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CSE13S

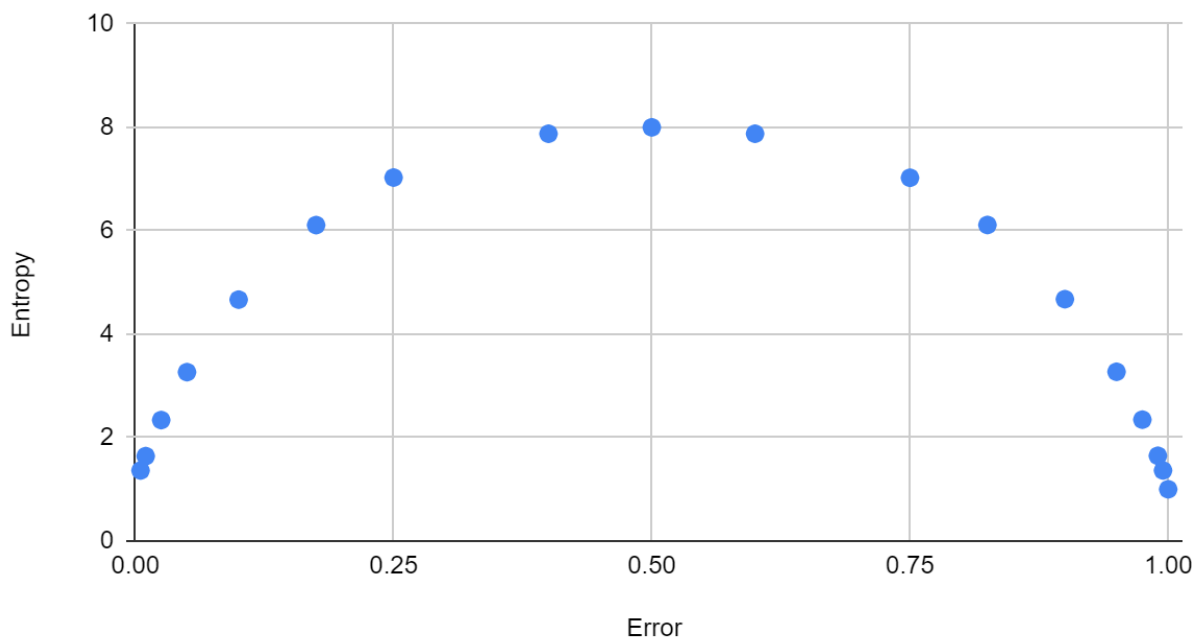
Prof. Darrell Long

April 17, 2021

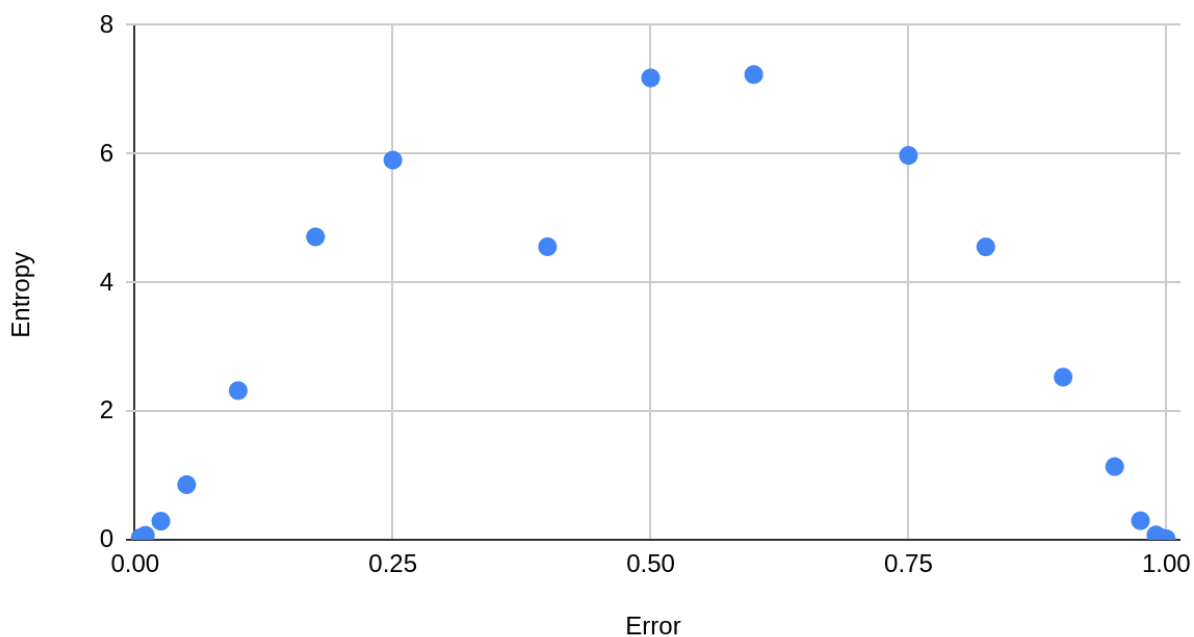
Asgn5 Writeup:

Entropy in aaa.txt

Entropy vs. Error in aaa.txt

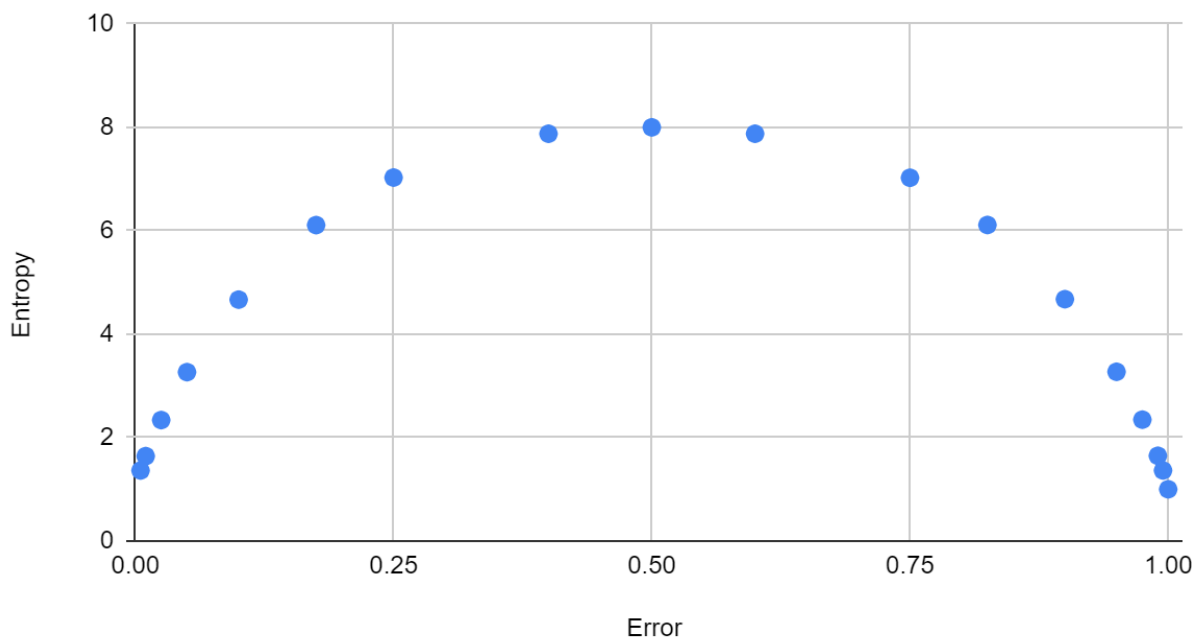


Entropy vs. Error in decoded aaa.txt



Entropy in random.txt

Entropy vs. Error in random.txt



ANALYSIS of graphs:

Based on these graphs, it's evident that entropy behaves in a bell-curve like manner in relation to error. When error is low, there is a small amount of entropy. This is likely because bits are more predictable or systematic when less error is introduced because random bit flips aren't occurring. Due to this relationship, it makes sense that as error increases that entropy would as well. As more randomness is added to the bits through errors causing bit flips, the binary makeup of the file would be less predictable and uniform, thereby increasing the entropy.

However, this proportional relationship only exists to a certain degree. After error reaches 50%, entropy begins to decrease as error increases, instead of continuing to increase along with it. At first this seems counter-intuitive, but because the binary file being evaluated is composed solely of 1's and 0's, when more than 50% of the bits are flipped, the chaos factor has been maximized at 50%, and thereafter the ratio of one's to zero's evens out again, but in opposite proportions. Entropy continues to decrease as error increases after the 50% mark, making the entire graph a parabolic shape. This continues until at 100% error rates, entropy is back to the same rate as it was at 0%. This phenomenon can be explained by the fact that the nibble 0111 has the same entropy as it's composite 1000. So when the entire binary file is flipped, the entropy is exactly the same as the original file's entropy because the ratio of one's to zero's is exactly the same.