when a message is sent electronically it is usually sent as a stream of bits, each of which can be either a 0 or a 1. If the digital channel is noisy then each bit has some probability of being flipped ...ie changed from a 0 to a 1 or vice versa, resulting in a corrupted message.

assume that a message is being sent through a noisy channel where the probability that any individual bit will be flipped is 0.2. What is the probability that a message 4 bits long would be successfully transmitted?

One method of dealing with the problem of bits being flipped is to use a Hamming code. This involves sending extra bits along with the message that can be used to check the main message. For example a 7 bit Hamming Code contains 4 bits of message data and 3 check bits. If only one of the bits is in error at the receiving end then mathematical techniques can be used to determine which one it is and apply a correction. However, if more than one bit is flipped then an erroneous correction will be applied and the message will still be corrupted.

Assume that a message is being sent through a noisy channel where the probability that any individual bit will be flipped is 0.2 as before. If the message is sent using a 7 bit amming code what is the probability that it will get through with no more then one of the seven bits being flipped?

If we are concerned with the possibility that 2 bits have been flipped then instead of using the correction mentioned above we can ask for the 7 bits to be resent. However, there is the possibility that when more then 3 bits have been flipped that the final corrupted message will correspond to a message where the Hamming code thinks that none of the bits have been flipped. The probability of this occurring when 3 or 4 bits have been flipped is 0.2. It does not occur if 5 or 6 bits have been flipped (similar to 1 or 2 bits being flipped). It always occurs if all 7 of the bits have been flipped.

Assume that a message is being sent through a noisy channel where the probability that any individual bit will be flipped is 0.2 as before. A 7 bit Hamming code is being used. When the message is decoded at the receiving end the procedure indicates that none of the bits have been flipped. What is the probability that the message that was received that appears to have no bits flipped is in fact an error with 3 or more bits flipped?

Assume that a message is being sent through a noisy channel where the probability that any individual bit will be flipped is 0.2 as before. A 7 bit Hamming code is being used. When the message is decoded at the receiving end the procedure indicates that at least one of the bits have been flipped. Therefore the 7 bit message is re-transmitted. What is the probability that if the decoding procedure is applied to both messages that both times will result in the correct 7 bit message (including the case where the second message does not need any unflipping)?

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