

Parallel Functional Programming

Final Project Proposal - Fall 2022

Swetha Shanmugam (UNI: ss6357)

Project: Word search in a grid (WordSearch)

Given an MxN grid of characters, we will search for a word in the given grid and return the position of the word if found. A word can be matched in 8 directions (vertically up or down, horizontally right or left or diagonally in 4 directions).

E.g:

```
Input:  grid[][] = {"GEEKSFORGEEKS",  
                    "GEEKSQUIZGEEK",  
                    "IDEQAPRACTICE"};  
          word = "GEEKS"
```

```
Output: pattern found at 0, 0  
          pattern found at 0, 8  
          pattern found at 1, 0
```

Reference: <https://www.geeksforgeeks.org/search-a-word-in-a-2d-grid-of-characters/>

Implementation

- The grid of characters along with the word to be searched will be taken from a text file passed as input.
E.g: wordGrid <input_file.txt>
- In order to do a performance test, I will write a module that will take M and N (size of grid) as input and generate random sample input grids for the main program.
- The main program will have to search for the word from every cell of the grid. Since each of these subtasks are independent of each other, they can be parallelised and we could see a huge improvement in performance when parallelised.
- Similarly, since at a given cell, we need to look for the word in 8 directions, we can parallelise this task as well.

Expected Output/Results

The final end goal would be to have two programs - non-parallel and parallel implementation of the word search algorithm. I will run the program for different inputs and measure the performance for both the implementations.

Possible Extensions

- Given multiple words as input, find all the words in the grid. This in turn can be parallelised.
- Given a word pattern as input, find all the words in the grid. E.g: “*at” will look for 26 possible words like “cat”, “bat”, etc.