

WORDS GAME



Computer Engineering - Senior Project Report

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Summary

Children learn the best and retain the most information when they use their senses. One of the hardest things is teaching a child reading. Even if it is harder if the kid has dyslexia or apraxia. Therefore teaching reading to children should be in a funny way. By this idea, there is a game called “Osmo Words”[1]. It is in English and it has some other language options. However it is not in Turkish. Therefore I want to do it for Turkish alphabet.

Therefore in my project, I aim to make a tactile mobile game that recognizes Turkish alphabet for teaching reading to children.

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1. Introduction

In Turkey, there are about more than 120,000 dyslexia children. Dyslexia is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling. By Words game word dictionary can be extended to assist adult patients of dyslexia and apraxia. Therefore it also prevents a child to be dyslexia and apraxia. Furthermore Words game can also teach kids encouraging social interaction while playing. Words game teaches children letter-sound associations. Lastly it is a tactile game. Therefore it adds children skills that work on eye-hand coordination tasks while playing.

2. Methods

Perform of system, there will be two subsystems. These subsystems are “Development of Android Application for User Interface” and “Python scripting for Image Detection”.

❖ Development of Android Application for User Interface

For user interface part Android studio will be used [2]. Therefore Java will be using as a programming language.

When development of user interface, some conditions were considered. These conditions:

- Implementation of Python script as a backend for android.
- Using javascript libraries for good looking and for some functionalities

❖ Python Scripting for Image Detection

- Detection distance of letters
- Camera quality to detect
- The brightness of surface to be detected

When consider these conditions, I did several experiments. I determined library according to best and correct detection in worst case scenario. That scenario conditions were low camera quality, brightness of surface and distance maximum. Consequently, OpenCV (Open Source Computer Vision) is an open source computer vision and machine learning software library [3]. Written in optimized C/C++, OpenCV was built to provide a common infrastructure for computer vision applications. OpenCV-Python is the Python API of OpenCV and I will be using it. Tesseract is an optical character recognition (OCR) tool for python [4]. It will recognize and "read" the text embedded in images.



Figure-1:The output of finding letter C by contours

```
--- Start recognize text from image ---
C
----- Done -----
```

Figure-2:Recognizing the letter C from output image



Figure-3:The output of finding letter A by contours

```
--- Start recognize text from image ---
A
----- Done -----
```

Figure-4:Recognizing the letter A from output image

3. Results

In first semester, I have almost completed python scripting part. I can detect the letter from image.

First of all, there is a certain criteria that I have to consider such as reading letter/word from image. To read from image is easy with Tesseract library. It also has 'config' option to read a single character (should be equal to '--psm 10').However it does not give correct result if the

background is noisy. Therefore OpenCV library should be used. With OpenCV library tesseract can detect text successfully. However another problem is reading only one letter. Even if the size of the image is big, it is much more difficult to detect. Therefore firstly I tried to crop the image according to letter (kare kağıt harfler). Then I needed to rotate the cropped image. However the program did not know the angle that it should rotate. Then I changed my way. I wrote script that the program finds letter by color. It worked actually. Now one of the most important things that I need to handle is getting the correct results while putting letters one after the other. At this point, this part takes some time. I guess, this phase was a little challenge.

Secondly I started setting the user interface part. Just main pages,basic parts.

Lastly I searched how to use Python script on Android Studio,how to merge them. I found some solutions and tried. I installed some dependencies for Python on Android Studio.

In second semester, I will complete remaining parts such as development of android.

4. Conclusion

“Children are the world's most valuable resource and its best hope for the future.” Therefore whatever is made must be beneficial to children. Words game will provide many opportunities to them such as preventing them to has dyslexia, encouraging social interaction,teaching letter-sound associations.

5. References

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