# Hamming Codes as Error Reducing codes

**Team Members:**

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**Abstract:-** Hamming Codes are used for both Error Correction as well as Error Deduction .Now we are trying to extend the functionality of hamming codes to Error Reduction also.So the main goal of this paper is to increase the error reducing capabilities of the hamming codes.We show a lower bound on the average number of errors present in a decoded message when two errors are introduced by the channel for general Hamming codes. This is because of the voice in the channel.But when we use Standard decoding the error reduction capabilities of the Hamming codes decrease hence other decoding algorithms are investigated experimentally, and it is found that these algorithms improve the error reduction capabilities of Hamming codes beyond the a fore mentioned lower bound of standard decoding.

This paper focuses on the error-correction of binary linear codes. The message is encoded in blocks of bits, called codewords. A linear code has a generator matrix, that encodes the message at the transmitting side of a communication channel by multiplying itself with the message. At the receiver side a generator matrix of null space of code decodes the message. A code has a limit in the number of errors that it is capable of correcting given by **floor**[(d−1)/ 2] , where d is the minimum pairwise Hamming distance between words of the code. Our main contribution is to show that the lower bound on the average number of errors remaining in the decoded message with standard decoding while two errors are

introduced is achieved by hamming codes.We explore several other potential decoding methods for Hamming codes and experimentally show that it is possible to beat the standard decoding lower bound on average number of errors.This demonstration is followed by several algorithms that attempt to maximize the reduction in errors along with an analysis of the performance and scalability of each algorithm.

| DAY | WORK |
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| **18 to 19 March** | **Finding through papers which to implement and making abstract with monthly schedule** |
| **20 March to 23 March** | **Install and learn NS2 (learning about C++ and TCl in NS2 , Trying to install it in windows and ubuntu)** |

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| **23 to 25 March** | **Reading research paper on "Hamming codes as error detection code" (Trying to figure out algorithms, techniques and formula used in the above paper)** |
| **26 to 28 March** | **Implement standard decoding for hamming code and will try to learn more about error detection with [7,4,3] - hamming code as given in research paper** |
| **28 to 30 March** | **Will try to figure out error in implementation and try to reduce it and to make the code working.** |
| **1 April to 3 April** | **Will discuss among selves on what and how to implement next thing and will try to find out more about things related to hamming code error correction and reduction.** |

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| **3 to 6 April** | **Read about Error reduction limits of standard decoding using hamming codes (lower bounds and basic facts) and will try to learn lemmas given in paper and try to implement the same.** |
| **7 to 10 April** | **Will try to implement the stuffs left , to generate tabular output and graphs and Comparing it with other methods theoretical.** |

**We are first time doing this paper implementation and also first time user to ns2 and such programming stuffs so don't know completely about the time required to learn and implement. We are estimating time, we will try to keep the pace of our work according to our daily plan.**