

Dictionaries Challenge 25: Code Breaker App

Description:

You are responsible for writing a program that will encode or decode a message based off the letter distribution of a predetermined key text. Your program will determine a frequency analysis for two texts and use these letter distributions to create a cipher to either encode or decode a message based off user input. This program is an extension of the Frequency Analysis App.

Step by Step Guide:

- Begin by copying your code from the Frequency Analysis App
- Print a new welcome message.
- Comment out the user input for getting key_phrase_1
- Hard code a predetermined phrase between you and the person you are communicating with for key_phrase_1. I am using excerpts from Sherlock Holmes, but anything will do.

```
key_phrase_1 = ""
```

To Sherlock Holmes she is always the woman. I have seldom heard him mention her under any other name.

In his eyes she eclipses and predominates the whole of her sex. It was not that he felt any emotion akin to love for Irene Adler.

All emotions, and that one particularly, were abhorrent to his cold, precise but admirably balanced mind.

He was, I take it, the most perfect reasoning and observing machine that the world has seen, but as a lover he would have placed himself in a false position.

He never spoke of the softer passions, save with a gibe and a sneer.

They were admirable things for the observer excellent for drawing the veil from men's motives and actions.

But for the trained reasoner to admit such intrusions into his own delicate and finely adjusted temperament was to introduce

a distracting factor which might throw a doubt upon all his mental results.

Grit in a sensitive instrument, or a crack in one of his own highpower lenses, would not be more disturbing than a strong emotion in a nature such as his.

And yet there was but one woman to him, and that woman was the late Irene Adler, of dubious and questionable memory.

I had seen little of Holmes lately. My marriage had drifted us away from each other.

My own complete happiness, and the homecentred interests which rise up around the man who first finds himself master of his own establishment,

were sufficient to absorb all my attention, while Holmes, who loathed every form of society with his whole Bohemian soul,

remained in our lodgings in Baker Street, buried among his old books, and alternating from week to week between cocaine and ambition,

the drowsiness of the drug, and the fierce energy of his own keen nature.

He was still, as ever, deeply attracted by the study of crime,

and occupied his immense faculties and extraordinary powers of observation in following out those clues,
and clearing up those mysteries which had been abandoned as hopeless by the official police. From time to time I heard some vague account of his doings: of his summons to Odessa in the case of the Trepoff murder,
of his clearing up of the singular tragedy of the Atkinson brothers at Trincomalee,
and finally of the mission which he had accomplished so delicately and successfully for the reigning family of Holland.
Beyond these signs of his activity, however, which I merely shared with all the readers of the daily press, I knew little of my former friend and companion.

""

- Comment out the user input for getting key_phrase_2
- Hard code a predetermined phrase between you and the person you are communicating with for key_phrase_2. I am using excerpts from Sherlock Holmes, but anything will do.

key_phrase_2 = ""

Quite so! You have not observed. And yet you have seen.

That is just my point. Now, I know that there are seventeen steps, because I have both seen and observed.

By the way, since you are interested in these little problems,
and since you are good enough to chronicle one or two of my trifling experiences, you may be interested in this.

He threw over a sheet of thick, pink tinted notepaper which had been lying open upon the table. It came by the last post, said he. Read it aloud.

The note was undated, and without either signature or address.

There will call upon you tonight, at a quarter to eight o'clock,
it said, "a gentleman who desires to consult you upon a matter of the very deepest moment. Your recent services to one of the royal houses of Europe have shown that you are one who may safely be trusted

with matters which are of an importance which can hardly be exaggerated.

This account of you we have from all quarters received.

Be in your chamber then at that hour, and do not take it amiss if your visitor wear a mask.

This is indeed a mystery, I remarked. What do you imagine that it means?

I have no data yet. It is a capital mistake to theorise before one has data.

Insensibly one begins to twist facts to suit theories, instead of theories to suit facts.

But the note itself. What do you deduce from it?

I carefully examined the writing, and the paper upon which it was written.

The man who wrote it was presumably well to do, I remarked, endeavouring to imitate my companion's processes.

Such paper could not be bought under half a crown a packet.

It is peculiarly strong and stiff.

""

- You should be able to encode or decode a message regardless of the key phrases chosen.
- To In order to accomplish this, you must look at the frequency analysis of the two key phrases.
- Given a character in the secret message that is to be encoded, you must find its index in the frequency analysis of the first message.
- Then find the letter that appears at the same index in the frequency analysis of the second message.
- This is your encoding rule to encode one character as another.
- For example, the letter "o" appears at index 1 in the first frequency analysis. The letter "t" appears at index 1 in the second frequency analysis. Therefore the letter "o" would be encoded to the letter "t".
- The letter "h" appears at index 7 in the first frequency analysis. The letter "r" appears at index 7 in the second frequency analysis. Therefore the letter "h" would be encoded to the letter "r".
- Similarly, the word "oh" would be encoded to "tr" using the given key phrases.

NEW CODE TO ADD

- Ask the user if they would like to encode or decode a message.
- Ask the user for the message.
 - You should take proper precautions to make the message all lower case.
 - You should take proper precautions to remove all non-letters from their message.
- If the user chose to encode the message, run an algorithm to encode and print the message.
 - Create a blank list called `encoded_phrase`.
 - For each letter that is in the phrase:
 - Create a variable called `index` and set it equal to the index of the current letter in `key_phrase_1_ordered_letters`.
 - To accomplish this you can use the `.index()` method.
 - Google or check Python documentation on the `.index()` method.
 - Create a variable called `letter` and set it equal to the letter that appears in `key_phrase_2_ordered_letters` at the specified index.
 - Append letter to the list `encoded_phrase`.
 - Print the encoded message.
 - There are multiple ways to do this. You may use the `end=` argument of the `print` function or the `.join()` method for strings.
- Elif the user chose to decode the message, run an algorithm to decode and print the message.
 - Create a blank list called `decoded_phrase`.
 - For each letter that is in the phrase:
 - Create a variable called `index` and set it equal to the index of the current letter in `key_phrase_2_ordered_letters`.
 - To accomplish this you can use the `.index()` method.
 - Google or check Python documentation on the `.index()` method.

- Create a variable called letter and set it equal to the letter that appears in key_phrase_1_ordered_letters at the specified index.
 - Append letter to the list encoded_phrase.
- Print the decoded message.
 - There are multiple ways to do this. You may use the end= argument of the print function or the .join() method for strings.
- Else, the user chose an invalid option and inform them.

- Use at least 2 comments to describe sections of your code.
- “Chunk” your code so that is readable.
- Use appropriate and informative variable names.
- Format your output as below.

Example Output 1:

Welcome to the Code Breakers App

Here is the frequency analysis from key phrase 1:

Letter	Occurrence	Percentage
a	153	7.77%
b	32	1.63%
c	53	2.69%
d	81	4.12%
e	249	12.65%
f	57	2.9%
g	28	1.42%
h	117	5.95%
i	150	7.62%
j	1	0.05%
k	12	0.61%
l	85	4.32%
m	69	3.51%
n	142	7.22%
o	157	7.98%
p	27	1.37%
q	1	0.05%
r	116	5.89%
s	139	7.06%
t	154	7.83%
u	45	2.29%
v	17	0.86%
w	46	2.34%
x	3	0.15%

y	34	1.73%
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Letters ordered from highest occurrence to lowest:
eotainshrldmfcwuybgpvkxjq

Here is the frequency analysis from key phrase 2:

Letter	Occurrence	Percentage
a	103	8.17%
b	21	1.67%
c	36	2.85%
d	45	3.57%
e	169	13.4%
f	21	1.67%
g	16	1.27%
h	67	5.31%
i	88	6.98%
j	1	0.08%
k	10	0.79%
l	33	2.62%
m	29	2.3%
n	78	6.19%
o	103	8.17%
p	26	2.06%
q	3	0.24%
r	72	5.71%
s	77	6.11%
t	135	10.71%
u	46	3.65%
v	15	1.19%
w	29	2.3%
x	3	0.24%
y	35	2.78%

Letters ordered from highest occurrence to lowest:
etoainsrhudcylmwbpbgvkqxj

Would you like to encode or decode a message: encode
What is the phrase: Wow, this is awesome!

The encoded message is:
mtmorisisamestce

Example Output 2:

Welcome to the Code Breakers App

Here is the frequency analysis from key phrase 1:

Letter	Occurrence	Percentage
a	153	7.77%
b	32	1.63%
c	53	2.69%
d	81	4.12%
e	249	12.65%
f	57	2.9%
g	28	1.42%
h	117	5.95%
i	150	7.62%
j	1	0.05%
k	12	0.61%
l	85	4.32%
m	69	3.51%
n	142	7.22%
o	157	7.98%
p	27	1.37%
q	1	0.05%
r	116	5.89%
s	139	7.06%
t	154	7.83%
u	45	2.29%
v	17	0.86%
w	46	2.34%
x	3	0.15%
y	34	1.73%

Letters ordered from highest occurrence to lowest:
eotainshrlmfcwuybgpvkxjq

Here is the frequency analysis from key phrase 2:

Letter	Occurrence	Percentage
a	103	8.17%
b	21	1.67%
c	36	2.85%
d	45	3.57%
e	169	13.4%
f	21	1.67%
g	16	1.27%
h	67	5.31%
i	88	6.98%

j	1	0.08%
k	10	0.79%
l	33	2.62%
m	29	2.3%
n	78	6.19%
o	103	8.17%
p	26	2.06%
q	3	0.24%
r	72	5.71%
s	77	6.11%
t	135	10.71%
u	46	3.65%
v	15	1.19%
w	29	2.3%
x	3	0.24%
y	35	2.78%

Letters ordered from highest occurrence to lowest:
etoainsrhudcylmwpbfgvkqxj

Would you like to encode or decode a message: decode
What is the phrase: mtmorisaisamestce

The decoded message is:
wowthisisawesome