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Roll Number: BT20ECE044

Semester: 6

Course: Coding Techniques

Lab Report
Convolutional Encoder and Decoder

Theory:

- Error-correcting codes are the way to deal with the errors introduced in the actual message signal at the time of transmission in data communication. It is regarded as an error detection and correction technique by which the information signal is encoded using redundant bits. These are categorized as Block Code and Convolutional Code.

- The major elements of the convolutional coding technique include the shift register that acts as temporary storage and whose stored bits undergo shifting using a sliding window and a logic circuit that performs modulo-2 addition incorporating the X-OR function.

- Basically, there are mainly two parameters that define the convolutional coding which is as follows:

- **Constraint length**: The constraint length corresponds to the length of the convolutional encoder i.e., the overall window size in bits, within the shift register. It is denoted by K (uppercase). Sometimes also denoted by L as it might cause confusion with k (lowercase). There is another parameter 'm' which corresponds to the number of input bits retained within the shift register once it is entered in the encoder.

- **Code rate:** Code rate is the ratio of the number of bits shifted at once within the shift register (denoted by k) to the total number of bits in an encoded (generated) bitstream (denoted by n). Thus, it is given as k/n

Code:

```
K =3;
G1=7;
G2=5;
msg = [1 1 0 0 1 0];
trellis = poly2trellis(K,[G1,G2]);
coded = convenc(msg,trellis);
tblen=length(msg);
decoded = vitdec(coded,trellis,tblen,'trunc','hard');
disp('Decoded Output:');
disp(decoded);
```

Output:

```
>> BT20ECE044_1
Decoded Output:
     1     1     0     0     1     0
```