<span style="color:red">One Compound MI values:</span>

$$I(\{c_i\}_{i=1}^{N}; \{r_i^*\}_{i=1}^{M}) = H(\{c_i\}_{i=1}^{N}) - H(\{c_i\}_{i=1}^{N} | \{r_i^*\}_{i=1}^{M})$$

$$\boxed{\dot{H}(\{c_i\}_{i=1}^{N}) = 2^1 = 2 = 1 \text{ bit}}$$

$$H(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M}) = -\sum_{y=1}^{Y} P_Y \sum_{x=1}^{X_y} P(x|y) \log_2 P(x|y)$$

#of group: 1    1→ #of members in the group: 2 (0,1)

$$H(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M} = -[1 * \frac{2}{2} * (\frac{1}{2} * \log_2 (\frac{1}{2}) + \frac{1}{2} * \log_2 (\frac{1}{2}))] = 1$$

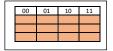<span style="background-color:yellow">$I(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M}$ = 1-1 = 0 bits</span>

| 0 | 1 |
|---|---|
|   |   |
|   |   |

#of group: 2    1→ #of members in the group: 1 (0) , 1 (1)

$$H(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M} = -[\frac{1}{2}(\frac{1}{1} * \log_2 (\frac{1}{1})) + \frac{1}{2}(\frac{1}{1} * \log_2 (\frac{1}{1}))] = 0$$

<span style="background-color:yellow">$I(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M}$ = 1-0 = 1 bits</span>

| 0 | 1 |
|---|---|
|   |   |
|   |   |

<span style="color:red">Two Compounds combination MI values:</span>

$$\boxed{\dot{H}(\{c_i\}_{i=1}^{N}) = 2^2 = 2 = 2 \text{ bit}}$$

| 00 | 01 | 10 | 11 |
|----|----|----|----|
|    |    |    |    |
|    |    |    |    |

#of group: 1    1→ #of members in the group: 4 (00,01,10,11)

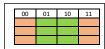$$H(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M} = -[1*(4/4)*((1/4)*log2(1/4)+(1/4)*log2(1/4)+(1/4)*log2(1/4)+(1/4)*log2(1/4))]=2$$
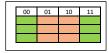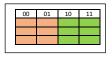
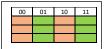<span style="background-color:yellow">$(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M}$ = 2-2 = 0 bits</span>



#of group: 2    1→ #of members in the group: 2 (00,01-1st table or any other option as in table)
2→ #of members in the group: 2 (10,11-1st table or any other option as in table)

$$H(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M} = -[2*(2/4)*((1/2)*log2(1/2)+(1/2)*log2(1/2))] = 1$$

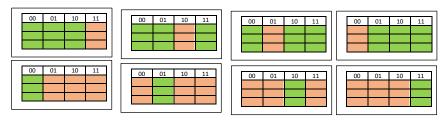<span style="background-color:yellow">$(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M}$ = 2-1 = 1 bits</span>



#of group: 2    1→ #of members in the group: 1 (11- 1st table or any other option as in table)
2→ #of members in the group: 3 (00,01,10-1st table or any other option as in table)

$$H(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M} = -[(1/4)*((1/1)*log2(1/1))]+[(3/4)*((1/3)*log2(1/3)+(1/3)*log2(1/3)+(1/3)*log2(1/3))] = 1.1887$$

<span style="background-color:yellow">$(\{c_{gl}, c_{lac}\} | \{r_i^*\}_{i=1}^{M}$ = 2-1.1887 = 0.8113bits</span>

| 00 | 01 | 10 | 11 |
|----|----|----|----|
|    |    |    |    |
|    |    |    |    |

| 00 | 01 | 10 | 11 |
|----|----|----|----|
|    |    |    |    |
|    |    |    |    |

| 00 | 01 | 10 | 11 |
|----|----|----|----|
|    |    |    |    |
|    |    |    |    |

#of group: 3    1→ #of members in the group: 1 (00- 1st table or any other option as in table)

2→ #of members in the group: 2 (01,10-1st table or any other option as in table)

3→ #of members in the group: 1 (11-1st table or any other option as in table)

$H(\{c_{gl}, c_{lac}\}|\{r_i^*\}_{i=1}^M$ = - [2*(1/4)*((1/1)*log2(1/1))+(2/4)*((1/2)*log2(1/2)+(1/2)*log2(1/2))]=0.5

($\{c_{gl}, c_{lac}\}|\{r_i^*\}_{i=1}^M$ = 2-0.5 = 1.5bits

| 00 | 01 | 10 | 11 |
|----|----|----|----|
|    |    |    |    |
|    |    |    |    |

#of group: 4    1→ #of members in the group: 1 (00- 1st table or any other option as in table)

2→ #of members in the group: 1 (01-1st table or any other option as in table)

3→ #of members in the group: 1 (10-1st table or any other option as in table)

4→ #of members in the group: 1 (11-1st table or any other option as in table)

$H(\{c_{gl}, c_{lac}\}|\{r_i^*\}_{i=1}^M$ =[(1/4)*((1/1)*log2((1/1))+(1/4)*((1/1)*log2((1/1))+ (1/4)*((1/1)*log2((1/1))+ 1/4)*((1/1)*log2((1/1)))))] =0

($\{c_{gl}, c_{lac}\}|\{r_i^*\}_{i=1}^M$ = 2-0 = 2 bits