Logits & the Bernoulli Distribution

Weather (W) → bad / good

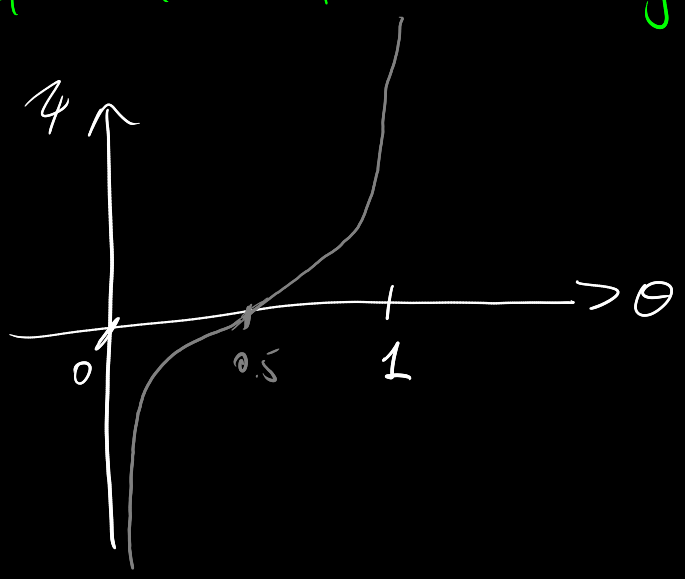
$W \sim Bern(\theta) = p(W)$

θ... probability of good weather

$\theta \in [0, 1]$ ... because it is a probability

$W \sim Bern(\eta)$ | $\eta \in (-\infty, \infty)$ | How? → Logits

$$\eta = \log\left(\frac{\theta}{1-\theta}\right)$$



$\theta = 0 \Rightarrow \eta = -\infty$

$\theta = 0.5 \Rightarrow \eta = 0$

$\theta = 1.0 \Rightarrow \eta = +\infty$

But why is it called logit? How to use it with a Bernoulli?

$\eta \rightarrow \theta$

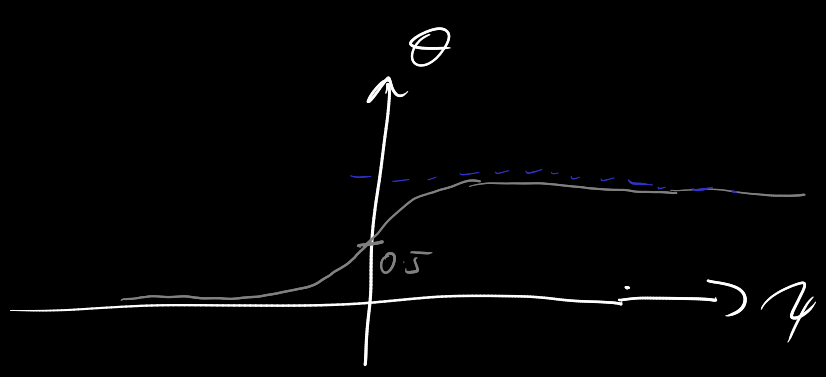
$$\eta = \log\left(\frac{\theta}{1-\theta}\right) \quad | \exp$$

$$e^{\eta} = \frac{\theta}{1-\theta} \quad | \cdot (1-\theta)$$

$$(1-\theta) e^{\eta} = \theta$$

$$e^{\eta} = \theta(1 + e^{\eta}) \quad | : (1 + e^{\eta})$$

$$\theta = \frac{e^{\eta}}{1+e^{\eta}} = \text{sigmoid}(\eta)$$



linked with logistic regression

⇒ Logistic Unit "logit"