COL759 Assignment 1 - Decrypting Vigenère Cipher by Riddhidipta Pal, 2021CS10546 and Vaibhav Bajaj, 2021CS50126

How to run the code:

1. Open the terminal and navigate to the directory where the code is present.
2. Install dependencies from the requirements.txt file:

   ```
   pip install -r requirements.txt
   ```

3. Run the code using the following command:

   ```
   python3 vigenere_cryptanalysis.py Ciphertext: "<encrypted_text>"
   ```

   where `<encrypted_text>` is the encrypted text that you want to decrypt. For example:

   ```
   python3 vigenere_cryptanalysis.py Ciphertext: "T omvwmz ifmdkxa rvhu figlurz bti hcfik eavel; rskouzxvqwl myikoqw yzaq mmzhbvs snz urgmd ahzxh."
   ```

4. The decrypted text will be displayed on the terminal.

Example:

```
python3 vigenere_cryptanalysis.py Ciphertext: "T omvwmz ifmdkxa rvhu figlurz bti hcfik eavel; rskouzxvqwl myikoqw yzaq mmzhbvs snz urgmd ahzxh."
```

Output:

```
Key:    "Time", plaintext:      "A garden emerges from tending the outer world; forgiveness emerges from tending our inner world."
```

Note:

- The code has been tested on Python 3.10.0 on a Windows machine.
- The first time you run the code, it may take a few seconds to run as the code downloads the entire English dictionary from the internet. Subsequent runs will be faster as the dictionary will be cached locally. The English dictionary is used to check if the decrypted text is valid English text and which key is the most likely key when multiple keys are possible from Kasiski and IC analysis. You can comment out the part safely without affecting the decryption process.
- The letter frequencies are calculated using the Pride and Prejudice book by Jane Austen from Project Gutenberg. To avoid downloading the book every time, the letter frequencies are stored in the code itself. A function has been provided to calculate the letter frequencies from any text file.