Tutorial : Quantifying Information

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Quantifying Information

1/1 point (ungraded)

I make up a random 5-bit two's complement number by flipping a fair coin to determine each bit. You're trying to guess the number. If I tell you that the number is positive (> 0), how many bits of information have I given you? Provide the answer in the form log2(X/Y).

Information in my message: log2(32/15) ✔ bits

$\log_2\left(\frac{32}{15}\right)$

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Quantifying Information

1/1 point (ungraded)

X is an unknown 8-bit binary number. You are given another 8-bit binary number, Y, and told that the Hamming distance between X and Y is 7. How many bits of information about X have you been given?

- (●) 5.00 bits
- ( ) $log_2\left(8/256\right)$ bits
- ( ) 1 bit
- ( ) 7 bits
- ( ) None of the above

✔

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Quantifying Information and Error Correction

3/3 points (ungraded)

We wish to transmit messages comprised of the four letters shown below with their associated probabilities and 5-bit fixed length encoding.

$symbol$	$p\left(symbol\right)$	$encoding$
A	0.125	00000
B	0.125	11100
C	0.5	11011
D	0.25	10111

An unknown letter is received and you are told it's not D. How much information have you received?

(●) $-log_2\left(1-0.25\right)$ bits

Calculator

$-log_2\ (1-0.25)$ bits

$-log_2\ (0.25)$ bits

$log_2\ (0.25)$ bits

$log_2\ (1-0.25)$ bits

None of the above

When transmitting a message comprised of these four symbols with the probabilities as given above, the expected amount of information received when learning of a symbol is

1.75 bits

1.25 bits

1.5 bits

2 bits

None of the above

If we transmit messages using the 5-bit fixed-length encoding shown above, will it be possible to perform single-bit error detection and correction at the receiver?

yes

no

not enough information to tell

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Discussion

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- Grammatical error — 1
  It should say "comprising" or "composed of" not "comprised of". This is a common grammatical mistake
- isn't the Hamming distance in the last question is 3 ? — 5
  How is it that the Hamming distance is just 2 ?
- confusion in entropy and expected value of information — 2
  Is the expected amount of information received and entropy are same things??
- 2's complement of8 in 4bit — 2
  2's complement of (1000) is same as (1000). how 8 would be distinguished from -8?
- What is the different between Entropy and the expected length of a encoding?

Calculator

I am confused on the difference of the entropy and the expected length of a encoding which is calculated by sum of the products of ...

2nd Q : hamming distance of 7 In this question : X is an unknown 8-bit binary number. You are given another 8-bit binary number, Y, and told that the Hamming dist...	2
How is the second last question solved? The expected amount of an information when learning of a symbol. How is it calculated?	4
Hamming Distance and Information I still don't understand how to solve this question: X is an unknown 6-bit binary number. You are given another 6-bit binary number, Y...	7
Why math? log(a/b)= log(a)-log(b) Manipulation of log() expression seems more appropriate for a math course. Straightforward answer log2(1/.75) would be better	1

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Calculator