Modeling & Coding

Coding

i. Coding is an assignment of binary sequences to elements of an alphabet.

ii. The set of binary sequences is called a code, and the individual members of the set are called codewords.

iii. An alphabet is a collection of symbols called letters. Ex. The ASCII code for letter 'a' is 1000011, the letter 'A' is coded as 1000001, and the letter 'b' is coded as 0011010.

iv. The ASCII code uses the same number of bits to represent different symbols. If we use fewer bits to represent symbols that occur more often, on the average we would use fewer bits per symbol.

v. The average number of bits per symbol is often called the rate of the code. The idea of using fewer bits to represent symbols that occur more often is the same idea that is used in Morse Code.

vi. The codewords for letters that occur more frequently are shorter than for letters that occur less frequently.

Ex. The Morse code for E is ; while the codeword for Z is - - . .

Four different codes for four-letter alphabet.

Letters	Probability	Code 1	Code 2	Code 3	Code 4
a1	0.5	0	0	0	0
a2	0.25	0	1	10	01
a3	0.125	1	00	110	011
a4	0.125	10	11	111	0111
Average Length		1.125	1.25	1.75	1.875