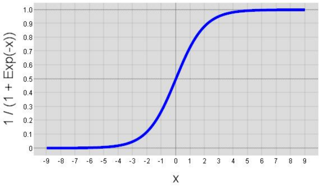

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Where $\sigma(z) = \frac{1}{1+exp[-z]}$

What is a one word document that is evenly balanced?

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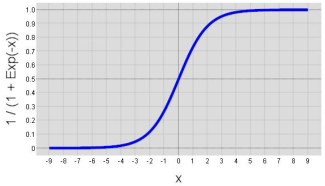

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What is a two word document that is evenly balanced?

Logistic Regression

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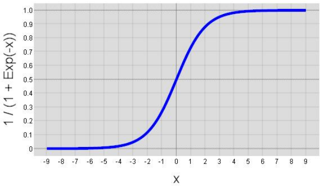
β_{fur}	-0.5
β_{leash}	0.5



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Where $\sigma(z) = \frac{1}{1+exp[-z]}$

What is classification of “bark, fur, fur”?

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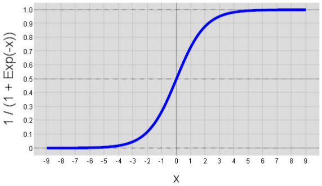

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Where $\sigma(z) = \frac{1}{1+exp[-z]}$

What is classification probability of “bark, fur, fur”?

Computing Probabilities

$$P(Y=0|X)=\sigma\left((\beta_0+\sum_i \beta_i X_i)\right) \tag{3}$$

$$\tag{4}$$

Computing Probabilities

$$P(Y=0|X) = \sigma\left((\beta_0 + \sum_i \beta_i X_i)\right) \tag{3}$$

$$= \sigma\left((0.5 + 1.0 + -0.5 + -0.5)\right) \tag{4}$$

$$\tag{5}$$

Computing Probabilities

$$P(Y=0|X) = \sigma\left((\beta_0 + \sum_i \beta_i X_i)\right) \quad (3)$$

$$= \sigma\left((0.5 + 1.0 + -0.5 + -0.5)\right) \quad (4)$$

$$= \sigma\left(0.5\right) \quad (5)$$

$$(6)$$

Computing Probabilities

$$P(Y=0|X) = \sigma\left((\beta_0 + \sum_i \beta_i X_i)\right) \quad (3)$$

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$$= \frac{1}{1 + exp[-0.5]} = 0.62 \quad (6)$$

Computing Probabilities

$$P(Y=0|X) = \sigma\left((\beta_0 + \sum_i \beta_i X_i)\right) \tag{3}$$
$$= \sigma\left((0.5 + 1.0 + -0.5 + -0.5)\right) \tag{4}$$
$$= \sigma\left(0.5\right) \tag{5}$$
$$= \frac{1}{1 + exp[-0.5]} = 0.62 \tag{6}$$

$$P(Y=1|X) = 0.38 \tag{7}$$