# Optical Character Recognition Feature Implementation in Cooking Recipe Application using Tesseract Google Project

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*Abstract* **--Development of cooking recipe application is not a new topic currently, there were many available cooking recipe mobile application that is available in the developer application store, for users to use it as their cooking assistant. However, based on the related work review, most available cooking recipe application only serves the user common features, such as showing the list of recipes, searching for recipes by the ingredient or by the title of the recipe. In this research, the author intends to combine cooking mobile application with Optical Character Recognition technology by implementing OCR feature in the cooking application as the additional feature that can be used in searching recipe(s) by using their camera to capture a new image or by simply choosing existing image. The development of the application uses Tesseract Google Project as the library for supporting the development of this application. The author will also conclude whether text recognition feature implemented in cooking recipes application is able to help the user in searching recipe or not.**
*Keywords: optical character recognition, tesseract, cooking application, mobile application, leptonica, android.*

## I. INTRODUCTION

The development of mobile application grows rapidly which makes mobile devices very powerful to fulfill user's needs in accessing information everywhere, including during cooking. Cooking is an activity where users need the proper and enough time and knowledge about what food that they are going to make and how can each ingredient being cooked properly. Before the growth of mobile applications, users often ask other people how to cook a particular ingredient or by reading a cooking recipe book, but now with available cooking application on most mobile devices, it can act as user's cooking assistant by giving the information about cooking recipes.



Figure 1 Several Cooking Application Available

The development of searching recipe is not a new topic in software development area. As seen in Figure 1.1, it shows that development even has been conveyed in the field of mobile device. With this, users do not need to bring their recipe books everywhere to keep the recipes with them. However, as human demands are completed by the technology, the needs to be fulfilled expands.

The inspiration of doing research about implementing Optical Character Recognition in Searching Recipe Application came from the author's observation result of researching at existing searching recipe applications, which shows that most applications uses a text-based input in order to command the system regarding the recipe needed. From the results of the observation, the author intends to provide additional alternative method for users to input their queries by simply capturing an image with textual content in it so that system can recognize the text and make those character as the input.

In order to implement Optical Character Recognition on the Cooking Recipe Mobile Application, the author chooses Tesseract Optical Character Recognition Google project as the library to support the development of the recipe application in this research. Optical Character Recognition is a technology which the implementation of Computer Vision, involves tracking character of a reading paper from the handwritten or even a printed document,, as seen in Figure 1.2. This technology was first used in

scanner devices [1] as a character detector that makes the un-editable text become editable text.

Tesseract OCR is Google Project that firstly developed in HP Lab described in [1][2], this project firstly made for feature of the hp printed scanner until now it acquired by Google Inc as one of the best Optical Character Recognition Open source Project.
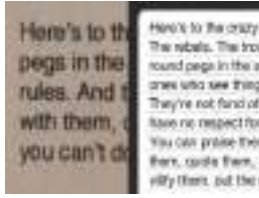


Figure 1.2 The Implementation of OCR as the scanner book

Implementing a text recognition feature in searching recipe mobile application will be a new innovation, as previously researched by the author, the implementation of OCR has only been used as a translator or a converter of un-editable documents and that there are no mobile-based recipe application that implements OCR technology to support users in their query input for searching purposes.

## II. RELATED WORK

### A. Text Recognition for forms
Published on 1995 Andrew Gillis et. al first wrote about implementing OCR for processing the high amount of census forms [3]. OCR technology was developed for processing the high amount of census form and research about document analysis processing also wrote by Veronica Romero published on 2011 about using Text Recognition in processing marriage books[4] which in that research they used OCR for processing the marriage forms.

### B. Mobile Translation
Mobile translation has been published before, where many researches developed and implemented OCR in the mobile translations in different language. The developed application was able to detect the text and translate it into the purposed language [5].

### C. Tourist Application
Optical Character Recognition, which is commonly used only for detecting the text on the scanned Images, has developed in the different areas in [6] Optical Character recognition implemented in the Translator application. the researcher used OCR feature in the application so the users can take the world from their camera.

### D. Searching Recipe Application,
Research regarding development of recipe application has been done before [7][8][9]. Previous researches focused on developing recipe application with different areas, including pastry, main dish, desserts and etc. However, the results show the input query feature is still the same where the user has to input by typing.

From all the related work that has been done before, the author intends to implement Optical Character Recognition feature in Mobile-based Recipe Application as the new feature to help the user in searching recipe.

## III. PROPOSED SOLUTION

### A. Application Features Identification
One of the phases of this application development is to develop the application feature that has been designed by the user requirement for searching recipe based on the ingredient. The feature that will be serve in this application is as follows:

1) Index
In the index page, user is able to choose the available recipes that has been indexed based on the alphabets. User will also be able to choose the recipe and once they select one recipe, the system will display the details including the picture of the dish or recipe.

2) Search
The searching page is used to provide the user an easier access in searching recipes based on the name or the ingredient of the recipe. User will be served by to option, searching by text or tracking the symbol available.

3) Search By Text
Search by text page has the function to show the user the input form, and the user can input the name or the ingredient of recipe that they are looking for.

4) Search by Optical Character Recognition Feature
Search by tracking page is where the system will open the camera directly and will track the object that is available. If the registered picture has detected the object, the application will go directly to the recipe and includes the ingredients of the recipe.

5) Contrast Feature
Contrast feature could help user in controlling the contrast of selected image, to minimize the error recognition when the lighting or the image is not clear enough.

6) Crop Feature
Crop feature is where the user could crop the image, so the region will be focused on the spot that they want the optical character recognition to read.

7) Tips
This page will show the user several tips in making a simple recipe, as the first purpose of this application targets beginners in cooking. The tips page will display several basic tips in cooking.

8) Help
This help page will give the users information about the available menus in purpose that it could help the user in using the application.

9) About
In this about page users will get information about the project team and any further information about the application version.

## B. Optical Character Recognition Construction
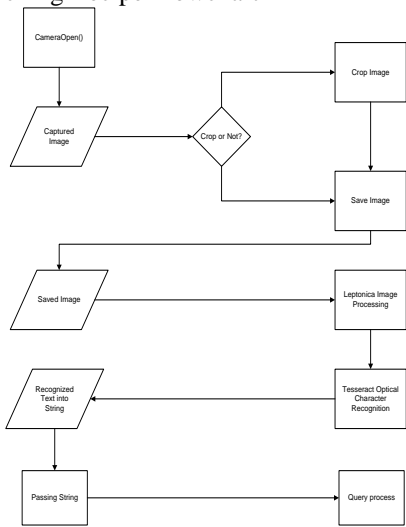OCR Searching Recipe Flowchart



Figure 1.3 OCR Searching Recipe Flow Chart

Figure 1.3 explains the activity of the camera when the user clicks the camera button to use the optical character recognition feature to search by the camera or choose an image from their gallery.

## IV. RESULTS ANALYSIS AND SIMULATION

### A. *Optical Character Recognition Simulation*
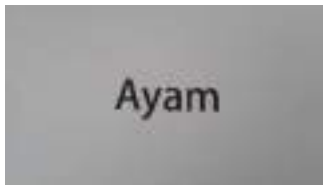#### 1) *Capture Image*



Figure 1.5 Captured Image Sample

When an Image has been saved in the system path, the system will saved the data of the picture.
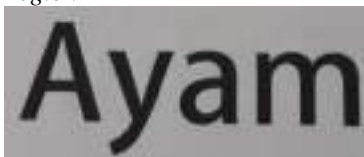
#### 2) *Scan the region*



Figure 1.6 OCR Scan the region of the detected image

After saving the Image, the system will scan the region and crop the original region into a smaller region where the text is available.

#### 3) *Fixed Pitch Detection*



Figure 1.7 Fixed Pitch Phase

Tesseract tests the text line to determine whether there are fixed pitch in the tracked words. This phase is lining as the separation of the character and to see whether there any spacy ( ) in among them or not.

#### 4) *Chopping*



Figure 1.8 Chopping Phase Simulation

The line finding is to track the fixed line to separate each character. Tesseract chops the words into characters using the pitch, and disables the chopper and associator on these word for the word recognition step.
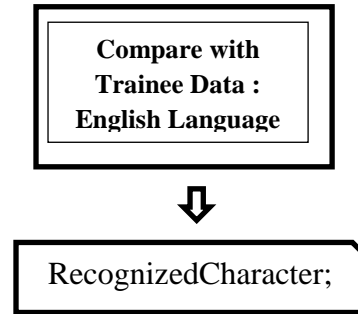
#### 5) *Character Classification*



Figure 1.9 Tesseract OCR Character Classification

The process of comparing the chopped Image with the training data, in this research the alphabet will contain of English language alphabet {a-z, A-Z, 0-9} not including the symbols.

#### 6) *Collecting Character into String*
The next step is the Recognized Character will be collected into one string that will be sent into the user interface
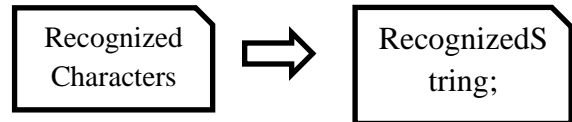


Figure 7 Collecting Character to A String

### B. *Implementation Mobile Application*
This research testing phase is divided into two versions based on the testing methods, first is self-testing, where the application will be tested by the author and the second is testing where the application package will be distributed by the author in the internet where all user could download and install the package in their Android Handheld.

In the handheld implementation, the author choose one tablet mobile device, Samsung Note 10.1 with the specification available in table 1.1 and the handheld device with the specification available also in table 1.1 device specification.

TABLE I

Mobile Device Details

| Specification | Device Type |
|---|---|

| | Samsung Note 10.1 | Advan |
|---|---|---|
| Display | 10.1" WXGA(1280x800) LCD | 5.3 inch. 480 x 800 pixels |
| Network | HSPA+ 21Mbps 850/900/1900/2100 | Dual SIM GSM 900 |
| | EDGE/GPRS 850/900/1800/1900 | + GSM 1800 |
| Operating System | Android Jelly Bean 4.1.2 | Android Ice Cream Sandwich 4.0.1 |
| Processor | 1.4GHz Exynos Quad-Core Processor | 1.4GHz Exynos Dual-Core Processor |
| | | |
| Konektivitas | Bluetooth, wifi | Bluetooth, wifi |
| Memori Eksternal | 8 GB | 8 GB |
| Memori Internal | 8 GB | 8GB |



Figure 1.10 Screenshot of the OCR feature Result

Figure 1.10 above shows where the captured picture contain of recognized text, that shows that recognized character is Ayam, and then next is Ayam will be the keyword for searching any particular recipe that contains "Ayam" as its ingredient.



Figure 1.11 Screenshot Kambing Letter

Figure above shows where the captured picture contain of recognized text, that shows that recognized character is Ayam, and the recognized word will become the keyword for searching any particular recipe that contains "Ayam" as its ingredient.



Figure 1.11 Searching Result when the application cannot find the name of ingredient in the database

The figure shows when there is no recipe contain the recognized letter . The system will show that there are no recipe found with the word.

V. CONCLUSION AND FUTURE WORK

Based on the implementation of the Searching Recipe with Optical Character Recognition Feature using Tesseract Google Project, the author have concluded some points listed below.

(1) Developing cooking recipe application in a mobile device could be done by developing a cooking application in Android Platform so that the application can be implemented in any mobile device that using Android Operating system.

(2) Image to Text feature can be implemented by using Tessearch Optical Character Recognition as the Library for translating image into recognized text and the Tesseract OCR result accuracy will depend on the quality of the image.

For the purpose of future works, future research implementing an OCR feature in Searching Recipe mobile application can be developed by adding some fixtures, such as:

(1) The chosen Tesseract Optical Character Recognition has their limitation in tracking that depend on the contrast, color of the picture. So this is a necessary for having a good lighting in the capture part.

(2) Tesseract implementation for Image to text that still have the limitation in the image processing phase, in the future, it will be better if the next development use a better Image processing feature so it can maximized the output of text recognition part.

(3) In this research, the development of Searching Recipe Mobile Application only touch about Indonesian Language, in the future, the development of application might be can add translate additional feature to detect another language in searching the recipes.

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