→ Logistic Regression

~~5 category~~

→ Statistical Model

→ Classification → Target is a Categorical Col → Ordinal & Nominal

Party decay ↓ MLA

→ Binary Classification → Only 2 category

↓ dichotomous

↓ 1 ↓ 0

Y/N ↓ 1 ↓ 0

Study class?

In the background, Logistic Regression uses linear regression for performing Classification

Data → [logistic Reg.] → 0, 1

either 0 or 1

~~0.84~~

11734

Data → [Linear Regression] → Line ($\hat{y} = mx + c$) → $[-\infty, +\infty]$ $\hat{y}$ ↗ → 0.789 → $[0, 1]$ → round-off → 0 or 1

0.34

Default boundary = 0.5

0+

0.65

0.35

Regression

Logit fn

Sigmoid fn

b.val = 0.85

0.67 → 0

0.91 → 1

Logistic Regression

Sigmoid $f^n \Rightarrow$

$$\boxed{P = \frac{1}{1+e^{-y}}} \Rightarrow P(1+e^{-y}) = 1 \Rightarrow P + Pe^{-y} = 1 \Rightarrow Pe^{-y} = 1 - P \Rightarrow e^{-y} = \frac{1-P}{P}$$

$$\rightarrow e^{y} = \frac{P}{1-P} \rightarrow \ln e^{y} = \ln\left(\frac{P}{1-P}\right) \Rightarrow y\,\underbrace{\ln(e)}_{1} = \ln\left(\frac{P}{1-P}\right) \rightarrow \boxed{y = \ln\left(\frac{P}{1-P}\right)}$$

↳ logit f^n

$$\frac{1}{1+e^{-y}}$$

$y = -\infty$

$$\frac{1}{1+e^{-(-\infty)}} \Rightarrow \frac{1}{1+e^{\infty}} \Rightarrow \frac{1}{1+\infty} \Rightarrow \frac{1}{\infty} \Rightarrow 0$$

$y = +\infty$

$$\frac{1}{1+e^{-(\infty)}} = \frac{1}{1+\frac{1}{e^{\infty}}} = \frac{1}{1+\frac{1}{\infty}} \rightarrow \frac{1}{1+0} = \frac{1}{1} = 1$$

$(-\infty, +\infty) \to (0,1) \to 0 \,|\, 1$

L

α (0, 2)

α (0, 3)

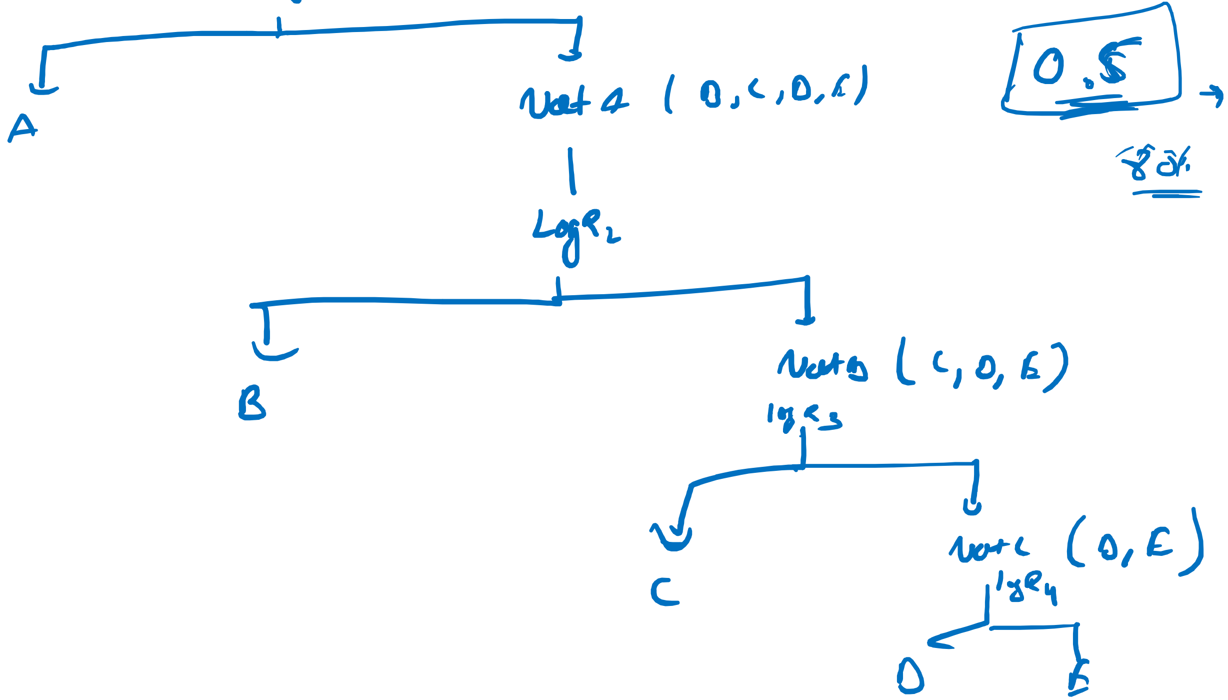
α (0, 4)

Using a hack, we can perform multiclass classification

5 → 4 LogR.

N classes/cat => N-1 log Reg.

A, B, C, D, E



$\boxed{0.5}$ → < T

LU

80%

T ng.v

0 → 1

< 0.5 → 0

> 0.5 → 1