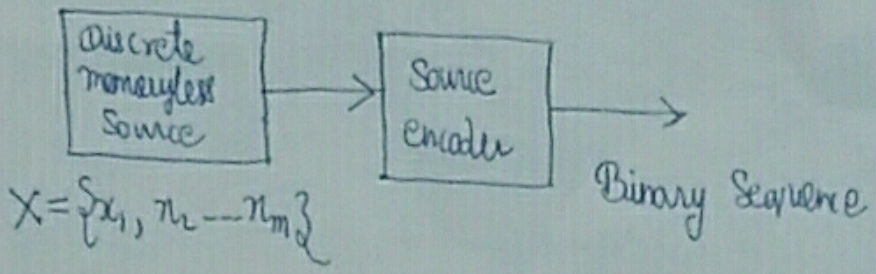
Source Coding →



A conversion of the o/p of a DMS into a sequence of binary symbols (binary code word) is called source coding. The device that performs this conversion is called the source encoder.

Code word Length → Let X be a DMS with finite entropy H(X) and an alphabet $\{x_1 \text{ --- } x_m\}$ with corresponding probabilities of occurrence $P(x_i)$. Let the binary code word assigned to symbol x_i by the encoder having length n_i, then the average code word length 'L' per source symbol is given by →

$$L = \sum_{i=1}^{m} P(x_i)\, n_i$$

$$L = P_1 n_1 + P_2 n_2 + \text{---} P_m n_m$$

Classification of codes →

1-) Fixed Length codes (2) Variable length codes (3) Distinct codes
4-) Prefix-free codes

1-) Fixed-length codes → A fixed-length code is one whose code word length is fixed.

2-) variable-length codes → A variable-length code is one whose code word length is not fixed.

3-) Distinct codes → A code is distinct if each code word is distinguishable from other code words.

4-) Prefix-free codes → A code in which no code word can be formed by adding code symbols to another code word is called a prefix-free code. Thus, in a prefix-free code no code word is a pre-fix of another.

Kraft Inequality →

Let X be a DMS with alphabet $\{x_i\}$ where $i = (1, 2, \dots m)$

Let us consider that the length of the assigned binary code word corresponding to x_i is n_i.

A necessary and sufficient condition for the existence of an instantaneous binary code is →

$$K = \sum_{i=1}^{m} 2^{-n_i} \leq 1$$

Which is known as the Kraft inequality.