Conditional & Joint Entropies.

$$H(x) = -\sum_{i=1}^{m} P(x_i) \log_2 P(x_i)$$

$$H(y) = -\sum_{j=1}^{n} P(y_j) \log_2 P(y_j)$$

$$H(x|y) = -\sum_{j=1}^{n} \sum_{i=1}^{m} P(x_i\, y_j) \log_2 P(x_i|y_j)$$

$$H(Y|X) = -\sum_{j=1}^{n} \sum_{i=1}^{m} P(x_i\, y_j) \log_2 P(y_j|x_i)$$

$$H(X,Y) = -\sum_{j=1}^{n} \sum_{i=1}^{m} P(x_i\, y_j) \log_2 P(x_i\, y_j)$$

H(X): Avrage uncertainty of channel input

H(Y): ______________________ output.

H(X|Y): conditional Entropy H(X|Y) is measure of the avrage uncertainty remaining about the channel I/P after the channel output has been observed.
equivocation of X with respect to Y

H(Y|X): conditional Entropy is measure of avrage uncertainty of the channel O/P given that X was transmitted

H(X,Y): is the avrage uncertainty of the communication Channel as a whole.

Relationship Among diffrent Entropies.

1. $H(X,Y) = H(X|Y) + H(Y)$
2. $H(X,Y) = H(Y|X) + H(X)$.
3. $H(X,Y) \leq H(X) + H(Y)$.