Image Reader for Storing Contacts

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Abstract—*Taking phone numbers of different people around the world has become common in daily life. This process as we have noticed would take a lot of memorization and then it is stored into the contacts database of our phone. But have we ever wondered that there can be also another way of saving the number into the database that can take less time than the latter by image processing. The paper being made here uses this concept that studies the image in order to obtain information from it. The role that this idea can play if implemented in real life will be discussed here.*

Keywords: *Android, Image scanning, Contacts database, Optical character recognition, Tesseract*

1. INTRODUCTION

Getting acquainted with the new and latest kind of ideas for making advanced applications is what android is about. It would naturally involve the task of the android developer to find out ways of building a new android application or modifying the older one so that it gains its profit in the world. Among some of these applications image processing can also play its part in its own way. This paper also brings out this term in the application which is being implemented here. It would tell how this concept would play its part.

As stated by the Jae S Lim about the theoretical and application aspects of digital image processing for the images examined from the piece of paper, we draw out the similar concept of image processing in this paper. Image processing is defined as the analysis of an image using techniques that can identify shades, colours and relationships. In field of image processing, it involves scanning the image using mathematical operations by use of any form of signal processing for which input is image and output is set of parameters related to the image. However we use this term here to retrieve the data from the image in the right order and then save it into the contacts bar of the android phone.[1]

With the introduction of this term many advanced applications have come into light in the field of gamma rays, X-rays, ultraviolet rays, Visible rays, infrared rays, microwave rays, radio band etc. This paper brings out this definition in view. We are all familiar with saving a new phone number by memorizing it, writing it down and saving it into the contacts list but this application would now reduce this time just by scanning the image with the help of camera. To know how this procedure is being carried out, we will discuss about it all in the paper being made here.

Testing the application on various platforms and implementing its idea in actual life in same way as done by Athanas for various image processing applications on custom computing platforms would help the person save his/her time while saving the contacts of other people in the android phone when he/she is engrossed in his/her daily schedule.[2]

2. MATERIALS REQUIRED

When building any kind of application right next to the objectives behind it the requirements should be known before beginning. It is very essential for us to understand the requirements beforehand as without its proper knowledge it is impossible to implement anything. So obviously this application has some equipments required for its overall development. Hence the information about both hardware and software requirements are given out as follows:-

1) HARDWARE REQUIREMENTS: Hardware represents the components that act as a platform in helping us develop the application. Without any hardware component computer would not have existed and software too would not be able to set its example. The components that are being used here are given as follows--

- Processor – Intel Core i3
- RAM – 4GB
- USB cable
- Android mobile

2) SOFTWARE REQUIREMENTS: Software represents the set of instructions that directs the computer to perform specific operations. It acts as a fuel in the vehicle and imparts interaction between human and machine. Hence it is necessary to run software in order to allow the computer to function properly. The components that are needed here to implement the application are given as follows--

- Operating system – Windows 7
- Android studio
- Android virtual device

- Android SDK

Many authors such as Hoang T Dinh et al (2013) have done a complete survey giving overview of the emergence of mobile cloud computing concept being taking place from where we have taken the inference of various requirements in the paper. Each requirement that is being listed here has its own place and time to execute its role in the application. All the details which are regarding these requirements will be explained in the given paper.[3]

3. TECHNIQUES AND TECHNOLOGIES

Various image processing applications that have been developed lately involve different techniques and technologies required to make it run successfully. These are usually implemented with the computer languages which can include c, c++, android etc. However the techniques and technologies used here are explained as follows :-

1) TECHNIQUES: It refers to the way of carrying out a particular task especially during the execution or performance of a particular work. The application being implemented here usually involves techniques that perform their tasks. Certain techniques used in this application can be explained as follows-

- Digital image processing -- It deals with manipulation of digital images through a digital computer. It is a subfield of signals and systems but focus particularly on images. It focuses on developing a computer system that is able to perform processing on an image. The input of that system is a digital image and the system process that the image using efficient algorithms and gives an image as an output. The most common example is Adobe photoshop.

The concept given out by G Kang gives out the use of digital computer for required operations and the image processing technology being implemented is concerned with the manipulation of the elements of the image to enhance its information content. Making use of same concept image processing application made here is used for storing the contacts of the people in the contacts database of the android phone just by scanning the numbers which are present in the image. For this reason Android studio software is used here. In addition to this, the application is also implemented on the android phone using the USB cable.

This application proves its efficiency in different fields of our life when we are entangled with our daily busy routine and have less scope for leisure.[4]

2) TECHNOLOGIES: It refers to a bunch of techniques used for producing goods and services in the completion of objectives.

A complete guidance regarding the detailed description of android application framework and developing android apps has been given out by the Liu Jianye et al (2011) from where we draw out various technologies required for running the android applications being explained as follows-

- Android -- It is an operating system which is based on the Linux kernel. It is generally designed for touch screen mobile devices like smartphones and tablets.
- Java – It is a programming language which is object-oriented, and designed to have as few implementation dependencies as possible. The language is mostly derived from C and C++, but has less features of these languages.
- Xml (Extensible markup language)--It is a language which has a set of rules for making data in a format which is readable by both human and machine. This language emphasizes simplicity, generality and usability across the Internet. It is a textual format with strong support via Unicode. XML has been used in this project in order to give it proper GUI design and making it very presentable.[5]

4. METHODOLOGY

Just like other applications, here also the paper being made involves a set of methods that need to be followed in order so as to enable it to run properly. Methodology being described here refers to the set of rules from which specific methods may be derived to solve different problems within the scope of particular discipline. The methodologies being implemented here can be explained as follows:-

Optical character recognition (OCR):

This method involves the electronic conversion of scanned images of typewritten machine text. It is a common method of digitizing printed text so that they can be electronically searched, stored more compactly, displayed on line and used in machine processes such as machine translation, text to speech and text mining.

The Optical character recognition functionality given out by Ravina Mithe et al (2013) has been implemented in this paper that takes the image as input and obtains the text from the image as output.

Recently OCR has enabled the scanned documents to become more than just image files turning into fully searchable documents with text content that is recognised by computers. It now has the ability to extract relevant information and enters it automatically. The result is accurate and there is less time in efficient information processing.[6]

In this paper the OCR methodology involves the matrix matching technique also known as pattern recognition that involves comparing an image to a stored glyph on a pixel by pixel basis. This usually requires matching of generated binary format with the existing template for this purpose the binary has been divided into 5 tracks and each track is subdivided

into 8 sectors. A corresponding track sector matrix is to be generated, identifying number of pixels in each region.

The matrix matching algorithm explained by Mohammad Faisal et al (2014) for Optical character recognition implemention is carried out in the same procedure as in this paper which can be explained as follows--
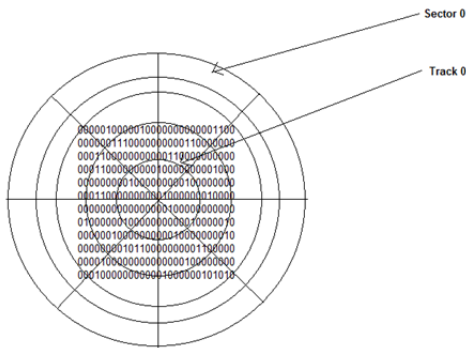

Fig. 1: Division into tracks and sectors

1. Identify center of matrix

2. Calculate radius say rad by finding pixel with maximum distance from center using distance formulae.

dist= sqrt($((y2 - y1)^2 + (x2 - x1)^2)$)

3. Perform (rad/5) to identify size of each imaginary track.

4. Identify imaginary sectors.

5. Generate track- sector matrix by calculating number of 1's in each intersection of sector and track.

The track-sector matrix generated above is then matched with existing template. The existing template consist of each track-sector intersection value, each track value and each sector value. If all these parameters are found to match with the template values then the resultant is the character identified.[7]
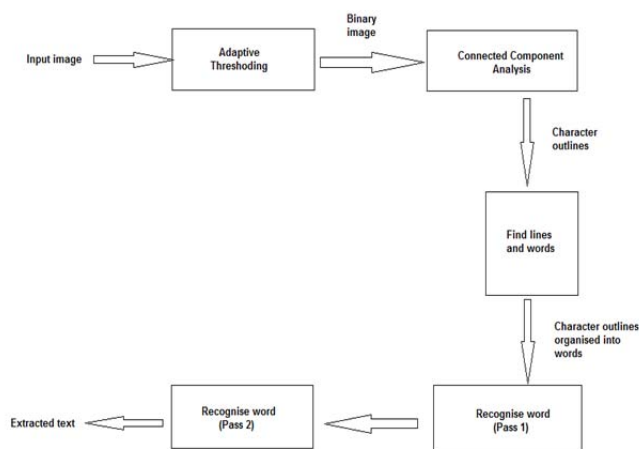
Fig. 2: Architecture of tesseract

The Tesseract ocr engine case study brought out by Chirag Patel et al (2012) tells about its functionality in the optical character recognition using a two pass approach for character recognition. It works in step by step manner as per the block diagram shown in Fig. 2 which can be explained as follows:

a) First step is Adaptive Thresholding, which converts the image into binary images.

b) Next step is connected component analysis, which is used to extract character outlines. This method is very useful because it does the OCR of image with white text and black background. Tesseract was probably first to provide this kind of processing.

c) Then after, the outlines are converted into Blobs. Blobs are organized into text lines, and the lines and regions are analyzed for some fixed area or equivalent text size. Text is divided into words using definite spaces and fuzzy spaces.

d) Recognition of text is then started as two-pass process as shown in Fig. 2. In the first pass, an attempt is made to recognize each word from the text. Each word passed satisfactory is passed to an adaptive classifier as training data. The adaptive classifier tries to recognize text in more accurate manner. As adaptive classifier has received some training data it has learn something new so final phase is used to resolve various issues and to extract text from images.[8]

5. TESTING

It is defined as the process of executing a program with the purpose of finding the flaw. It is usually performed in this application to check if it is running successfully. By running the application we can find out if it is performing its task efficiently. Following are the points that need to be kept in mind while testing the application:-

• Creating android virtual device.

• Running android application.

1) CREATING ANDROID VIRTUAL DEVICE:-

It is an emulator configuration that lets us design a real device by describing hardware and software options to be used by the android emulator.

The analysis made by the authors Jerome da Rugna et al (2011) bring out the steps of feature extraction to overcome the problems in the applications that are made to run in order to test whether it works properly. In the same way in this paper the first thing that needs to be done while testing the application is to create an android virtual device. The first thing that needs to be done while creating an android virtual device is to launch the android virtual device manager which can be done in either of the 2 ways as follows:

Select **Tools > Android > AVD Manager from the toolbar**

- Select the AVD Manager icon in the toobar

Once the AVD Manager is launched we can effectively test our app by creating an AVD that models each device type for which we have designed our app to support. For instance we create an AVD for each API level equal to and higher than the minimum version you have specified in your manifest**.** The steps that are followed while creating the android virtual device are given as follows:

a) After the AVD Manager main screen is opened, Click Create virtual device.
b) In Select Hardware window, select device configuration, then click Next.
c) Select the desired system version for AVD and click Next.
d) Verify Configuration settings, then Click Finish
e) To launch our android virtual device, click the launch button in the list of AVD's.[9]

Finally our android virtual device is created and we are prepared to run our application.

2) RUNNING ANDROID APPLICATION:-

After creating the android virtual device we are now ready to run our application which can be done on-

- Android emulator
- Android phone

Following the instructions given out by Lauren Darcey et al (2012) to build robust android apps the running scheme behind the above two given frameworks can be explained as follows:

Android emulator

It lets a user create and check android applications without the use of real device. It initiates the features of a mobile device and also provides navigation and controls keys. To run the application in android studio, select Run→Run from the menu bar. It automatically creates a run configuration for the project. Android studio will perform the following --

- Compile the project
- Create a default run configuration
- Install and start the application on an emulator based on the deployment target defined by the run configuartion

Hence the application starts running in the emulator. Now further we will learn about how to run the application in real android mobile phone.

Android phone

It is a smartphone which runs on open source android operating system. Before running the application on the device we need to perform the basic setup for device such as—

- Ensuring that our application is debuggable by setting the android:debuggable attribute of the <application> element to true in build.gradle file
- Enable USB debugging on your device
- Ensure that your development computer can detect your device when connected via USB[10]

The authors Recardo da Silva Torres et al (2006) bring out the concept of content based image retrieval systems and the steps that are involved in building the applications. Taking the inference from these steps, it is necessary that before running the android app on the device we need to make sure to export .apk file for application. Following steps need to be followed for generating an apk file in android studio:

a) Go to Build→Generate signed APK
b) Then after the first step an info dialog message appears.
c) Click on Create new button.
d) After clicking the button a dialog box appears where we need to enter keystore file info other signing authority details.
e) Once we fill the entire details then Click the OK button and a new dialog box opens up
f) Click on Next button, then check mark on Run ProGuard and click on finish. and then the signed APK is generated

After the APK is generated we can upload it to our drive. Now the steps followed in running it on device are given as follows -

a) Connect the android phone with the laptop using the USB cable.
b) Go to the drive location of the apk file of your project
c) Right click on the apk file, a menu bar opens up and then go to 'Send to' option and select the name of the android phone being displayed in the new menu bar. The apk file will be send to the android phone
d) After the data is sent to android phone it is stored into the file manager of the phone.
e) Open the file manager and install the apk file
f) After installing the apk file the android app is saved in the homescreen of the phone.[11]

Hence the android app is successfully stored in our mobile and we can test it by clicking on icon of the android app which is saved in the homscreen of the android phone.

6. AREAS OF USE

After we have fully designed our application we are able to upload it to the Playstore and before installing any application from there we first check out the benefits that the application holds. After going through it we would be able to reach a conclusion of whether the application is beneficial for installation or not. Also the application stated in this paper holds out certain features which are given out as follows:-

- We can take the image of any paper, poster, notice, message, pamphlet etc containing the data and retrieve it using image processing.

- A new phone number (i.e. the numeric data) will be saved into the contacts database of the android phone.

- The images are being taken from the android phone which can be carried around anywhere.

- Saving the number by just scanning the image saves us the time and the effort than by just retaining and typing it.[12]

Various contributions of image retrieval in today's world as explained by Ritendra Datta et al (2008) bring out the above uses that are given out in this paper regarding this application.

All the above stated areas bring out the effectiveness of the application such that it can help the people in the near future.

7. RESULTS AND DISCUSSIONS

At the end of completion of the project the application which is created will take an image from the android phone and will fetch the characters from it by scanning the picture in right order and the data which is retrieved will be stored into the contacts database of the phone.

Fig. 3 Contact reader application

From the above 2 figures we draw the following outcomes with the development of the application:-

- A person will be more efficiently able to save a difficult phone number in the database than by just memorizing it, writing it down and then storing in the contacts database.

- The numeric data which is being retrieved is being saved in the order in which the numbers are being scanned.

- There would be a new way of saving the phone numbers into the contacts list of the android phone.

- The project build here scans the image of the numbers in their one common font form and not in any other styles

- People would get acquainted with a new kind of software.

A complete survey of recent technical achievements in high level semantic based image retrieval has been given out by authors Ying Liu et al (2007) which focuses upon improving the retrieval accuracy of content based image retrieval systems. In the same way taking a complete survey of the application, the above mentioned points draw out the benefits that this application holds. By taking a look at the effects one can say that they are being acquainted with the new useful accessory but it has also certain drawbacks:-

- It would be able to scan the proper data from the image if the paper is tampered.

- It would not be able to scan handwritten text.[13]

The vision for internet of things and the future trends as observed by Jayavardhana Gubbi et al (2013) in cloud centric internet of things bring out the inferences about how we make the application better in the future as apart from the limitations being listed here we can still say there is a scope for its betterment in the future. Some of the ways in which the application can be further enhanced can be done by the following points given below:-

- Making the application to be able to understand the text in different font styles.

- Enabling a calling feature in the application

- Making the application to scan the data in different languages

- Creating a database that stores the details of all the numbers scanned so far.

If we look at the above stated points we can say that the application would make a bright scope in the future.[14] However, still more new ideas from our side can be very helpful in making the application a great success.

8. CONCLUSION

Taking inference of the end points collected by authors Jean Luc Starck et al (1998) for many image processing applications and its usefulness we bring out the following concluding points being given out as follows:-

- Image processing demonstrates its use by retrieving the data from the image which is saved in the order in the way the image is scanned.

- We get to know the new way of saving phone numbers by the technique of scanning.

- The scanned data is being effectively stored in the contacts database.[15]

This application lets out a new idea in today's fast paced life for letting a person save his/her contacts in an another way which is scanning. Hence it also holds a good scope in the future.

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