MiCARD-A Business Card Scanner Application based on Android

Submitted in partial fulfillment of the requirements of the degree of

BACHELOR OF ENGINEERING

In

COMPUTER ENGINEERING

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2018-2019

Abstract

As business cards are most useful in networking and growing the business, the requirement of saving these business cards cropped up. MiCARD provides you with the option of saving these business cards digitally. The data stored from the business can be used as and when required. MiCARD differs from other apps currently available in the market is that the option of direct calling and emails is available here.

MiCARD will eliminate the physical handling of business cards thus eliminating the chances of human error while using the data mentioned in these business cards. Also the scanner saves time of the user who in normal circumstances would have to feed each data into the smartphone for his record. MiCARD works on the widely used platform of Andriod. It is user friendly, hassle free and most convenient.

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Chapter1

Introduction

1.1 Introduction

The Business men and employee use business card most often. They increase their contacts through paper based business card. Hence Day by day handling the paper based business card is now out of control. In the world almost every country uses English Language, so we are considering English as an international language. Most of the visiting cards &amp; legal documents have fix font size & font style in order to follow universal standard. In earlier days paper based business card used to lose or damage so this disadvantage can be defeat in new electronic business card. An E-Card is created using digital media instead of paper or other traditional materials. E-Business card considered environment friendly & much more versatile. This older system can be automated using ‘optical character recognition’ technology.

Business card scanning application use smart phone's camera and put it to work as a scanner. This application typically takes a photo of the paper based card and performs optical character recognition (OCR) on the image to translate the contents to editable text. It then adds that info like name, cell number, email address etc. to the app’s own database, to your smart phone’s contacts listing or both. The scope of Text data extraction from business card application is to provide business card to convert image to text, single card pattern, multiple card pattern, QR code card pattern on the smart phone. Optical character recognition (OCR) performs electronic conversion of images of typewritten or printed text into machine encoded text.

1.2 Aim & Objective

The principle aims of this 4th year group project is to automize the process of reading the business card by human vision and then feeding it into a device. This paper focuses on an application that performs scanning of paper based Business card using optical character recognition. The objective is to make use of the visual capabilities of the built in camera of Android devices to extract name, address &amp; contact information given on paper based business card . Day by day escalation of science &amp; technology and quick living wage of human beings, business card are now becoming very much popular. Business cards have fix fonts and its style as per the universal standard. There are established types of papered visiting cards. There is possibility that paper based business card will become obsolete. This paper describes the issues in developing the E-Business card. It says how to process on business card through android phone using OCR, when the user wants to select proper or desired user. We can share image through android phone. It utilizes GPS System to find user location as well as it can store user information on smart phone.

1.3 Scope

The Project Scope pertains to the work necessary to deliver a product. A novel ways to enhance traditional business cards is to interact with mobile application. This project develops a mobile application to solve the limitation of using the traditional business cards. Scope of this project includes a system that is able to change information into digital format. This shall occur by having OCR to represent the cards information in digital format. The digitalized information is able to extract directly into the mobile devices. In addition, this project also provides a server part that is able to store all the business cards information. Furthermore, it could allow synchronize of information through the server and sharing of the scanned data with other mobile applications to perform the tasks of calling or emailing etc.

Chapter 2

Review of Literature

2.1 Domain Explanation

Optical Character Recognition(OCR)

Optical Character Recognition deals with the problem of recognizing optically processed characters. Optical recognition is performed off-line after the writing or printing has been completed, as opposed to on-line recognition where the computer recognizes the characters as they are drawn. Both hand printed and printed characters may be recognized, but the performance is directly dependent upon the quality of the input documents.

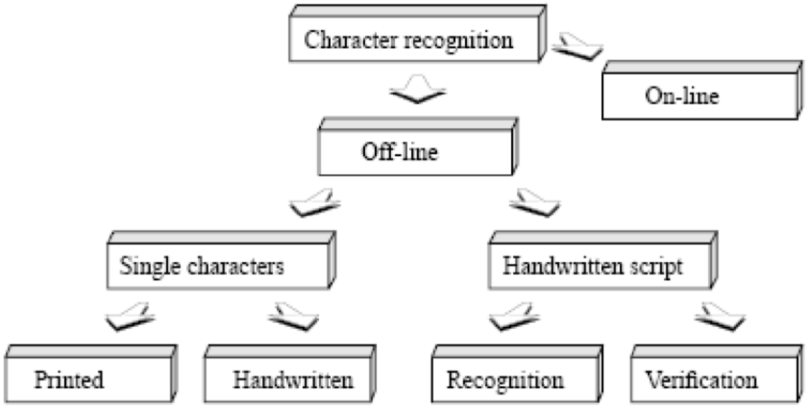

Figure 2.1.1: Flow of OCR

Optical character recognition is needed when the information should be readable both to humans and to a machine and alternative inputs cannot be predefined. In comparison with the other techniques for automatic identification, optical character recognition is unique in that it does not require control of the process that produces the information.

Android for Mobile Application

Figure 2.1.2: Logo design of Android

Android is an operating system for mobile devices such as smart phones and tablet computers. It is developed by the Open Handset Alliance led by Google. Google purchased the initial developer of the software, Android Inc., in 2005. The unveiling of the Android distribution on November 5, 2007 was announced with the founding of the Open Handset Alliance, a consortium of 84 hardware, software and telecommunication companies devoted to advancing open standards for mobile devices. Google released most of the Android code under the Apache License, a free software license. The Android Open Source Project (AOSP) is tasked with the maintenance and further development of Android. Android consists of a kernel based on the Linux kernel, with middleware, libraries and APIs written in C and application software running on an application framework which includes Java-compatible libraries based on Apache Harmony. Android uses the Dalvik virtual machine with just-in-time compilation to run compiled Java code. Android has a large community of developers writing applications ("apps") that extend the functionality of the devices. Developers write primarily in a customized version of Java. There are currently more than 520,000 apps available for Android. Apps can be downloaded from third-party sites or through online stores such as Android Market, the app store run by Google

Tesseract OCR Engine

Tesseract is an open-source OCR engine that was developed at HP between 1984 and 1994. Once the text lines have been found, the baselines are fitted more precisely using a quadratic spline. This was another first for an OCR system, and enabled Tesseract to handle pages with curved baselines. Tesseract tests the text lines to determine whether they are fixed pitch. Where it finds fixed pitch text, Tesseract chops the words into characters using the pitch, and disables the chopper and associator on these words for the word recognition step.

The first step is Adaptive Thresholding, which converts the image into a binary version using Otsu’s method [3]. The next step is page layout analysis, which is used to extract the text blocks within the document. In the next stage the baselines of each line are detected and the text is divided into words using definite spaces and fuzzy spaces [4].In the next step, the character outlines are extracted from the words.Recognition of text is then started as two-pass process. In the first pass,word recognition is done using the static classifier. Each word passed satisfactory is passed to an adaptive classifier as training data [4]. A second pass is run over the page, using the newly learned adaptive classifier in which words that were not recognized well enough are recognized again.What is Baseline fitting &amp; how is it done? Tesseract uses a very novel algorithm for finding the rows of text on a page. The algorithm performs well even in the presence of broken and joined characters, speckle noise and page skew. It operates as follows[5]:

1. Connected Component Analysis is performed.

2. The median height is used approximate the text size in the region and components (blobs) that are smaller than some fraction of the median height mostly being punctuation, diacritical marks and noise are filtered out.

3. The blobs are sorted (into ascending order) using x-coordinate (of the left edge) as the sort key. This sort makes it possible to track the skew across the page.

4. For each blob in sorted order:Find the existing row which has most Vertical overlap with the blob.If there is no overlapping row

Then Make a new row and put the blob init.

Record the top and bottom coordinates of the blob ae the top and bottom of the row .

Else

```
Add the blob to the row .
Expand the top and bottom limits of the row with the top and bottom of the blob, clipping the row height to a limit .
Endif
Endfor
```

Tesseract tests the text lines to determine whether they are fixed pitch (having a constant spacing between word and characters) during word detection step. For the fixed pitch text, Tesseract chops the words into characters using the pitch.The rest of the word recognition step applies only to non-fixed-pitch text.

2.2 Existing solutions

Neural Network based Approach for Recognition of Text Images

[6]Handwritten character recognition can be differentiated into two categories i.e. Online Handwritten character recognition and Offline Handwritten character recognition. On-line handwritten character recognition deals with automatic conversion of characters that may be written using a special digitizer; tablet PC in which a sensor picks up the pen-tip movements and also the pen-up/pen-down switching. Off-line handwritten character recognition deals with a data set, which is obtained from a scanned handwritten document. Neural network has a wide application in the field of pattern recognition. In this work, English handwritten characters are recognized through Feed Forward Multi-Layer Perceptron Network (MLPN) with one hidden layer. For training, backpropagation algorithm has been implemented. The network can be used to learn the character in the format of patterns and then generalizing from the trained network and recognizing the character that is presented in the form of image.

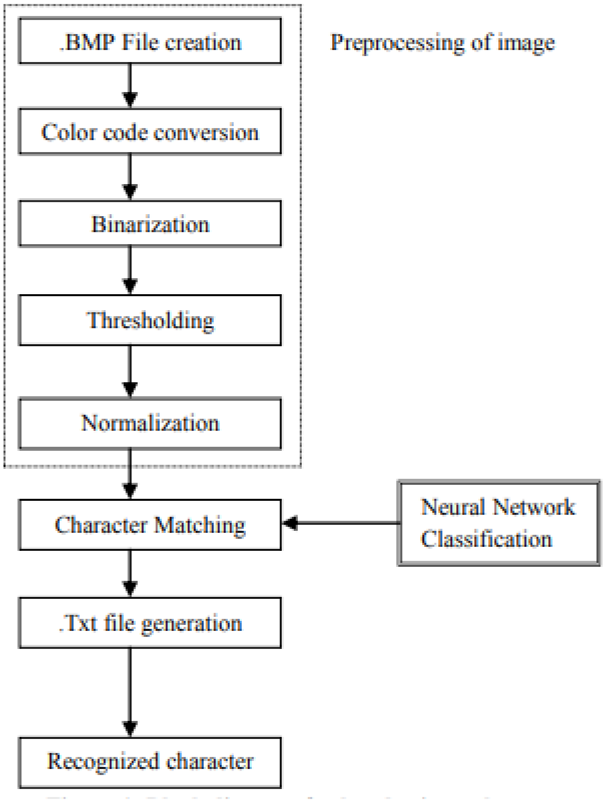

Figure 2.2.1: Block Diagram of Neutral Network based text recognition

End-to-End Text Recognition

[5]Full end-to-end text recognition in natural images is a challenging problem that has received much attention recently. Traditional systems in this area have relied on elaborate models incorporating carefully handengineered features or large amounts of prior knowledge. In this paper, we take a different route and combine the representational power of large, multilayer neural networks together with recent developments in unsupervised feature learning, which allows us to use a common framework to train highly-accurate text detector and character recognizer modules. Then, using only simple off-the-shelf methods, we integrate these two modules into a full end-to-end, lexicon-driven, scene text recognition system that achieves state-of-the-art performance on standard benchmarks, namely Street View Text and ICDAR 2003.

Extracting textual information from natural images is a challenging problem with many practical applications. Unlike character recognition for scanned documents, recognizing text in unconstrained images is complicated by a wide range of variations in backgrounds, textures, fonts, and lighting conditions.

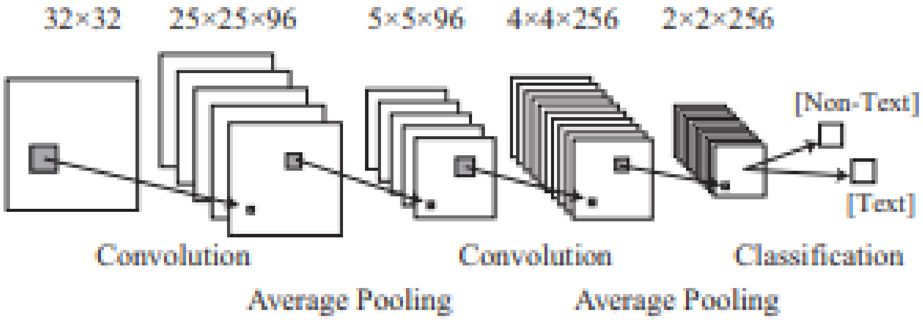

Figure 2.2.2: CNN Used for Text Recognition

Our full end-to-end system combines a lexicon with our detection/recognition modules using postprocessing techniques including NMS and beam search. Here we assume that we are given a lexicon (a list of tens to hundreds of candidate words) for a particular image.

The pipeline mainly involves the following two stages: (i) We run sliding window detection over high resolution input images to obtain a set of candidate lines of text. Using these detector responses, we also estimate locations for the spaces in the line. (ii) We integrate the character responses with the candidate spacings using beam search to obtain full end-to-end results.

Evernote Mobile App

Evernote is a mobile app designed for note taking, organizing, tasks lists, and archiving. Notes can be sorted into a notebook, tagged, annotated, edited, given comments, searched, and exported. Evernote is cross-platform, including support for iOS, Android, Microsoft Windows and macOS . Evernote is free to use with monthly usage limits, and offers paid plans for expanded or lifted limits.

How it works?

When a note is sent to Evernote (via synchronization), any document included in the note that match the MIME types for PNG, JPG or GIF are sent to a different set of servers whose sole job is performing Optical Character Recognition (OCR) on the supplied image and report back with whatever it finds. These results are added to the note in the form of a hidden--that is, not visible when viewing the note--metadata attribute called recoIndex. The full recoIndex node is visible when a note is exported as an ENEX file

2.3 H/W & S/W requirement

1. Hardware requirement:

- Intel(R) Core™ 3.00 GB RAM.
- 16 GB HDD.
- Android compatible Camera minimum

2. Software requirements

- Windows XP, Windows 7,8
- Android SDK,NDK
- JAVA Android
- Android Studio 3.0
- OCR LIB

Chapter 3

Analysis

3.1 Functional Requirement

- This approach uses Android Operating System.
- Android is free and open software. Thus OCR mobile application is significantly of lower cost.
- Early OCR requires expensive scanners and special purpose electronic or optical hardware, but this approach is a mobile application having inbuilt camera.
- As Android based on Linux kernel it has feature of safety from virus infection.

3.2 Non-Functional Requirement

- Reliability: The reliability of the system is affected on how properly the system is designed, modeled and implemented.
- Response Time: The system will be implemented in such a way that it has an efficient response time.
- Portability and Flexibility: The system will be upgraded as and when the need arise and it will make sure that the system adapt to the new changes in the standards. \
- Accuracy of an OCR system is directly dependent on the quality of input document.
- The output from OCR systems is often quite “noisy” and garbled. In order to correct this, the application will perform some post processing on the text after it has received a response from the OCR package.

3.3 Proposed System

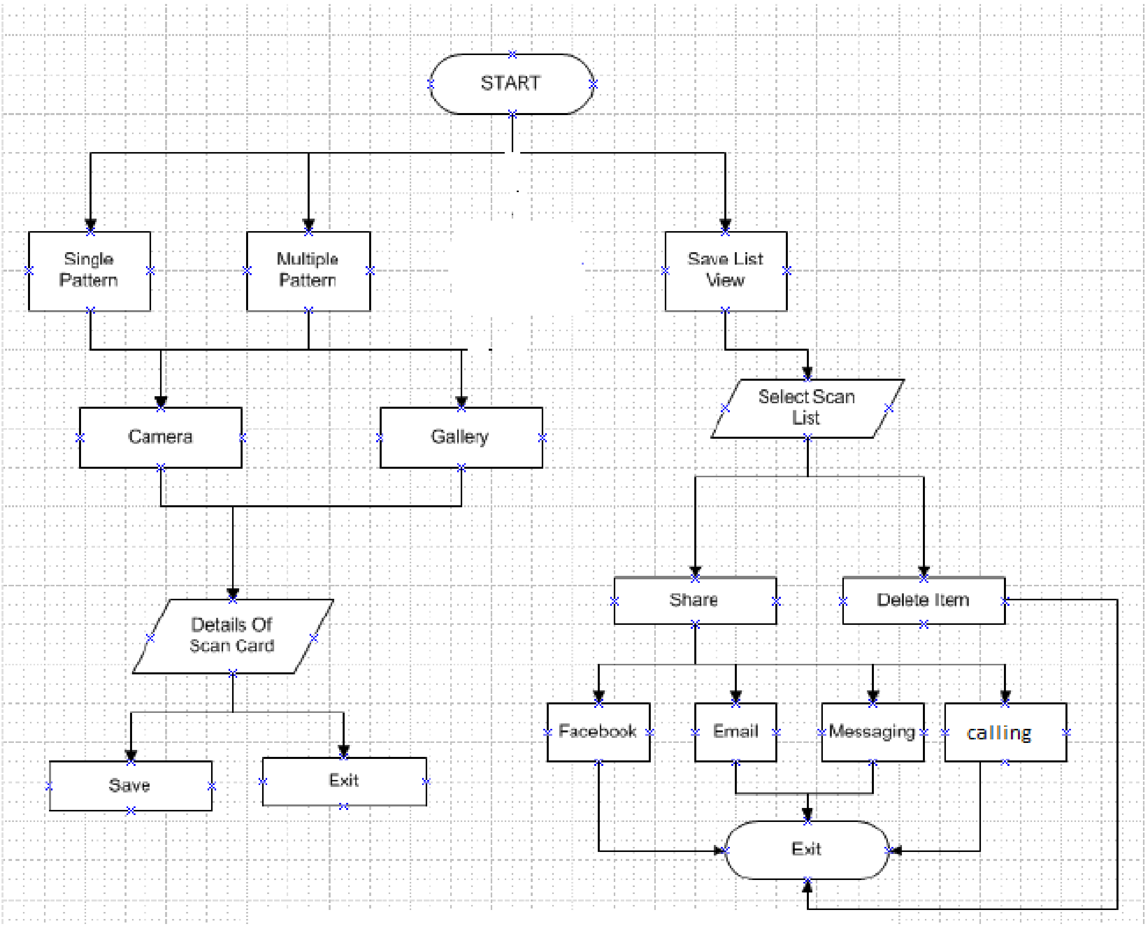

Figure 3.3: Flow of phases of the project

Here below steps have to follow to get proper system working model.

Phase1: Functional Requirements

Splash screen: Splash screen load data after going to dashboard screen.

Business Logic:

- Splash screen display the company logo.
- Splash screen waits for 2000 ms display and after it goes to dashboard.
-

Dashboard: Dashboard screen will be the four button display. Single pattern scan, multiple pattern scan and save list button display the screen.

Phase 2: Single Pattern Scanning:

Single pattern scanning page scan the single pattern detail. Name, address, mobile no and email id are scan in the card.

Business Logic:

- Camera, gallery, save and exit are four option.
- Camera option click event open camera and catch the card image and crop the image.
- Image is scan. After the detail are displays in different edit box.
- Gallery options directly get image and display the detail.
- Save options are the name, address, mobile no, email id, those are save in the database.
- Exit options are use to exit the application.

Phase 3: Multiple Patterns Scanning:

Multiple pattern scanning pages scan the all type of card patterns.

This page scan single card and hence single items are scan.

Business Logic:

- Shows Camera, gallery, save and exit four options.
- Camera option click event open the camera, catch the card image and crop the image.
- Image is scan but edit text box long click event scan single items and display in edit text box.
- Gallery options directly gets image and display the detail.
- Save options - the name, address, mobile no, email id are save the database.
- Exit options are use to exit the application.

Phase 4: Save Data View:

Save data view list page scans page detail & save in display list view. It is use for social media sharing. Save data view list page display one option share. This option is share the detail social media.

Business Logic: Share option are use to share detail on facebook, message, email, twitter and others.

Delete Detail: Save data view list page display one option delete. This option is use to delete the detail list view. Above whole process is explained graphically which is shown in figure. as system flow work.

Intent

Intents are objects of theandroid.content.Intent type. Your code can send them to the Android system defining the components you are targeting. For example via the startActivity() method you can define that the intent should be used to start an activity. An intent can contain data via a Bundle. An Intent in the Android operating system is a software mechanism that allows users to coordinate the functions of different activities to achieve a task.

Shared and Explicit intent

Sending and receiving data between applications with intents is most commonly used for social sharing of content. Intents allow users to share information quickly and easily, using their favorite applications. Implementing the share Intent allows users of your apps to share content across multiple channels, including email, text messaging, social networking and more.

Steps on how to use Intent and Share Intent on Android:

Step 1: Start a New Android Project

Step 2: Choose an Activity to Launch the Share Intent

Step 3: Create a Share Button

Step 4: Listen for Button Clicks (This code specifies a method for the application to call when users press the share button.)

Step 5: Create a Send Intent

Step 6: Pass Content to the Intent

Step 7: Use Android shared intents, activities and data are sent to the required app.

Chapter 4

Design

4.1 Design Consideration

After the requirements have been determined, the necessary specifications for the hardware, software, people, and data resources, and the information products that will satisfy the functional requirements of the proposed systemcan be determined. The design will serve as a blueprint for the system and helps detect problems before these errors or problems are built into the final system. Professionals create the system design, but must review their work with the users to ensure the design meets users' needs.

4.2 Design Details

4.2.1 System Flow Diagram

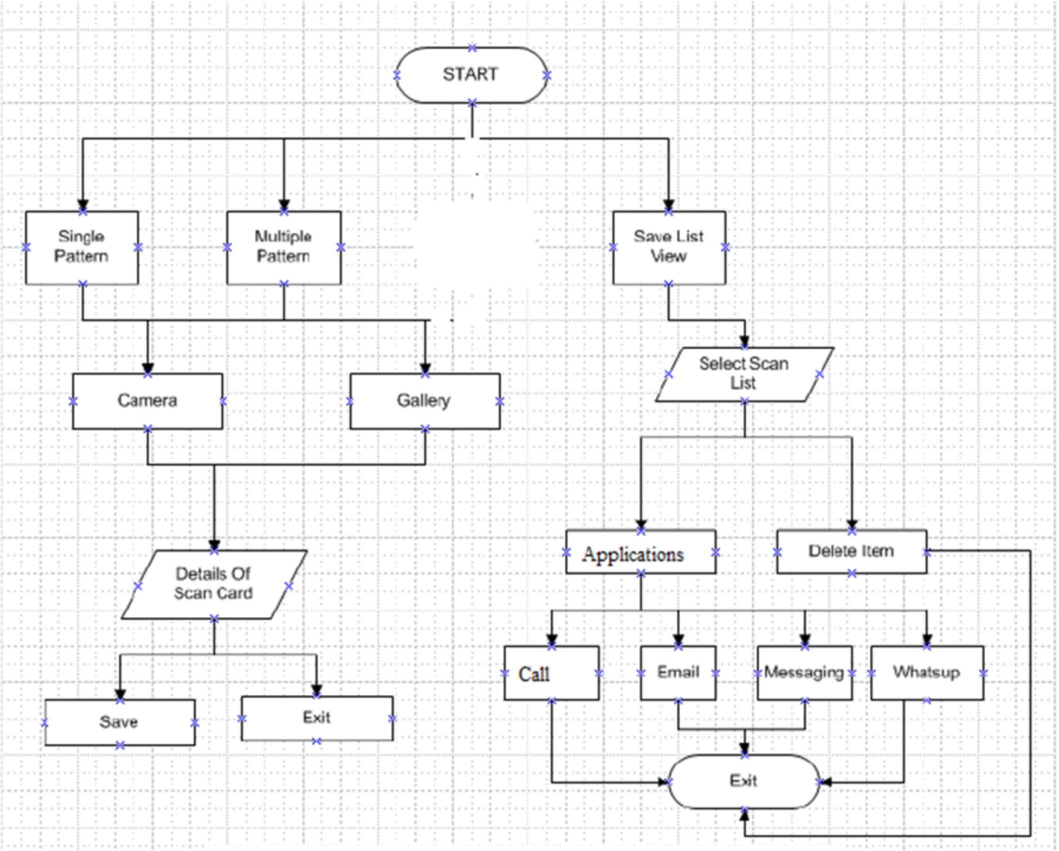

Figure 4.2.1:System Flow Diagram

4.2.2.Use Case Diagram and Description

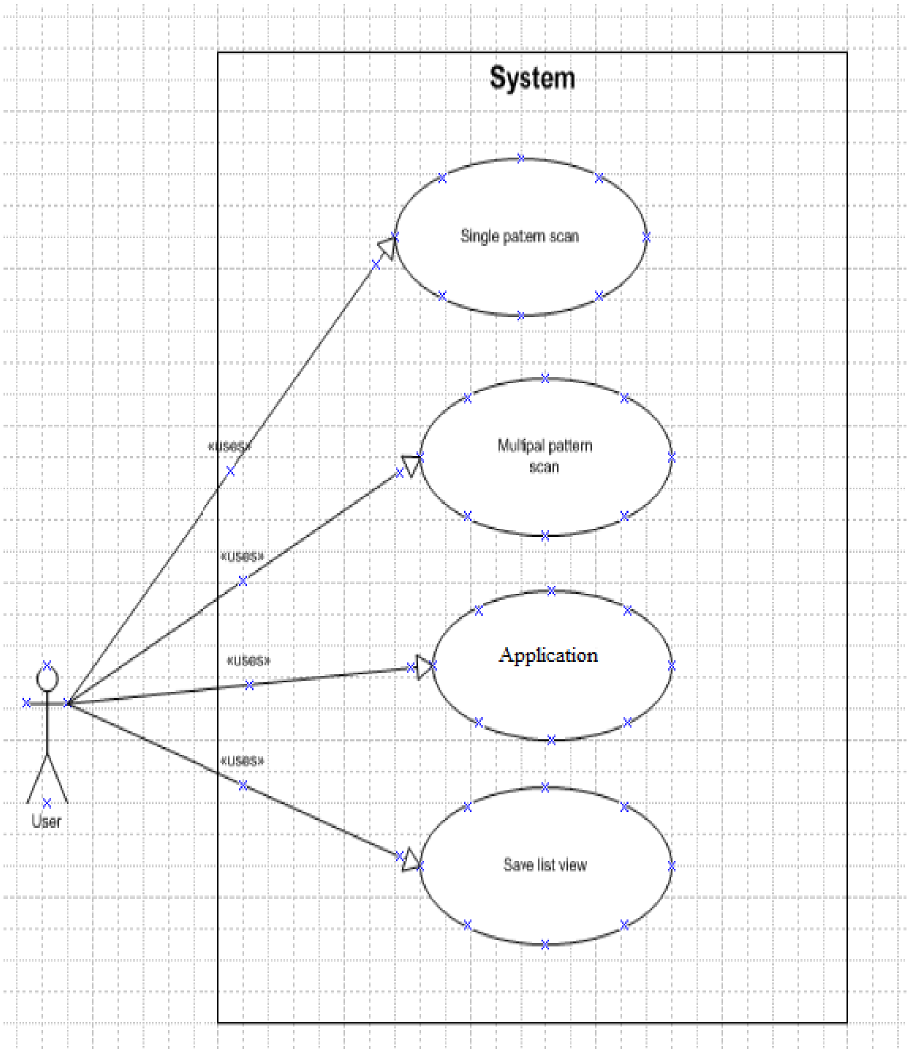

Fig 4.2.2 Use-Case Diagram

The actor (user) access the MiCard(Business card scanner system) by scanning the business card than the actor can choose to choose the any of the following application i.e calling, email or save in google contact.

4.2.3. Class Diagram

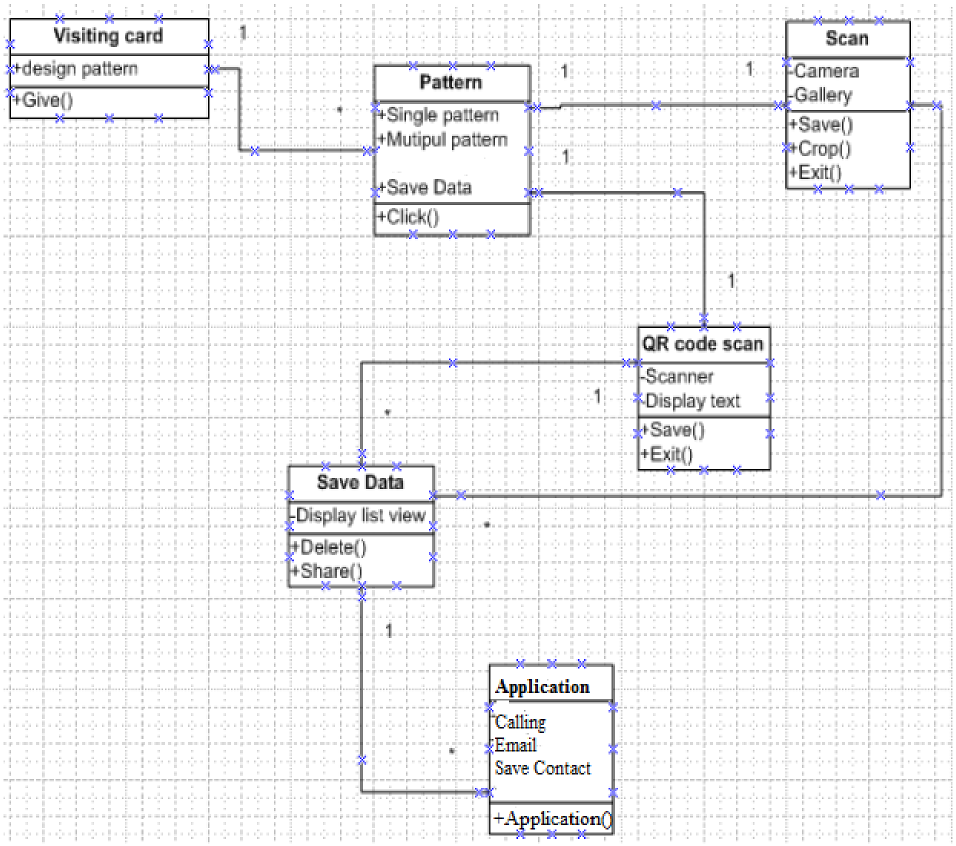

Figure 4.2.3: Class Diagram

Chapter 5

Implementation and Results

5.1 Preliminary Survey

Android is well-liked with technology companies which require a handy, low-cost and customizable operating system for smart devices. Android is an open source [1],[2] & license free mobile operating system based on the Linux kernel developed by Google presently. Android's open nature has encouraged a large number of developers to develop smart applications .Everyday millions of developers searches for android java code & fixes the errors .Survey says that Android’s graphical user interface is more effective & modern than other Platforms. The latest version of Android is Android 5.1, codenamed Lollipop. Google’s Android is secured against malicious behavior. Android has better stability, security and performance than Apple ios. As of JULY 2015, Android users were able to choose between 1.5 million apps whereas Apple’s App Store remained the second-largest app store with 1.4 million available applications.

5.2 Methodology

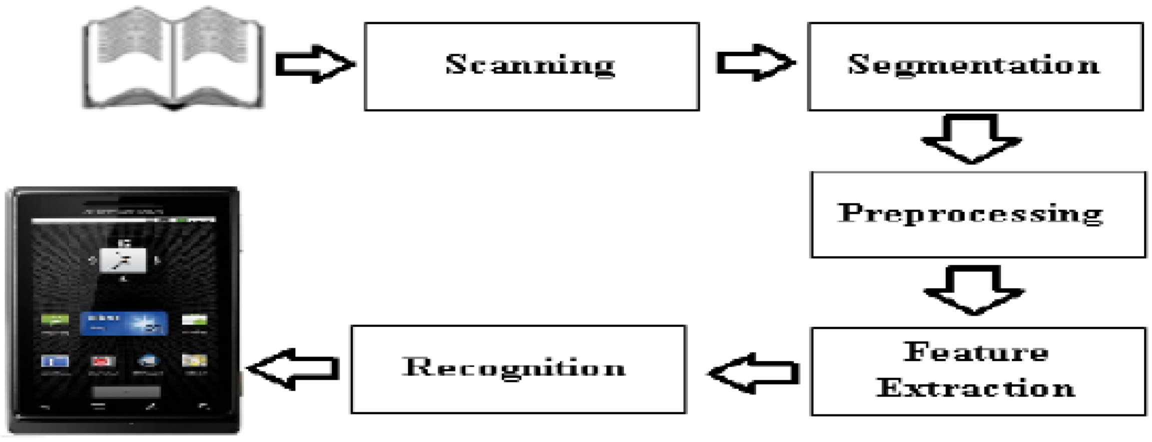

Figure 5.2: Methodology

Scanning: This application i.e. OCR system uses Android mobile camera. Camera captures image of document. Generally, original documents are made up of the black colored text print on the white colored background. Scanning comes with thresholding which makes the digital image as gray scale image. Thresholding is the process which converts multi level image into bilevel image i.e. black and white image. Fixed threshold level is defined in thresholding. If the gray levels are below the threshold level, identified as black. Whereas if gray level is above the threshold level, identified as white. This results in saving memory space and computational efforts.

Segmentation: The process of locating regions of printed or handwritten text is segmentation. Segmentation differs text from figures and graphics. When segmentation is applied to text, it isolates characters or words. The mostly occurred problem in segmentation is: it causes confusion between text and graphics in case of joined and split characters. Usually, splits and joints in the characters causes due to scanning. If document is dark photocopy or if it scanned at low threshold, joints in characters will occur. And splits in characters will occur if document is light photocopy or scanned at high threshold. OCR system also gets confused during segmentation when characters are connected to graphics.

Preprocessing: As we seen above, some noise may occurred during scanning process. This results in poor recognition of characters. This usually occurred problem is overcome by preprocessing. It consists of smoothing and normalization. In smoothing, certain rules are applied to the contents of image with the help of filling and thinning techniques. Normalization is responsible to handle uniform size, slant and rotation of characters.

Feature Extraction: It extracts the features of symbols. Features are the characteristics. In this, symbols are characterized and unimportant attributes are left out. The feature extraction technique does not match concrete character patterns, but rather makes note of abstract features present in a character such as intersections, open spaces, lines, etc. Tesseract algorithm is used to implement feature extraction. Feature extraction is concerned with the representation of the symbols. The character image is mapped to a higher level by extracting special characteristics of the image in the feature extraction phase.

Recognition: OCR system works with Tesseract algorithm which recognizes characters. Tesseract identifies characters in foreground pixels, called as blobs, and then it finds lines. Word by word recognition of characters is done throughout the lines. Recognition involves converting these images to character streams representing letters of recognized words. In short, recognition extracts text from images of documents.

5.3 Implementation Time and distribution

Activity	Description	Effort in person weeks	Deliverable
Phas			
P1-01	Requirement Analysis	1 weeks	Requirement Gathering
P1-02	Existing System Study & Literature	2 weeks	Existing System Study & Literature
P1-03	Technology Selection	1 weeks	ASP.NET
P1-04	Modular Specifications	1 weeks	Module Description
P1-05	Design & Modelling	3 weeks	Analysis Report
	Total	**8 weeks**	

Activity	Description	Effort in person weeks	Deliverable
Phas			
P2-01	Detailed Design	2 week	LLD / DLD Document
P2-02	UI and user interactions design	Included in above	UI document
P2-03	Coding & Implementation	5 weeks	Code Release
P2-04	Testing & Bug fixing	2 weeks	Test Report
P2-05	Performance Evaluation	3 weeks	Analysis Report
P2-06	Release	Included in above	System Release
	Total	**12 weeks**	Deployment efforts are extra

Chapter 6

Conclusion

Fundamental goal of developing the application was to create business card and visiting card scan detail, social networking and platform for technical subject. As we were comfortable with android and java,it was choosen as programming language. Application was tested successfully on Android Compatible phone, platforms and the internet environment, but it is still in its development stage as user wants more comprehensibility and ease of usage. The implementation process of the system was described to recognize the text data in the business card using the camera screen. Card Image scan by a smart phone and the text data as Company name, Person name, Contact no., Address and Email-id were display on the screen trough OCR extraction process. Using this android application user can be easily recognized and track for validation. This application is much user friendly. User can save time by avoiding typing of customer information. User can easily share contact information to other user through different sharing applications in internet.

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Acknowledgement

We would like to express our sincere gratitude to our guide Dr. Aarti Deshpande for her guidance, encouragement and gracious support throughout the course of our work, for her Expert knowledge in the field that motivated us to work in this area and for her faith and belief in us in every stage of this research.

We're grateful to Dr. Tanuja Sarode, Head of the Computer Engineering Department, for giving us opportunity to develop and work on this project. We are highly obliged to our Principal, Dr. G.T. Thampi, the principal of Thadomal Shahani Engineering College, Bandra(W) for providing the facilities and infrastructure for the project.

We would also like to thank all our fellow students and staff of Department of Computer Engineering for their help in the whole process leading to the conceptualization of the project.

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