CS001X: Introduction to Computer Programming with Python

Department of Computer Science, University of Pittsburgh

Project 3: Cryptography - Lab 3

Introduction

For this assignment you will need to create a basic cryptography program based the Vigenère cipher.

To Note:

- You can assume that the length of the text to be encrypted/decrypted is always greater than zero.
- **If you find a character that's *not a letter*,** i.e. a number, a space, or a punctuation character (, ; . ! @ # $ & % ,etc.), **do not change it, leave as is, and copy it over.**
- **Although the examples given in these instructions are a good place to start. Your program must work with any encrypted/decrypted messages given in the inputs.**

The Vigenère cipher encodes text based on a second string that is called **key**. The alphabetical position of each of the characters in the key determines how many positions the character in the original text must be shifted. The letter "A" in the key means a shift of zero, "B" produces a shift of 1, "C" a shift of 2 and so on. A key can contain more than one character, in those cases you need to 'extend' the key by repeating it as many times as necessary until it reaches the same length of the whole text. **Your program must ask the user for the Enconding Key**. To learn more about the cipher visit: https://en.wikipedia.org/wiki/Vigen%C3%A8re_cipher.

For example, suppose that the text to be encrypted is "pittsburgh pa" and the key is "yes". The first step is to concatenate "yes" over and over until it's same length as "pittsburgh pa", consider white spaces as a special character.

TEXT	pittsburgh pa
key	yes
adjusted key	yesyesyesyes (we ignore anything that's not a letter, so key is one character shorter for this example)
calculated shift	24,4,18, …
encrypted text	nmlrwtsvyf ts

TEXT	pittsburgh pa
key	b
adjusted key	bbbbbbbbbbbb (we ignore anything that's not a letter, so key is one character shorter for this example)
calculated shift	1, …
encrypted text	qjuutcvshi qb

TEXT	pittsburgh pa
key	a
adjusted key	aaaaaaaaaaaa (we ignore anything that's not a letter, so key is one character shorter for this example)
calculated shift	0, …
encrypted text	pittsburgh pa

TEXT	computer programming
key	python
adjusted key	pythonpythonpythonp (we ignore anything that's not a letter, so key is one character shorter for this example)
calculated shift	15, 24, 19, 7, 14, 13
encrypted text	rmfwigtp iyctgyftwav

Part 3

- Write a function menu() that takes no arguments**,** and displays a menu with options to (1) encrypt a message, (2) decrypt a message or (9) exit. The function should return the selected option in case it is valid or display "Invalid option. Try again." and display the menu again until a valid option is entered.

Write a function main() that takes no arguments, and runs a loop with menu and the appropriate action until 9 is selected.

Your function must:

- call encrypt_vigenere() for option 1.
- call decrypt_vigenere() for option 2.
- end the program for 9.

Remove any other calls to decrypt/encrypt_vigenere() outside of main and call main() at the end of your program. Submit your program in Canvas.

Sample Output

```
VIGENERE CIPHER

Select Operation:
1) to encrypt text
2) to decrypt text
9) Quit
>>>5
Invalid option. Try again.

VIGENERE CIPHER

Select Operation:
1) to encrypt text
2) to decrypt text
9) Quit
>>>1
ENCRYPTING TEXT...

Enter name of file to be encrypted: text.txt
Enter the encryption key: greenranger
```

```
Enter name for the output file (must be .txt): encrypted.txt

DONE!
VIGENERE CIPHER

Select Operation:
1) to encrypt text
2) to decrypt text
9) Quit
>>>2
DECRYPTING TEXT...
Enter name of file to be decrypted: encrypted.txt
Enter the encryption key: greenranger
Enter name for the output file (must be .txt): decrypted.txt
DONE!
VIGENERE CIPHER

Select Operation:
1) to encrypt text
2) to decrypt text
9) Quit
>>>
```