

# # Model Evaluation

①

$$N = 45$$

$$\mu = 0.0667$$

$$\sigma = \sqrt{\frac{\mu(1-\mu)}{N}}$$

$$= \sqrt{\frac{0.0667(1-0.0667)}{45}}$$

$$= \sqrt{0.0013}$$

$$= 0.036$$

$$95\% \text{ C.I.} = \mu \pm 1.96 \sigma$$

$$= 0.1401 - 0.0001$$

$$= (-0.0001, 0.140)$$

2.

$$N = 45$$

$$\mu_1 = 0.0667$$

$$\mu_2 = 0.0889$$

$$\mu_3 = 0.137$$

$$\mu_{2-1} = \mu_2 - \mu_1 = 0.0222$$

$$\sigma_2 = \sqrt{\frac{\mu_2(1-\mu_2)}{N}}$$

$$= \sqrt{\frac{0.0889(1-0.0889)}{45}}$$

$$= 0.041$$

$$\sigma_1 = \sqrt{\frac{M_1(1-M_1)}{N}} = \sqrt{\frac{0.0667(1-0.0667)}{45}}$$

$$= \sqrt{0.0013} = 0.036$$

$$\sigma^{2-1} = \sqrt{(\sigma_2)^2 + (\sigma_1)^2}$$

$$= \sqrt{(0.041)^2 + (0.036)^2}$$

$$= \sqrt{0.002977} = 0.054$$

$$\frac{M_2 - 1}{\sigma_2 - 1} = \frac{0.0222}{0.054}$$

$$= 0.4074$$

~~744~~ 40.744. confident that  $\mu_2$  will perform better.

$$M_{3-1} = M_3 - \mu_1 = 0.133 - 0.0667$$

$$= 0.0663$$

$$\sigma_3 = \sqrt{\frac{M_3(1-M_3)}{N}} = \sqrt{\frac{0.133(1-0.133)}{45}}$$

$$= \sqrt{0.00256} = 0.0505$$

$$\sigma_{2-1} = \sqrt{(\sigma_3)^2 + (\sigma_1)^2}$$

$$= \sqrt{(0.0505)^2 + (0.036)^2}$$

$$\sigma_{2-1} = \sqrt{0.003846}$$

$$= 0.063$$

$$Z = \frac{13-1}{\sigma_{2-1}} = \frac{0.0663}{0.062} = 1.069$$

$$\underline{\underline{3}} \quad N=10$$

$$e(\text{D.T} - \text{Juv Algo}) = e(\text{CPT})i - e(\text{Juv Algo})i$$

Decision Tree	Juv Algo	DT-FA	$\sqrt{\frac{e_H - e_i}{N}}$
9.3	8.89	0.41	0.081
9.48	9.52	-0.04	0.06
9.12	8.13	0.99	0.269
9.13	9.48	-0.35	0.158
9.48	10.12	-0.14	0.092
11.01	10.23	0.78	0.192
9.62	8.56	0.46	0.097
8.55	9.12	-0.56	0.225

$$\mu = \frac{1.52}{10} = 0.152$$

$$\sigma = \sqrt{\frac{\sum (H - \mu)^2}{N}} = 1.28$$

As  $N < 30$

Use  $t$ -test.

$$H - t_0 = 0$$

$$t = \frac{\mu}{\sigma} = 0.118$$

$$\text{Dof} = N - 1 = 9$$

$$At\ 9, t = 0.985 \text{ at } 0.5\%$$

$$\text{But } t_{cal} = 0.118 < 0.985$$

4. 
$$TPR = \frac{TP}{TP + FN}$$

$$FPR = \frac{ER}{TN + FP}$$

$$H_1 = FPR = \frac{1}{1+13} = \frac{1}{14} = 0.071$$

$$TPR = \frac{29}{29+2} = \frac{29}{31} = 0.93$$



$$H_2 = FPR = \frac{3}{15} = 0.2$$

$$TPR = \frac{29}{31} = 0.93$$

$$H_2 = FPR = \frac{3}{15} = 0.2$$

$$TPR = \frac{22}{30} = 0.73$$

from (i)

$$\begin{aligned} H_1 = ED &= 1 - \sqrt{0.5((1-0.93)^2 + (0.07)^2)} \\ &= 1 - \sqrt{0.5(0.0049)} \\ &= 0.9292 \end{aligned}$$

$$\begin{aligned} H_2 &= 1 - \sqrt{0.5((1-0.96)^2 + (0.04)^2)} \\ &= 0.857 \end{aligned}$$

$$\begin{aligned} H_3 &= 1 - \sqrt{0.5((1-0.93)^2 + (0.07)^2)} \\ &= 0.841 \end{aligned}$$

$H_1$  is best model as it is highest.