OMR SHEET EVALUATION USING IMAGE PROCESSING

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Abstract: OMR sheets has been widely used across the globe for grading purpose it is a process of evaluating a human marked data from the documents such as survey, and test. This technology is acts as a guiding tool or helping tool for processing large amount of data mainly questionnaires and multiple choice test. Today we come across various entrance exams that use the OMR technology. These exams are made up of MCQs. The exam taker has to feel the bubble or the box as an appropriate answer to the question. The following proposed system helps to scan the input sheets and display the corresponding results. Using various image processing techniques such as median filtering, RGB to Gray, edge detection, compliment of the image, the answers marked for each of the questions helps to evaluate the sheet and display the total marks. This system eliminate the installation of heavy machinery, and expensive scanners in return saving time and cost. The proposed work consist of an ordinary webcam, a conveyor belt and a computer for computation purpose.

I. INTRODUCTION

Optical Mark Recognition (OMR) is to scan a paper to detect the presence of the mark in a specified location on the sheet. Today OMR is harnessed as the input for an data entry system. Previously it had forms of paper tape and punch cards. These had real holes punched in them instead of the marked circles.OMR sheets have replaced by the subjective answer sheets and are widely used as a evaluation or grading tools for the exams conducted by the schools, colleges and many other institution. It has made the tedious job of grading the exam taker easier as the examiner does not have to read through the paragraphs of the answers written by the exam taker. For example, competitive exams in India strictly stick to the OMR sheets for the calculation of marks[4,6].

OMR is generally used as direct input for data of censuses and surveys and is perfect for discrete data handling, whose values are limited set. In the field of education widely uses OMR technique can process objective questions in exams[1,5], as Scholastic Aptitude Test-SAT, Graduate Record Examination-GRE, and the College English Test-CET . However, there are a few drawbacks limiting the application of OMR technology.

Earlier OCR used a optical scanner to scan the paper as bitmap image and the software was used to realize the texts and the images. These OCRs matched these input images with the stored bitmap images which resulted in inaccuracy due to its hit-and-miss pattern recognition[9]. This paper guides you to the solution to overcome the complex algorithm and calculate the marks within lesser time period. this paper suggest an accurate and cost efficient system for the evaluation of the OMR sheet. Based on the image provided by the user the system provides the result in the form of grades for the purpose of evaluation.

II. PROPOSED WORK

A. Creation of database:

For the creation of database it is necessary to have one image which is going to be treated as a database image. Database image is the answer sheet with all correct answers, loaded from the institutional site. This database image will be used to compare with the other input test images. The processes performed on this database image are RGB to Gray, padding, edge detection, median filtering, complimenting of the image. This resultant image will be used for the comparison purpose.

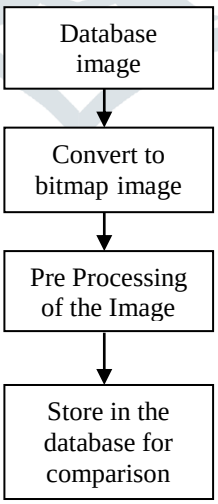

Fig 2.1: Creation of database

B. Processes performed on an input image:

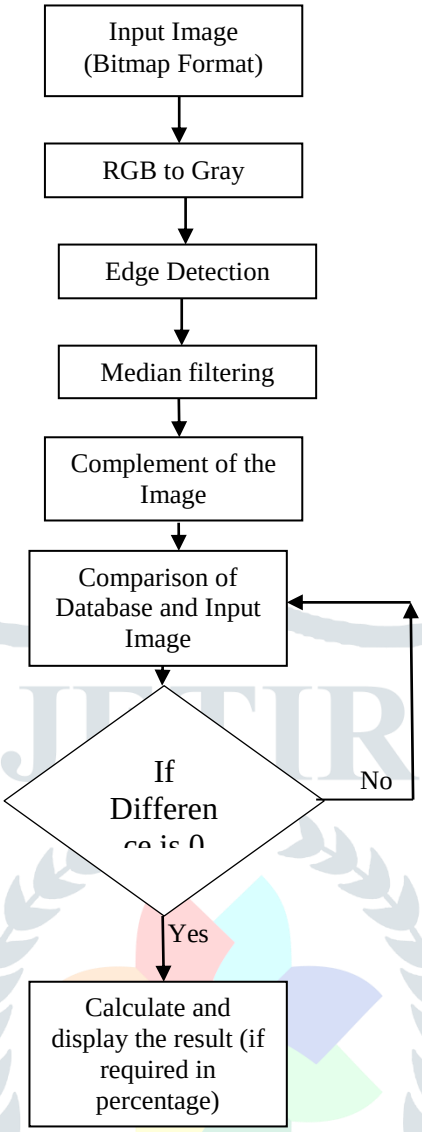

Fig 2.2: Flowchart for input image processes

Input image is the image of the answer sheet by the students as the OMR answer sheets are available in various colors it become necessary to convert it into one uniform color for the further process to be carried on smoothly. Hence we apply the command RGB to gray for obtaining the gray image of the colorful one. For the accuracy of a detecting of edges we need to apply a padding array of ones and zeros on both rows and column. This helps us to apply the median filter to the image. Further it becomes necessary to take the compliment of the gray image as it converts the gray image to black and white where the white area stands for one and black for zero. The complimented of the database and input are compared. If the difference between these two images is zero that means the answers are matching and it is saved to increase the counter. The scanning of every I and J component will be done until a pixel value is detected. When the I and J component in the input image crosses the threshold of 150 the bubble will be treated as a marked answer, if not it will be treated as zero or unmarked. The resultant image helps us to calculate the results or the grades.

C. Block Diagram of the system

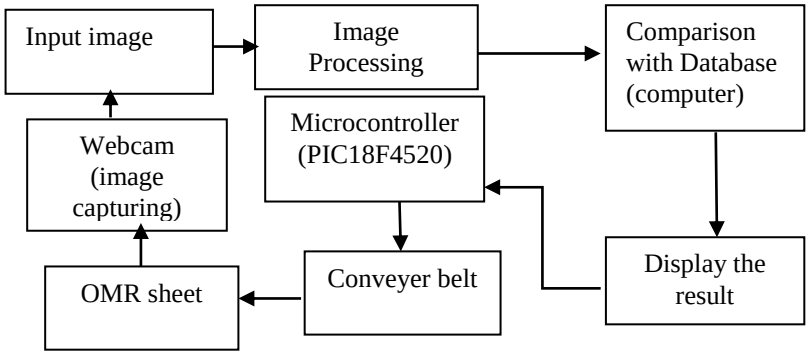

Fig 2.3: Block Diagram of OMR sheet evaluation system

OMR answer sheet will be placed on the conveyor belt which moves on the command from the microcontroller. Once the sheet comes under the webcam accurately with the help of sensors a snapshot is taken. This snapshot is treaded as a input image and all the processes described for an input image is performed. This is compared with the database and results are compared.

III. RESULTS AND ANALYSIS

Fig. 3.1 Input Image

Fig. 3.2 Grey Image

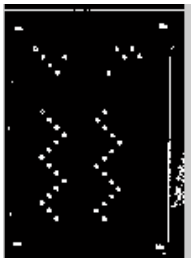

Fig. 3.3 Edge Detection Image

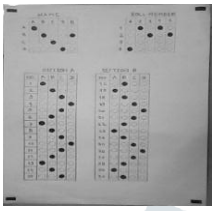

Fig. 3.4 Median Filtered Image

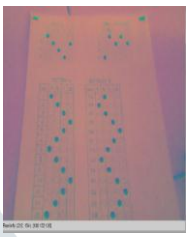

Fig. 3.1 is the input image can be database or the input from the student. This image is then converted into grey. Fig. 3.2 indicate the grey image. The grey image then passed through the edge detection which is shown in image 3.3. And then median filter is apply to the image as shown in Fig. 3.4.

IV. PERFORMANCE EVALUATION

This system has an accuracy of 88% and can successfully detect the marked circles or bubbles in the OMR(Optical Mark Recognition) and can easily be replaced as a initial grading tool for education purposes and many more. The time taken by the proposed system is approximately 60 seconds max, which means we can save on time and the cost to invest in heavy OMR sheet scanning machines. The only drawback of the system could be the tilt in the sheet while placing on the conveyor belt which can later be corrected.

V. CONCLUSION

This system proposed can be used to provide an efficient way to evaluate the answers sheets of various exams conducted across the globe. It also provide an inexpensive method of the user who does not want to invest lot of capital in a heavy machinery. Time being the most crucial factor of every human life this system has made a point to save it. The proven time for the system to evaluate the paper is 60 seconds max. The algorithm checks for the errors and gives the marks obtained by the candidate. Simple procedures of obtaining the image, converting it into gray scale, obtaining the intensity of each bubble, calculating it, and increasing its count have been included. This system proposed has a wide scope in future and can be of great help when harnessed for the purposes of survey, attendance, and many others.

ACKNOWLEDGEMENT

I would express my gratitude towards my mentor, Dr. R. C. Jaiswal for being of great support and guiding me through the research. He gave this paper the insight and the expertise it needed for making it a presentable one. His advice, professional acumen, and encouragement proved to be a valuable guidance.

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