Massachusetts Institute of Technology
18.413: Error-Correcting Codes Laboratory
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Handout 2
February 19, 2004

Small Project 2

Due: Thursday, February 26

In this project, we will compare the bit-error-rates of 3 decoding schemes for the product of parity-check codes presented in today's lecture.

For our channel, we will use the Gaussian Channel with standard deviations

$$\sigma \in \{2, 1.5, 1, .8, .64, .5, .4, .33, .25, .15\} .$$

The three decoding schemes that we will consider are the three mentioned in the lecture, namely:

- naive: only use the sign of the channel output to make a first guess as to whether the bit was 1 or -1. Then, apply the 1-error correcting algorithm to these guesses.
- ideal: apply the method from Lecture 4 for minimizing the BER (that is maximizing the number of bits transmitted correctly).
- heuristic: the heuristic method described in the lecture. Too involved to describe here, but it is in the lecture notes.

Your task is to estimate the bit-error-rate for each decoding algorithm on the channel determined by each sigma listed above. You should:

1. Plot all 3 curves together. Plot them in linear and logarithmic axes. Include confidence intervals in your plot.
2. Submit all code.
3. Submit all the data points that appeared in the plot, in a format that I can understand!
4. Record for my reference: how long did this take you? How was your time spent?

Collaboration: You are free to discuss how do this project with others in the class (and especially to get technical help). But, you should write your own code. Also, list those you have collaborated with.

Note: If computation time is a barrier, just do as much as you can.