

2. Inclusion-Exclusion formulation in set-theory

$$\mu^*(\tilde{X}_1 \cup \tilde{X}_2) = \mu^*(\tilde{X}_1) + \mu^*(\tilde{X}_2) - \mu^*(\tilde{X}_1 \cap \tilde{X}_2)$$

corresponds to

$$H(X_1, X_2) = H(X_1) + H(X_2) - I(X_1; X_2)$$

in information theory.