



# [CS 11] Prac 9i – Frequency Analysis

## Problem Statement

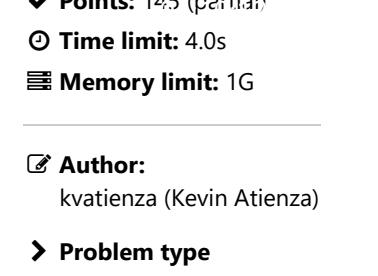
Zipf's law is an empirical law that often holds, approximately, when a list of measured values is sorted in decreasing order. It states that the value of the  $n$ th entry is inversely proportional to  $n$ :

For example, if one tallies the words in a typical passage of text, one often finds Zipf's law to approximately hold:

$$\text{word frequency} \propto \frac{1}{\text{word rank}}.$$

You would like to test this!

As a first step, you would like to be able to do the following: Given a sequence of words representing text, give the number of times each word has appeared previously in the text.



## Task Details

Your task is to implement a function called `with_freq_count`. This function has a single parameter, a `str`.

The function must return a `list` of pairs. The first element of each pair must be the next word in the text (a `str`), and the second element must be an `int` denoting how many times it has appeared previously in the sequence.

## Restrictions

(See 9a for more restrictions)

For this problem in particular:

- Recursion is allowed.
- The source code limit is 2000.

## Example Calls

### Example 1 Function Call

```
with_freq_count(""""
don't stop me now
I'm having such a good time
I'm having a ball
don't stop me now
if you wanna have a good time
just give me a call
""")
```

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### Example 1 Return Value

```
[("don't", 0),
('stop', 0),
('me', 0),
('now', 0),
("I'm", 0),
('having', 0),
('such', 0),
('a', 0),
('good', 0),
('time', 0),
("I'm", 1),
('having', 1),
('a', 1),
('ball', 0),
("don't", 1),
('stop', 1),
('me', 1),
('now', 1),
('if', 0),
('you', 0),
('wanna', 0),
('have', 0),
('a', 2),
('good', 1),
('time', 1),
('just', 0),
('give', 0),
('me', 2),
('a', 3),
('call', 0),
]
```

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### Example 2 Function Call

```
with_freq_count('a A a A')
```

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### Example 2 Return Value

```
[('a', 0), ('A', 0), ('a', 1), ('A', 1)]
```

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## Constraints

- The function `with_freq_count` will be called at most 60,000 times.
- The number of words per call will be at most 200,000.
- The total number of words across all calls will be at most 200,000.
- Each word is a nonempty string of up to 6 English letters or the `-` or `'` symbols
- Words will be separated by spaces or newlines.
- The text will have a length of at most 8 times the number of words.

## Scoring

- You get 45 ❤️ points if you solve all test cases where:
  - The number of words per call is at most has length at most 50.
  - The total number of words across all calls is at most 500.
- You get 40 ❤️ points if you solve all test cases where:
  - The number of words per call is at most has length at most 4,000.
  - The total number of words across all calls is at most 8,000.
- You get 60 ❤️ points if you solve all test cases.

## Clarifications

Report an issue

No clarifications have been made at this time.