

LAB Assignment #2 for ECE 525

Description: Compute Intra-chip HD on the bitstring data provided.

1) Compute Intra-chip HDs in a programming language of your choice (C is best but perl/python also works well). Plot the distribution as a histogram.

The files are named as follows:

XMR_1_Bitstrings_TV_0.txt

XMR_1_Bitstrings_TV_1.txt

...

XMR_1_Bitstrings_TV_12.txt

XMR_3_Bitstrings_TV_0.txt

XMR_3_Bitstrings_TV_1.txt

...

XMR_3_Bitstrings_TV_12.txt

XMR_5_Bitstrings_TV_0.txt

XMR_5_Bitstrings_TV_1.txt

...

XMR_5_Bitstrings_TV_12.txt

XMR_7_Bitstrings_TV_0.txt

XMR_7_Bitstrings_TV_1.txt

...

XMR_7_Bitstrings_TV_12.txt

The TV_x indicate testing conditions as follows:

TV_0: 25C_1.00V (enrollment data)

TV_1: 25C_0.95V

TV_2: 25C_1.00V

TV_3: 25C_1.05V

TV_4: 0C_0.95V

TV_5: 0C_1.00V

TV_6: 0C_1.05V

TV_7: -40C_0.95V

TV_8: -40C_1.00V

TV_9: -40C_1.05V

TV_10: 85C_0.95V

TV_11: 85C_1.00V

TV_12: 85C_1.05V

For EACH of these four XMR_x groups, compute Intra-chip HD using the 'TV_0' bitstrings (as the reference) against all the other 'TV_x' bitstrings in that XMR_x group, e.g., TV_1, TV_2. For example, use

XMR_1_Bitstrings_TV_0.txt

as the reference bitstring for the XMR_1 analysis and compute intra-chip HD using it with each of the following:

XMR_1_Bitstrings_TV_1.txt

...

XMR_1_Bitstrings_TV_12.txt

Repeat this process for the XMR_3, XMR_5 and XMR_7 groups of bitstrings (4 analyses in total).

Report the number of bit-flip errors per chip (there are 38 chips) for each of the 4 groups.

2) Identify the TV corner with the largest number of bit-flip errors across all chips for each analysis, e.g., for XMR_1, report TV_3 as the TV corner with the largest number of bit-flip errors if the sum of the bit-flip errors across all chips is largest. Repeat for each of the other XMR_x groups.

3) Compute the total number of bit-flip errors across all TV corners and all chips in each of the 4 analyses and then divide through by the total number of bits that were compared. The fraction you report is the probability of an bit-flip error occurring.

For extra points, compute the probability of error per TV corner

For extra points, run the TV_0 bitstrings through the NIST statistical tools and report the results separately for each XMR_x group of bitstrings