Probabilities Involved in Mutual Information

$$I(X_{w1}; X_{w2}) = \sum_{u \in \{0,1\}} \sum_{v \in \{0,1\}} p(X_{w1} = u, X_{w2} = v) \log_2 \frac{p(X_{w1} = u, X_{w2} = v)}{p(X_{w1} = u)p(X_{w2} = v)}$$

Presence & absence of w1: $p(X_{W1}=1) + p(X_{W1}=0) = 1$
Presence & absence of w2: $p(X_{W2}=1) + p(X_{W2}=0) = 1$

Co-occurrences of w1 and w2:

$p(X_{W1}=1, X_{W2}=1)$ + **$p(X_{W1}=1, X_{W2}=0)$** + **$p(X_{W1}=0, X_{W2}=1)$** + **$p(X_{W1}=0, X_{W2}=0)$ = 1**

Both w1 & w2 occur   Only w1 occurs   Only w2 occurs   None of them occurs