Mock Semifinals 2025 Web-Based Challenge Challenge 2: Shannon Entropy

Description

Entropy is a measure of uncertainty and randomness in predicting the next character of a block of text. Because of this, it is an important concept in information theory. We can calculate entropy using a formula discovered by Claude Shannon in 1948. The attached files each contain data, which may or may not be printable text. Your job is to find information about each file.

Requirements

- The file name, as provided in the download
- The size of the file, in bytes
- The MD5 hash of the file, in lowercase hexadecimal
- The ASCII value of the most common byte in the file, in lowercase
 hexadecimal, padded to two digits, without any prefixes like "0x" or "\x"
- The Shannon entropy of the file, calculated over **bytes**, in decimal, rounded to **five decimal places**.
- The Shannon entropy of the file, calculated over **bytes**, in decimal, rounded to **five decimal places**. However, use the natural logarithm instead of the logarithm base 2 when calculating the entropy.

Resources

- <u>https://en.wikipedia.org/wiki/Entropy_(information_theory)</u>
- <u>https://rendazhang.medium.com/information-theory-series-1-entropy-an</u> <u>d-shannon-entropy-a20a2101108e</u>

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Submission Instructions

You must submit your answer as a .csv file, in the following format:

- \Box The first line of the submission should contain your team number.
- \Box The second line should contain the information for file 1.
- \Box The second line should contain the information for file 2.
- \Box The second line should contain the information for file 3.
- \Box The second line should contain the information for file 4.

In each line, separate your answers with a comma, with no space in between each answer. Refer to the below example for formatting help. Each line should have three pieces of information: the username, the salt, and the password.

Each field is weighted equally in scoring. You will get points for each field that is correct. You will get 10 tries to submit before you will not be able to submit anymore.

Example Submission

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16-2250
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file1.jpg,3612,d62d4a6ae19b7dabc3f685ab6ef98135,32,8.154128597,9.562204296 file2.png,4428,75786ec4e5295e253f851c1a5e77d048,5a,4.154977138,8.349002818 file3.txt,33214,fd8fee0b647c11a94912bb9f589debc3,f5,9.756845581,2.709415475 file4.raw,54664,5645b1c3ca28b4a4b33c76af64dd2606,84,2.303707620,1.303707620