DATA COMMUNICATION
PROJECT REPORT

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Cyclic Redundancy Check

Introduction:

CRC 8 detects the occurrence of any errors during the transmission of the digital signal by appending some zeroes and generating the code word using the generator ($x^8 + x^2 + x+ 1$)

Instructions to run the program:

On running the program, the user is prompted to enter the digital data stream to be transmitted, the number of hops considered in the communication system, and the crossover probability 'p' for binary symmetric channel. At the senders side, the program divides the input stream into 16 bit data words (if any of the data words is less than 16 bits then 0s are appended to it to make it a 16 bit word) and performs CRC on each data word (modulo 2 division) and finally encodes it. Encoded Words are then transmitted through binary symmetric channels, where depending on the crossover probability, random error is either generated or not (for each individual bit). On the receivers side, the received digital stream is checked for error and if any error is present the data is discarded else the data stream is printed and on a separate window, the input and output streams are produced.

References:

Geeks for geeks
Stack Overflow
Youtube

HAMMING CODE

Introduction:

In this coding method, the source encodes the message (which is in the form of 4 bits data words) by inserting redundant bits within the message. These redundant bits are extra bits that are generated and inserted at specific positions in the message itself to enable error detection and correction. When the destination receives this message, it performs recalculations to detect errors and find the bit position that has error.

Instructions to run the program

At the senders side, some redundant bits are added to the data stream at bit positions of powers of 2. These redundant bits are parity bits and these bit values are calculated based on the bit values of the data stream.

At the receivers side, after receiving the 7 bit hamming code (4 bit data word and 3 redundant bits) the number and positioning of the redundant bits is determined following which a parity check is performed using XOR operator. There is an error if the bit parity is odd. Error detection and correction is the final step of the decoding procedure(if the bit has error, its value is flipped).

References:

Geeks for Geeks
Stack Overflow
Youtube