Android Application for Meter Reading Using OCR

[1]Riddhi Gor, [2]Priyanka Karkate, [3]Vidyalaxmi Selvaraj, [4]Prof. Harsh N. Bhor
[1,2,3]B.E IT Student, KJSIEIT, Sion, Mumbai, [2]Asst Professor, KJSIEIT, Sion, Mumbai, Maharashtra, India
[1]riddhi.g@somaiya.edu, [2]priyanka.k@somaiya.edu, [3]vidyalaxmi.s@somaiya.edu, [4]hbhor@somaiya.edu

Abstract **— Meter reading is an Application designed to automatically collecting consumption, diagnostic, and status data from utility meters and transferring the retrieved data to a central database for billing, troubleshooting, and analyzing etc. Tracking the real-time consumption on a day to day basis in the most cost effective way to identify energy wastage coupled with analysis.**

Keywords— *Computer vision, image preprocessing, Pattern Recognization, Segmentation, Feature Extraction.*

I. INTRODUCTION

This paper approaches both conceptual design and implementation for Android Based Meter-Reading using OCR system for reading water and power consumption meters; concepts and techniques for the evolution of the system, which might be extended to it, are also explore. This Application has been designed basically to reduce the tedious work and avoid the Human errors. The Application is built essentially to monitor the energy usage and accessing the daily energy data which can result in better energy management. Enabling accurate data stored, analyzed and presented to a customer on demand. The android based meter reading using OCR suggests: Android application and a Web application. Android app is for meter reader for reading the meter. This solution gives best benefits to meter readers. Meter reader from start of the day carries android device having android app in it which enables a route map called customer meter map which has the route of customer houses that he has to read the meters within a day. Once the meter reader reads the meter the color of pointer on map is changed so that reader can know the meters that are read. This is very helpful for new meter readers for reading the meter.

II. LITERATURE SURVEY

In recent years, the digital meter is used in variety industrial measurement and control applications for higher accuracy, easier manipulation and multi functional . Though the interface for wireless communication is found in some high-grade meter, in some circumstances such as scientific experiment, measurement controlling, power meter reading etc, the measurement results still need manual reading. Those results would be inputted into the computer for the post processing from the record sheet. This is a time-consuming, ineffective and low accuracy method, so people try to find a way to read the results from the meter automatically. The automatic meter reading system based on computer vision is one of the solutions.

2.1 Research on Optical character recognition

(OCR) is a powerful tool for bringing information from our analog lives into the increasingly digital world. This technology has long seen use in building digital libraries, recognizing text from natural scenes, understanding hand-written office forms, and etc. By applying OCR technologies, scanned or camera-captured documents are converted into machine editable soft copies that can be edited, searched, reproduced and transported with ease .

Our interest is in enabling OCR on mobile phones. Mobile phones are one of the most commonly used electronic devices today. Commodity mobile phones with powerful microprocessors (above 500MHz), high-resolution cameras (above 2megapixels), and a variety of embedded sensors (accelerometers, compass, GPS) are widely deployed and becoming ubiquitous today. By fully exploiting these advantages, mobile phones are becoming powerful portable computing platforms, and therefore can process computing intensive programs in real time

In particular, some modern mobile devices can use pictures of barcodes to look up detailed information about a product's ratings, price, and reviews. Some mobile phones with business card reader application installed facilitate users to transfer contact information directly from business cards. This allows business people to carry only one personalized card with no physical copies to share.

The real time system consists of automating the process of capturing an image and transmitting it to a remote handheld device located out of line of sight of the reader. To design a working solution for the given system problem, several different tasks had to be performed.

Research had to be conducted on key topics, including the ZigBee protocol and how to interface external devices with different operating systems. As well, implementation of transmission over ZigBee and communication through external devices, The research that we did, finally conclude that the system can be build based on android operating

system which can be used to get the Bill to the customer efficiently without any extra efforts.

III. EXISTING SYSTEM

The suppliers of electricity, water and gas use a manual process for billing purposes because they think that it is an easy process and don't require any skills. These companies cannot invest a huge amount of money for a new solution. However, the customer has to face many problems with the current procedure used by these companies to calculate Bills. According to meter reader there is difficulty in finding all the houses were meters are situated and mostly to identify meters that are located in rural areas. Complaint about meters that are not working cannot be made by meter reader at the same time. According to customer point of view there is no facility provided by company of knowing their current consumption units or calculating it manually. There is also no facility to compare the previous month's consumption units with the current month. Customers are facing difficulty in contacting with companies to make any complaints about incorrect bill or device failure. Finally from company's point of view, all these process are manually maintained which is a big burden for them. Companies doesn't have proper communicating channel to broadcast information about power failure and power consumption to the customers.

3.1 Problems in Existing System

Already existing is highly Person dependant which might lead to Human errors. Billing is done mainly on estimated/monthly average basis. As human lab ours are involved Billing cycle requires excessive time. Advanced graphical overview of usage can be viewed. Also in this system monitoring and controlling discrete loads will not be possible.

IV. PROPOSED SYSTEM

Android based meter reading application is an application that will help you monitor your consumption of e.g. electricity, gas or water. But in fact anything that has a meter can be monitored with Meter Reading. You may have potential savings in your budget if you monitor your consumption and change the way you consume energy.

Android based meter reading Application is used to get the readings from the meter automatically by simply capturing the image of the meter and then performing the OCR technique which is nothing but "optical character recognition". The OCR technique is used to identify the character from an image and used this character to get the meter readings.

The android based meter reading using OCR consists of an Android application and a Web application. Android app is for meter reader for reading the meter. This solution gives best benefits to meter readers. Once the meter reader reads the meter the color of pointer on maps changed so that reader can know the meters that are read. This is very helpful for new meter readers for reading the meter.

All that needs to be done is to capture the image then android app will perform operation of extracting the meter reading text from image and send to the server. Then the server does the calculation and proceed bills are sent to the relevant consumers via email at the same instance. Whenever a fault device is seen or an illegal power usage is spotted by meter reader. In such a case, an image of that particular meter can be sent to the server. Using website a customer can view bill having all details related to any of particular month in a graphical form for easy comparison with previous month consumption. Along with that he also has an option to make payments online. Customers can use website to lodge any complaint of incorrect bill and meter device failure. The web application built was used for administrative purposes. An administrator can assign meter readers with a particular route having list of customers using this system and can add new employees or customers in database. Administrator can broadcast any news related to power failure during certain time and of power consumption information on web application.

V. SYSTEM ARCHITECTURE

The implementation of Android Based Meter-Reading using OCR is combination of Android application and a Web application. After the Image is been taken. The image is pre processed with help of OCR technique. 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.

5.1 What is OCR?

Machine replication of human functions, like reading, is an ancient dream. However, over the last five decades, machine reading has grown from a dream to reality. Optical character recognition has become one of the most successful applications of technology in the field of pattern recognition and artificial intelligence.

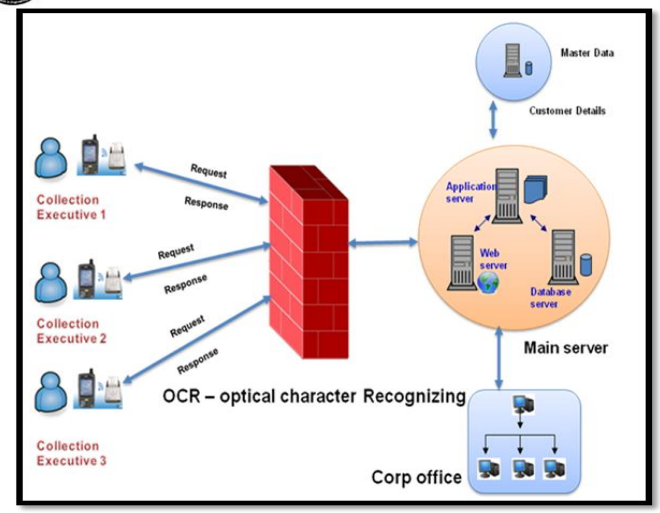

Fig. 5.1 Optical Character Recognition

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. Many commercial systems for performing OCR exist for a variety of applications, although the machines are still not able to compete with human reading capabilities.

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.

5.2 Methods of OCR

The main principle in automatic recognition of Patterns is first to teach the machine which classes of patterns that may occur and what they look like. In OCR the patterns are letters, numbers and some special symbols like commas, question marks etc., while the different classes correspond to the different characters. The teaching of the machine is performed by showing the machine examples of characters of all the different classes. Based on these examples the machine builds a prototype or a description of each class of characters. Then, during recognition, the unknown characters are compared to the previously obtained descriptions, and assigned the class that gives the best match.

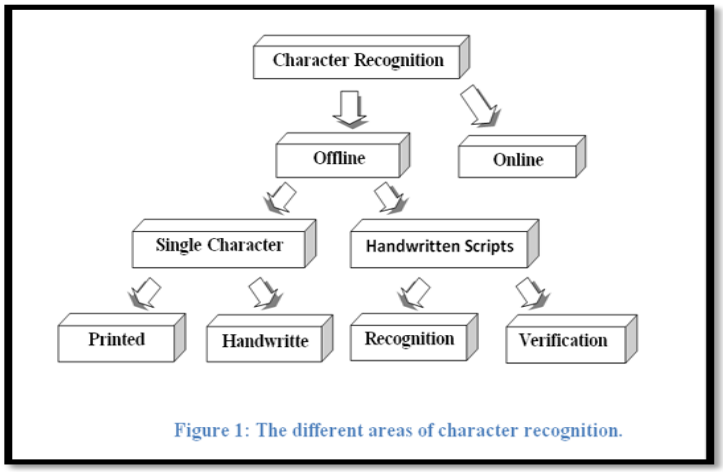

Figure 1: The different areas of character recognition.

5.3 Components of an OCR system

A typical OCR system consists of several components. In figure 2 a common setup is illustrated. The first step in the process is to digitize the analogy document using an optical scanner. When the regions containing text are located, each symbol is extracted through a segmentation process. The extracted symbols In most commercial systems for character recognition, the training process has been performed in advance.

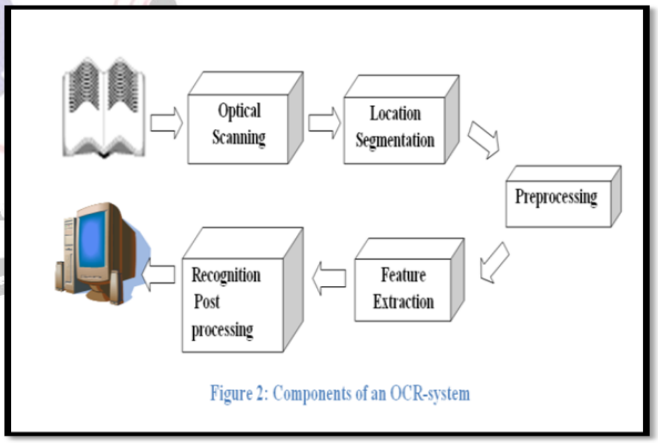

Figure 2: Components of an OCR-system

Some systems do however; include facilities for training in the case of inclusion of new classes of characters. may then be pre-processed, eliminating noise, to facilitate the extraction of features in the next step. The identity of each symbol is found by comparing the extracted features with descriptions of the symbol classes obtained through a previous learning phase. Finally contextual information is used to reconstruct the words and numbers of the original text. In the next sections these steps and some of the methods involved are described in more detail.

VI. RESULTS

The development of this application demonstrates the concept and implementation of new, it has a low infrastructure cost, low operating costs, more data security and less man power required. Therefore it not only solves the problem of conventional meter reading but also provides additional feature bill generation on mobile. The inputted image is pre processed with help of OCR. The result is updated in Database .With help of result of OCR technique the bill is generated and it is emailed to customer.

VII. CONCLUSIONS

This gives the solutions to address the problems related to manual electricity, gas and water billing process. The customers also complaint about incorrectness of bill, this is because the assumption of reading when not available and leads to major problem of current technology. Most of the time bill calculation and system updating are done manually. There can be some resulting human errors to frustrated customers who are not satisfied about the service of the Electricity Board at all.

The suggested system has come up with solutions which address all the above mentioned problems. With this service the burdens of the Meter reader as well as the Electricity Board get lessoned and are made more efficient. A mobile solution is given for the Meter reader so that the day to day work becomes less tiresome. Most of the manual processes and calculations are eliminated so that the meter readings can easily be collected more accurately to be updated to the system.

On the other hand, the Android customers are also given a mobile solution so that they can view their latest bills, make complaints against the Electricity Board's service, and make payments and other important tasks efficiently. Administration tasks of the Electricity Board can be easily done via a Web site which is provided as part of the complete project.

REFERENCES

[1] Mobile Based Electricity Billing System (MoBEBIS) by International Journal of Scientific and Research, Volume 3, issue 4, April 2013 ISSN 2250-3153.
[2] Overview of a system AMR based in computational Vision and Wireless Sensor Network, 2009 IEEE.
[3] A Novel Preprocessing Approach for Digital Meter Reading Based on Computer Vision 14-15, August 2010.
[4] Optical Character Recognition and High-Volume Book-Scanning by Clara Van Gerven.
[5] Tesseract : an Open-Source Optical Character Recognition Engine Expert WCF 4: SOA 2.0 with Windows Communication Foundation 4 Beginning Android 2 -By Mark Murfy.

