Q.6.

As the formula for getting the new data is as given

$$P(x=F|y_1^1, y_1^2) = \frac{P(x=F|y_1^1)\, P(x=F|y_1^2)\, P(x=F|y_0^1, y_0^2)}{P(F|y_0^1)\, P(F|y_0^2)} \quad -①$$

∴ from ① we can get the value of $P(x=F|y_0^1, y_0^2)$ as

$$P(x=F|y_0^1, y_0^2) = \frac{P(x=F|y_1^1, y_1^2) \times P(F|y_0^1)\, P(F|y_0^2)}{P(x=F|y_1^1)\, P(x=F|y_1^2)} \quad -②$$

using eq ② we can get the values for $x=F$, $x=M$ and $x=A$.

Now

- For $x = F$

$$P(x=F|y_0^1, y_0^2) = \frac{P(x=F|y_1^1, y_1^2) \times P(F|y_0^1)\, P(F|y_0^2)}{P(x=F|y_1^1)\, P(x=F|y_1^2)}$$

$$= \frac{0.88 \times 0.4 \times 0.6}{0.7 \times 0.8}$$

$$P(x=F|y_0^1, y_0^2) = 0.3771$$

- For $x = M$

$$P(x=M \mid y_0^1, y_0^2) = \frac{P(x=M_i \mid y_i^1, y_i^2)\, P(F \mid y_0^1)\, P(F \mid y_0^2)}{P(x=F \mid y_i^1)\, P(x=F \mid y_i^2)}$$

$$= \frac{0.11 \times 0.4 \times 0.3}{0.29 \times 0.15}$$

$$= 0.3034$$

- For $x = A$

$$P(x=A \mid y_0^1, y_0^2) = \frac{P(x=A \mid y_i^1, y_i^2)\, P(A \mid y_0^1)\, P(A \mid y_0^2)}{P(x=A \mid y_i^1)\, P(x=A \mid y_i^2)}$$

* Note :→ As in question the value of $P(x=A \mid y_i^1, y_i^2) = 0.2$ which exceeds the total value of more than 1 we have assumed it to be 0.02

Now using $P(x=A \mid y_i^1, y_i^2) = 0.02$ we get.

$$= \frac{0.02 \times 0.2 \times 0.1}{0.01 \times 0.05}$$

$$= 0.8$$

Now adding the probability to check value w.r.t 1.

$= P(x=F \mid y_0^1, y_0^2) + P(x=M \mid y_0^1, y_0^2) + P(x=A \mid y_0^1, y_0^2)$

$= 0.3771 + 0.3034 + 0.8$

$= 1.4805$

As the value is greater than 1 we will normalize it.

$\therefore$ Normalize values are

- For $x = F$

$$P(x=F \mid y_0^1, y_0^2) = \frac{0.3771}{1.4805}$$

$$= 0.2547.$$

- For $x = M$

$$P(x=M \mid y_0^1, y_0^2) = \frac{0.3034}{1.4805}$$

$$= 0.2049$$

- For $x = A$

$$P(x=A \mid y_0^1, y_0^2) = \frac{0.8}{1.4805}$$

$$= 0.5404$$

Now adding value to check closness to 1.

$= P(x=F \mid y_0^1, y_0^2) + P(x=M \mid y_0^1, y_0^2) + P(x=A \mid y_0^1, y_0^2)$

$= 0.2547 + 0.2049 + 0.5404$

$= 1.$

- Case : Note : As in question even with the value of 0.02 the total probability for the fused Data exceeds 1. we take a value of $P(x=A \mid y_1^1, y_1^2) = 0.01$

$\therefore$ the new data is.

- For $x = A$

$$P(x=A \mid y_0^1, y_0^2) = \frac{P(x=A \mid y_1^1, y_1^2) \cdot P(x=A \mid y_0^1)\, P(x=A \mid y_1^1)}{P(x=A \mid y_0^1)\, P(x=A \mid y_0^2)}$$

$$= \frac{0.01 \times 0.2 \times 0.1}{0.01 \times 0.05}$$

$$= 0.4$$

Now adding value to check if it is 1.

$= P(x=F \mid y_0^1, y_0^2) + P(x=M \mid y_0^1, y_0^2) + P(x=A \mid y_0^1, y_0^2)$

$= 0.3771 + 0.3034 + 0.4$

$= 1.0805$

Scanned with CamScanner

$\therefore$ we normalize the values as it exceeds 1.

$\therefore$

- For $x = F$

$$P(x=F \mid y_0^1, y_0^2) = \frac{0.3771}{1.0805}$$

$$= 0.3490$$

- For $x = M$

$$P(x=M \mid y_0^1, y_0^2) = \frac{0.3034}{1.0805}$$

$$= 0.2808$$

- For $x = A$

$$P(x=A \mid y_0^1, y_0^2) = \frac{0.4}{1.0805}$$

$$= 0.3702$$

Now adding to check

$= P(x=F \mid y_0^1, y_0^2) + P(x=M \mid y_0^1, y_0^2) + P(x=A \mid y_0^1, y_0^2)$

$= 0.3490 + 0.2808 + 0.3702$

$= \underline{1}.$

Scanned with CamScanner