

EE2703 - Applied Programming Lab

Assignment-4: Keyboard Analysis

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1 Introduction

In this assignment, our objective was to develop a python program to generate a heat map visualization of key presses on a keyboard of a given layout and also to analyse the distance travelled by the fingers in typing the given sentence.

2 Problem Description

The input contains a text string to analyze and a keyboard layout. In my code I have defined some predefined layouts like **Qwerty**, **Dvorak**, **Colemak** and also provide an option to use a custom layout as per the user's wish. The layout must follow the key configuration of our Programming Quiz - 4, Question - 3. The size of all keyboards is assumed to be 5x15.

Given all this info, our tasks are as follows:

- Generate a heat map visualization of key usage (by counting the frequency of each key)
- Calculate the distance travelled by the fingers for typing the given sentence. (Must include distance to and from shift keys etc.)
- **(BONUS)** Implement multiple keyboard layouts (I have implemented Qwerty, Dvorak and Colemak, and the user is also allowed to give their own custom layouts)
- **(BONUS)** Try to show an animation of the typing process.

3 Assumptions I have used in my code

In order to solve this problem there were a number of assumptions that I had to use in my code.

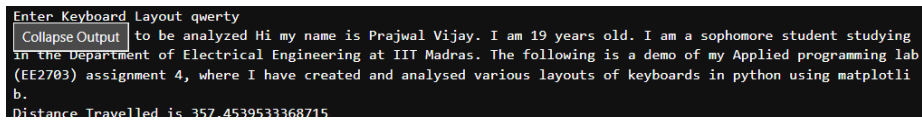
- Any input layout will follow the same convention as given in the APL programming quiz Q3 (https://eex.dev.iitm.ac.in/pluginfile.php/1/question/questiontext/9442/3/473/qwerty_layout.py). Also this input is from the terminal, not any file.
- The size of all keyboard layouts has been assumed to be 5x15 inches.
- There are no other characters in the input text apart from the ones mentioned in the characters dictionary, part of the APL Programming Quiz 4 Q3.
- Bottom left corner is assigned the value of (-0.5, -0.5).
- All special keys (with the exception of space) will have the size of 2x1 inches, and special keys are simply those that have more than one character on them (This seemed like a decent assumption to make).
- The Heat map generated is not exactly like how it was shown in the demo, but it does highlight the fact that some keys are used more than others.
- The animation generated cannot be downloaded, it can be viewed in the output of the online JupyterLab notebook itself.
- The color map I have used is not the one mentioned in the demo, this one is called **"cividis"**

4 Results

When using the input text:

Hi my name is Prajwal Vijay. I am 19 years old. I am a sophomore student studying in the Department of Electrical Engineering at IIT Madras. The following is a demo of my Applied programming lab (EE2703) assignment 4, where I have created and analysed various layouts of keyboards in python using matplotlib.

The following outputs were generated:



```
Enter Keyboard Layout qwerty
Collapse Output to be analyzed Hi my name is Prajwal Vijay. I am 19 years old. I am a sophomore student studying
in the Department of Electrical Engineering at IIT Madras. The following is a demo of my Applied programming lab
(EE2703) assignment 4, where I have created and analysed various layouts of keyboards in python using matplotlib.
b.
Distance Travelled is 357.4539533368715
```

Figure 1: Terminal Output

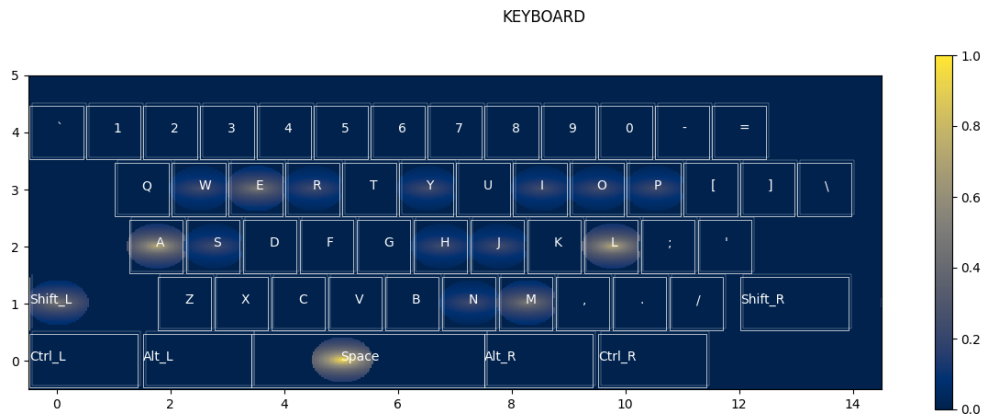


Figure 2: Resultant image(QWERTY Layout)

5 Steps to reproduce results

- The first cell the notebook corresponds to the animation. You will have to specify the layout and provide input text for running it. The output will be an animation.
- The second cell will generate an output image named **"keyboard.png"**.
- The Distance Travelled output will be printed in the terminal
- Submitted files include, this report, the python notebook and 2 input samples with their output maps and distance travelled results.

6 References

1. <https://www.overleaf.com/> was used to create the LATEX document
2. <https://docs.python.org/3/> the Python3 Documentation
3. <https://matplotlib.org/stable/api/index> the Matplotlib documentation
4. https://eex.dev.iitm.ac.in/pluginfile.php/1/question/questiontext/9442/3/473/qwerty_layout.py The format used is according to this document part of Question 3 in programming Quiz 4