Q1. Q2 → Not include " Gender "

$\alpha = 0.1$

pvalue

stepwise selection w/ AIC criteria

Q1 (Femal) - Final Model (F) - may include insignificant term

Q2 (Male) - Final Model (M) -

Q3, Q4.

0 : max lifespan < 10 yrs

Y : maxlife10

1 : ~~max~~ lifespan ≥ 10 yrs : Event of interest

X : bodyweight
brainweight
totalsleep
gestationtime

numerical ~~numbers~~

predationindex 1-5

sleepexposureindex 1-5

categorical, ordinal.

1 : reference.

Q3 : Y.
X as.factor(predationindex)
as.factor(sleep…)

* sleepexposure~~index~~ index is significant

p-value

sleepexpo 2 - 8.3

3

4

5

*

Q4 : Y : maxlife10
X : predationindex
sle…
) : numerical.

$$* \quad \frac{\text{odds}(\;\;" \quad = 2)}{\text{odds}(\text{sleepexposure} = 1)} = e^{4.99}$$

1 2 3 4 5

sleepexposureindex

significant.

$$\frac{\text{odds}(\;\;" \quad = 3)}{\text{odds}(\text{sleepe.} \; = 1)} = e^{\square} = 1$$

ANOVA: Race effect

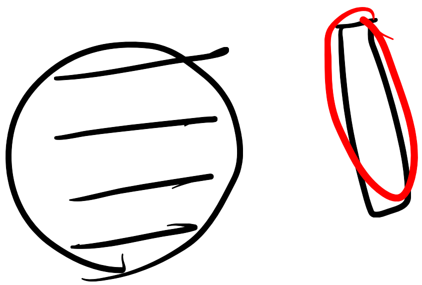
A B W Other

treat index var 2

— factor 4

4

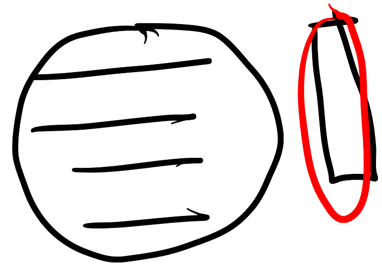
Q3



Insig.

Q4 treat index var

— numerical



sig.

[brainwe
sleep
totalsleep]

Small sample size

many # of levels in index variably

Sample size

51

Q3

+8

Q4

+2

power to detect significant variables

many # of parameters to estimate : power ↓

less " " : power ↑

Data example (respiratory data)

Backward selection w/ BIC → step(, k = log n)

n: # of obs, sample size.

① : good status

V1 ~ Treat + BL Final model

* Treat (active vs placebo) comparison
* BL (0 vs 1)

0: reference group

* age −0.34 exp(−0.34) = 0.73 ≥ 1

(*) $\frac{\text{odds (placebo)}}{\text{odds (active)}} = 0.31$ $\frac{\text{odds (BL=1)}}{\text{odds (BL=0)}} = 13.02 > 1$ $\frac{\text{odds (age=x+1)}}{\text{odds (age=x)}} = 0.73 < 1$

- active > placebo BL=1 > BL=0
- (*) (active treatment, good BL) younger patient

pearson residuals / std pear resid

deviance residuals / std devian. residual

y — $\hat{p}(Y=1)$

1, 0 $\quad 0 \le \quad \le 1$

Linear Model

① linear combination of x

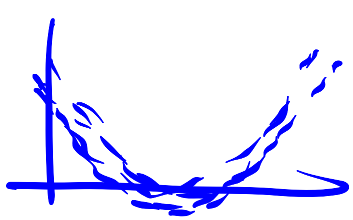
$$\log \frac{p}{1-p} = \beta_0 + \beta_1 x_1 + \cdots + \beta_p x_p$$

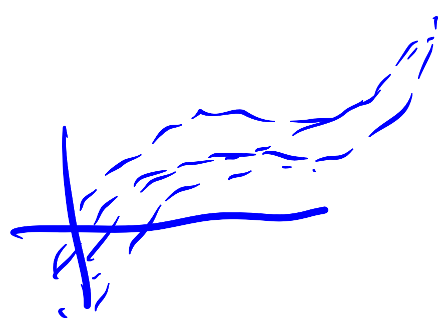
Reg model

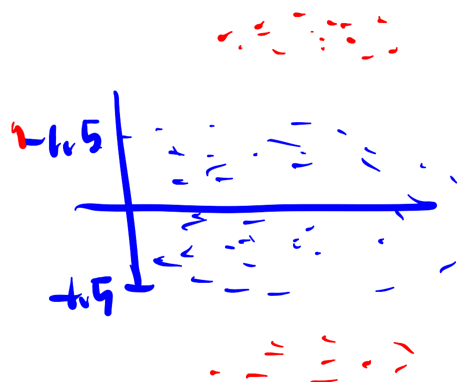
② Binomial assumption

Bernoulli

$Y \sim \text{Bernoulli}(P(Y=1))$







$$\log \frac{\hat{p}(Y=1)}{1-\hat{p}(Y=1)} = \hat{\beta}_0 + \hat{\beta}_1 x_1$$

$$\Downarrow$$

$$\hat{p}(Y=1) = \frac{\exp(\hat{\beta}_0 + \hat{\beta}_1 x_1)}{1 + \exp(\hat{\beta}_0 + \hat{\beta}_1 x_1)}$$

	x_1	$\hat{p}(Y=1)$		
obs 1	2.5	0.7	1	1
2	3.3	0.3	0	1
3	2.7	0.2	0	0
⋮	4.3	0.45	0	1
	⋮	0.56	1	1

cut-off

0.5

cut-off

0.25 sample propn

Final: Due Wednesday, Dec 9 11:59 pm ~ Saturday

available from Friday, Dec 4

quiz, programming

Monday Dec 14

Linear Reg

Logistic Reg.

linear regression specification w/ categorical variables

simulation studies

when assumptions are violated
(diagnostics plot)

Multicollinearity issue