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AUTOMATIC OMR ANSWER SHEET CHECKER

MS.VRUSHABHA MURAMKAR, PROF. SACHIN AGARWAL

Dept. Computer science and Engg, College of Engg and Tech, Akola.

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Abstract: In today's competitive era maximum exams and tests conducted are of multiple choice questions and hence OMR sheets are being checked using the OMR (Optical Mark Reader) machines, but the cost of these machines is very high. Hence we have designed the software called Automatic OMR answer checker which uses template matching technique. Template matching is a technique which is used to find the target object and this object is matched with the object in the main template. This software is cost effective and easy to use. Simple scanner is used here to scan the OMR sheets and saves these images collectively into a folder and then they are given as input to software where it matches this image with given sample template. The software will evaluate the answer sheet and save these results and display it to the students and staff.

Keywords: DBMS, .NET, C#, OMR, Scanner, template matching.

Corresponding Author: MS.VRUSHABHA MURAMKAR

Co Author: PROF. SACHIN AGARWAL

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INTRODUCTION

Aonla (*Pyllanthusembillica*), is the richest source of vitamin C (Ascorbic acid) among all the Generally, there are chances of human error if the OMR sheets are manually evaluated. Hence, template matching technique is used in digital image processing for targeting an object that matches with given sample template. The main aim of this paper is to apply template matching technique and evaluate the answer sheet having multiple choice questions in order to reduce the time duration and increase the efficiency of evaluation. Nominally, a person requires about 10-15 minutes for evaluating a single OMR answer sheet but this software needs just 5-7 minutes for evaluation of 50-60 OMR answer sheets. Thus, decreasing human errors and saving the cost of evaluation by is the main objective of this paper. The score evaluated can also be store into the database and also the marks can be displayed to the students and staff directly using server. This software can be used by various organizations, institutions and by government sectors for evaluation of OMR answer sheets where multiple choice questions based tests are being conducted, which will be error free and reliable.

Literature Reviews

The main objective of this paper is to develop a system which facilitates the OMR answer sheet evaluation technique which must be feasible and efficient. The objective is to eliminate the use of dedicated hardware which in turns very costly. So the evaluation of OMR answer sheet could be done by the simple scanned image of the sheet using simple scanner [1].

The most common use of OMR is to process student responses to a multiple choice exam, or responses to a questionnaire or feedback form after which the questions are provided on paper, and students mark their responses onto special pre-printed forms. Basically, the main task is to detect the presence and absence of dark marks and extract the information depending upon these marks from an image. There are number of softwares and hardwares in present market that are professionally used to detect such images. But however, here the aim is to develop suitable software that would detect marks and hence prepare their results according to the needs [2].

One of the most important usages of OMR is checking multiple choices question exam students choose the answer by filling square choice on a printed paper. Then after scanning, these papers will be checked by special software automatically. This article is written based on morphology and rejection error algorithm which is included: scanning, preprocess, steps, basic identify, checked steps, and conclusion of different tests [3].

In this paper, low cost OMR technique is represented. Apart implementation of all the functions of the traditional OMR , LCOMR supporting plain sheets (50-70 gsm) and low quality printing sheets are done, which includes scanning of images , tilt correction , error correction scanning, regional deformation correction and mark recognition, are presented[4].

Lopresti et al has explained Optical Mark Recognition process with reference to Remark Office OMR 3.0, made by Principia Products. He also reported that people who do statistical analysis for years have been designing questionnaires and getting them filled by the feed backers or interviewers and feeding the data into computers. In the early computers, punch cards were used in order to input data, thus errors occurred during this process and had to be verified. During those days it also allowed multiple- choice forms to be read [5].

Kia mentioned that Optical Mark Recognition (OMR) is used for standardization testing as well as course enrollment and attendance in education [6].

Dillman studied the impact of OMR forms on which it responded it to be relevant issue. One possible disadvantage with OMR surveys is that they may suppress response rates. OMR surveys are often combined with other cost-cutting measures (e.g., no follow up), so their low response rates may simply be an artifact of other choices about survey administration. Generally OMR forms have one standard ink color that provides limited visual appeal creating a disincentive for their response. Moreover these forms are also more tedious to fill out. Rather than simply reading through the survey and checking off or circling responses, the respondent must carefully fill in a circle or “bubble” for each question answer [7].

Garima Krishna et. al had developed an which enables implementation of OMR using an ordinary scanner. It provides tools to the user to design an OMR sheet based on the layout they want. The design of the sheet will be stored as image file format. Then user can take as many print outs as required, distribute it among others from whom information is desired, and get the filled sheets scanned. The scanned image files will then be provided as input to the software, processing will be done, value of filled fields will be extracted and then the data will be manipulated as instructed by the user. The implementation is done using Java [8].

W. Krattenthaler et. al proposed a new reduced-cost correlation technique (called “point correlation”) where matching is not performed with the entire template but with a pre-computed set of points of this template. We introduce a method to iteratively select a set of points which is optimal in a heuristic way.[9]

System Architecture

Here we have used template matching technique in digital image processing. The OMR answer sheets will first be scanned using any type of simple scanner then those images, they may be PDF files or JPEG images will be collected in a folder. Then this folder will be directly dragged and drop into the OMR answer sheet checker software. The sample answer sheet will also be feed into checker. This software will then evaluate the answer sheet by using template matching technique. The result evaluated of each student of each subject will be stored to the SQL data base server. Then after this subject wise result could be accessed by the faculty and by the respective students.

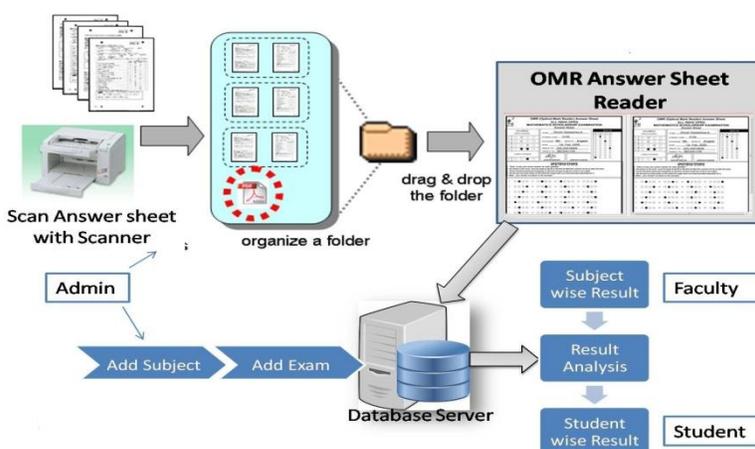


Figure 1: System Architecture

Research Methodology

In digital image processing there are various types of images used and in order to find the target object using template matching technique the first need to be converted into binary image.

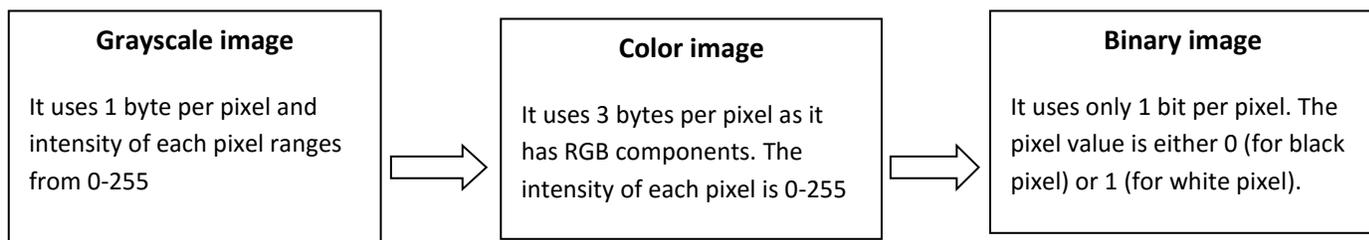


Figure 2: Image Conversion

The above Figure shows the image conversion of the grayscale image to binary image. After image conversion, we compare the sample template and the reference template to be checked using point correlation algorithm one of the template matching techniques. Here the matching will not be applied to the entire template but only the required points of the template will be matched. Thus the combination of various algorithm increases the accuracy of recognition of the target object. Figure 4.2 and Figure 4.3 shows the template matching. In this process object description is avoided, the shape is implicit in sets of views of objects, for each known object the database contains a sample, a set of images, each consisting of identifiable feature points. For each target image, for each sample, correspondences are set up between points in the target image and feature points in the sample images. Based on the correspondences, predictions are made about where other points in the target image should appear, resulting in a custom-made template for each sample. The target image is identified as an instance of the category associated with the sample template which matches

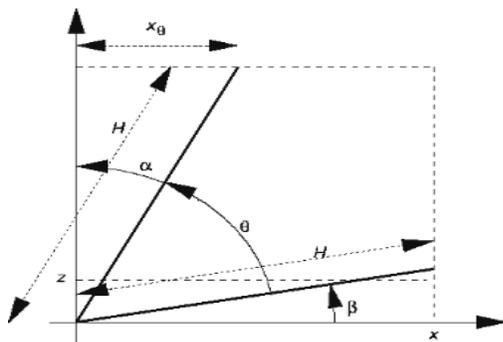


Figure 3: Points in Rotated Images

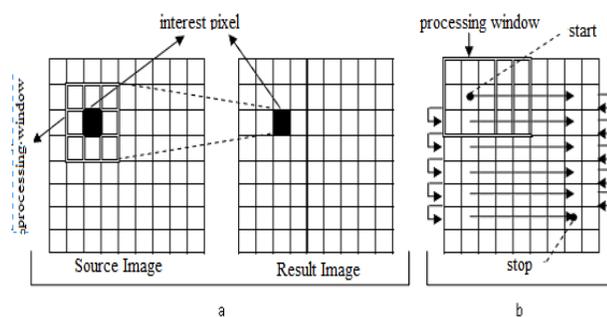


Figure 4: Correspondence between two point

Figure 3 shows the points in rotated images using co-ordinate system and orthographic projections.

The algorithm steps of OMR sheet system can be given as follows:

1. Start
2. Import binary image that was converted form grayscale to binary
3. Get the co-ordinates of two squares
4. Then the equation $y=mx+c$ will be applied to get the slope of the line
5. Rotate the image in order to make it perfectly vertical

6. Separate the sheet into two section on the basis of its seat no and answers marked
7. Calculate the x & y co-ordinates using the x & y direction and the template matching technique
8. After getting the co-ordinates map them to find the respective seat number
9. Each row of the first section must be scanned for identifying answer marked for each section
10. Again calculate the x &y co-ordinates using the moments x & y direction and template matching
11. Again map the co-ordinates that are found with respective marked answer
12. Then follow the same steps to identify the marked answers for section two
13. Then compare the scanned answer sheet with the actual answer in the database
14. Depending upon the marks evaluated the students result will be declared

Software Requirements

- OS- Windows 7
- Application Libraries- .Net frameworks 4.0
- Language- C-sharp , ASP.Net
- Back end- MS SQL server 2008

Hardware Requirements

- Processor – Pentium IV (minimum)
- Memory (RAM) – 2GB
- Hard disk- 1GB(or more depending on data volume)
- Scanner
- Server system with high configuration

CONCLUSIONS

From all the recent studies and from the above paper we have got an idea of the system which would facilitate the OMR answer sheet evaluation technique which must be feasible and reliable. Hence Evaluation of OMR answer sheet could be done by the simple scanned image of that sheet using simple scanner. The main thing about it is to eliminate the use of OMR machine which is very costly. This software is also very easy to access and efficiently stores the required results into the database which could be easily access by the student. The technique used for checking the answer sheet is efficient and takes very less time for evaluation.

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