Algorithm Analysis

Let us explore the time and memory used by the algorithm. Let as assume that all that is inputted is lowercase characters of the alphabet, a-z. Let n be the input size.

Time

Stepping through the program we find

- Initializing dictionary for letter count in O(1)
- Sanitizing input in O(n)
- Counting letters in O(n)
- Calculating frequencies in O(1)
- Comparing frequencies in O(1)
- Printing mismatches over 5% in O(1)

Final runtime is

$T(n) = O(n)$

Memory

Looking at items using memory we have

- Letter and original frequency list using O(1)
- Dictionary of letter count using O(1)
- Input string from user using O(n)
- Various variables using O(1)
    - Index, bool, temp

Final memory usage

$M(n) = O(n)$