

$$\text{Bayes' Theorem: } \Pr(A | B) = \frac{\Pr(B | A)\Pr(A)}{\Pr(B)}$$

Let  $A = pit_{1,3}$  and  $B = obs$

$$\Pr(pit_{1,3} | obs) = \frac{\Pr(obs | pit_{1,3}) \Pr(pit_{1,3})}{\Pr(obs)}$$

3	<b>P</b>		
2	B	-	
1	ok	B	<b>P</b>
	1	2	3

3	<b>P</b>		
2	B	<b>P</b>	
1	ok	B	-
	1	2	3

3	<b>P</b>		
2	B	<b>P</b>	
1	ok	B	<b>P</b>
	1	2	3

$$\Pr(obs | pit_{1,3}) = (.8)(.2) + (.2)(.8) + (.2)(.2) = .36$$

$$\Pr(pit_{1,3} | obs) = \frac{(.36)(.2)}{\Pr(obs)} = \frac{.072}{\Pr(obs)}$$

$$\text{Bayes' Theorem: } \Pr(A | B) = \frac{\Pr(B | A)\Pr(A)}{\Pr(B)}$$

Let  $A = \neg pit_{1,3}$  and  $B = obs$

$$\Pr(\neg pit_{1,3} | obs) = \frac{\Pr(obs | \neg pit_{1,3}) \Pr(\neg pit_{1,3})}{\Pr(obs)}$$

3	-		
2	B	<b>P</b>	
1	ok	B	-
	1	2	3

3	-		
2	B	<b>P</b>	
1	ok	B	<b>P</b>
	1	2	3

$$\Pr(obs | \neg pit_{1,3}) = (.2)(.8) + (.2)(.2) = .20$$

$$\Pr(\neg pit_{1,3} | obs) = \frac{(.20)(.8)}{\Pr(obs)} = \frac{.16}{\Pr(obs)}$$

$$\Pr(pit_{1,3} | obs) = \frac{.072}{\Pr(obs)}$$

$$\Pr(\neg pit_{1,3} | obs) = \frac{.16}{\Pr(obs)}$$

$$\Pr(A | B) + \Pr(\neg A | B) = 1$$

$$\Pr(pit_{1,3} | obs) + \Pr(\neg pit_{1,3} | obs) = \frac{.072}{\Pr(obs)} + \frac{.16}{\Pr(obs)} = \frac{.232}{\Pr(obs)} = 1$$

$$\therefore \Pr(obs) = .232 \quad \text{So, the normalization constant } \alpha = \frac{1}{.232}$$

$$\therefore \Pr(pit_{1,3} | obs) = \frac{1}{.232} \times .072 = .3103 \approx 31\%$$