MLDS 422 – Fall 2023
Homework 2
Due Friday, 10/6/23 at 11:59pm

Exercise 1: Random and Timeit Practice

Given a list of numbers and words, find the count of each element type in the list.

Example

my_list = [2, 3, ‘word’, -1, ‘python programming language’, 9, 321]

Count of numbers: 5
Count of words: 2

1. Create a function that will randomly generate a list of **N** numbers and words. Numbers and word counts are random and the order is random too.

2. Create a function to calculate the desired output using loops.

3. Create a function to calculate the desired output using list comprehension.

4. Use the timeit library to check the performance difference between the two solutions for different list sizes (N = 100, 1000, 10000, 100000). Plot the difference using matplotlib.

5. What conclusions can you draw from the results?

Exercise 2: The Collections Library

Create a function that returns the "beauty" of a string.

- Given a string **s**, the beauty is the sum of the beauty of the letters in it
- The beauty of each letter is an integer between 1 and 26, inclusive, and no two letters have the same beauty
- For each word, the most common letter should be given a beauty of 26, the second most common 25, and so on
- An uppercase **A** and lowercase **a** will have the same beauty
- You can ignore punctuation

Here are some inputs:

ABbCcc

Ignore punctuation, please :)

Sometimes test cases are hard to make up.

And here are the outputs for them:

152

491

729

1. Create a function that returns the "beauty" of a string using a defaultdict (from the Collections library) to store the counts. Apply it to the three test cases.

2. Create a function that returns the "beauty" of a string using Counter (from the Collections library) to store the counts. Apply it to the three test cases.

3. Compare the two solutions. Explain which one you think is better.

Exercise 3: Explore a Library

Pick an extension library from **PyPI or other sources** (something of interest to you). Summarize the functionality provided by the library (one paragraph) and show a usage example.

Document step-by-step how to run the example provided.

PyPI: https://pypi.python.org/pypi