EC8395-Communication Engineering

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Objective

1. To Discuss about operation of Convolutional Encoder
2. To know about state diagram, trellis diagram and code tree of convolution encoder.

Convolutional Encoder

It is one of the error correcting codes and can be defined by the following parameters::(n, k, K). Where n-represents encoder output, k is the number of input bits, K-is the constraint length

Constraint length:

It refers to the output of encoder and depends on (k-1) previous inputs. In other words, it refers to the number of flip flops in the shift register.

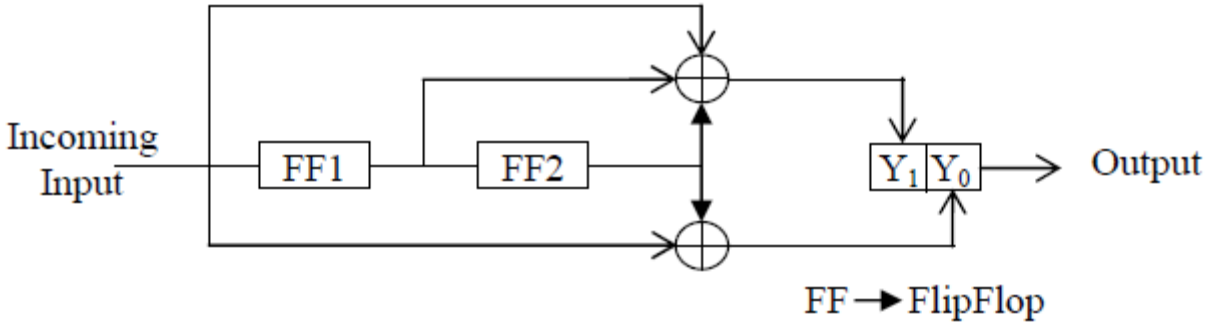
We can decode the convolutional encoder at the receiver side using the **Viterbi decoding algorithm.**

The operation of convolutional encoder can be done using three methods:

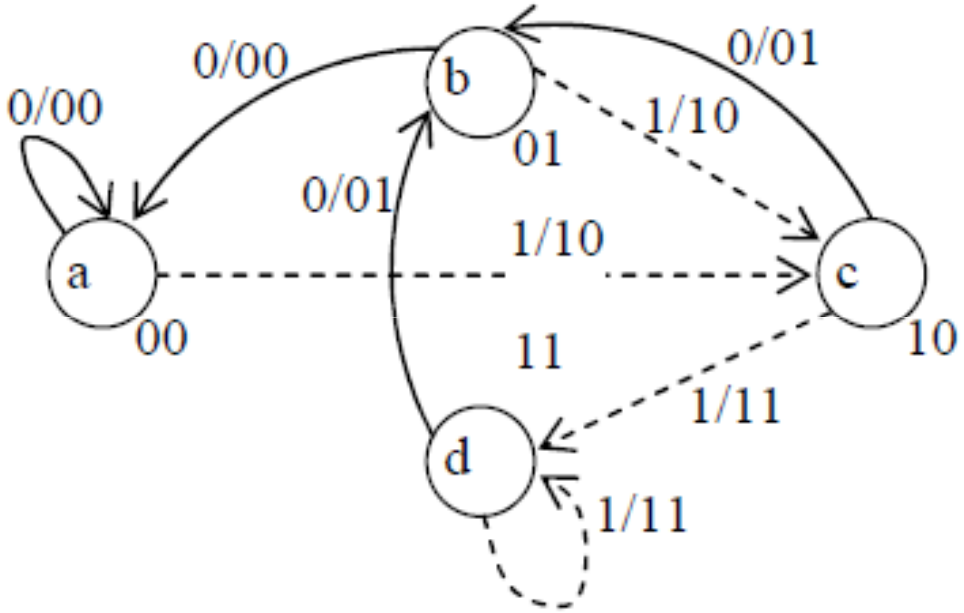
They are: 1. State diagram 2) Trellis diagram and 3) Code tree approach.

Problems

1. Convolutional encoder is shown in the figure below. Find the output of the encoder when the input is 0 1 0 1 1 0 0 0 1 1 1. Also discuss the operation of the convolutional encoder with the help of a state diagram, Trellis diagram and the code tree.



Current state	Next state	
	When input = 0	When input = 1
$a = 00$	00	10
$b = 01$	00	10
$c = 10$	01	11
$d = 11$	01	11


0/00
0/00
b
0/01
1/10
01
0/01
1/10
a
c
00
11
10
1/11
d
1/11

- 2. Draw the Trellis diagram for the convolutional encoder shown in figure, when the input to the encoder is 0 1 1.

CODE TREE

- This is another approach to explain the operation of a convolutional encoder.

1. Draw the code tree for the convolutional encoder shown in the figure below. When the current state of the encoder is .

Summary: In the code tree, upward direction implies application of input = 0. Downward directions are for applying input = 1.