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An Algorithm of Template Based Automatic Attendance Entry

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Abstract - **Manually marking attendance is very complicated and time consuming process. Even if one is using application for managing attendance, he/she needs to go through data entry of many persons attendance which is again a time consuming process. In this paper we have proposed an algorithm formaking attendance entry automatically using Template Matching and Image Processing Technique. The algorithm works in two parts, first it will generate attendance sheet by taking input from user. The pattern of attendance sheet and template is predefined using which the system will generate an image of an attendance sheet. After getting a filled attendance sheet one need to scan it. Second part will store image of attendance sheet into jpeg format and then using the concept of histogram it will match the image with predefined template for marking attendance.**

Key Terms - **Template Matching, Histogram, Attendance.**

I. INRODUCTION

Marking attendance is a common process at many places like school or college during regular classes and examinations. Also it is very important process. When manual process is adopted, it become very complicated and time consuming process to record and analyze attendance of many students. Another way is to use an application which keeps records of attendance. But still one need to enter data of many students manually in the application, which is again a time consuming task. In this paper we are proposing an algorithm which marks attendance of students automatically which will reduce the task of making entry of attendance manually. Here, in this algorithm the input is to be given as a filled circle, one for each student. So ultimately we have proposed a system which will work just like OMR but without using the machine to read OMR sheet. This way our proposed system will also reduce use of resources. We have used the concept of histogram and template matching for the said system.

Template Matching: Template matching is one of the major image processing techniques. Image recognition techniques have been studied for many applications. Especially, those techniques are useful for computer based automated recognition system and mobile camera phones. While implementing template matching technique, one needs to define rules for creating a template. If the inputted data is unstructured, more rules need to be defined for creating a template [9].We are using this technique for identifying the area of filled circle for the particular student. As discussed earlier, the scanned image of attendance sheet is given as an input to the system. The role of template matching in our system is to identify the exact rectangle place of filled circle for each student.

Histogram: In an image processing context, the histogram of an image normally refers to a histogram of the pixel intensity values. As a definition, image histograms are a count of the number of pixels that are at certain intensity. When represented as a plot, the x-axis is the intensity value, and the y-axis is the number of pixels with that intensity value. Once the rectangle of filled circle is identified, we are identifying whether the student is absent or present using the concept of histogram.

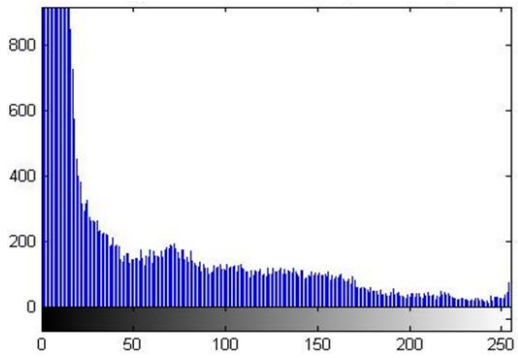

Figure - 1: Example of Histogram

II. LITERATURE REVIEW

Different type of attendance marking system is developed by different authors. Every system is based on different concept. One of them is using finger print reconstruction technique which is based on the biometric technology [8].

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They are storing the image of finger print of each student or staff into database. Then they are taking fingerprint while marking attendance and matching the same with the stored image of the same person. The problem we identify with this system is, it require extra resource to take fingerprint of person. Also, it uses more memory, as the image of each and every student is to be stored before taking attendance. Another fingerprint based attendance system is proposed [6], in which they have enhanced the preprocessing phase. But the same problem will arise in their system also.

A face recognition based attendance system is also developed [10] in which their main focus is to reduce the time spent for not only entering the attendance data into system but also to reduce the time for taking attendance. They have proposed a system which marks entry of attendance without human intervention. Their system takes image using a camera, enhance the image using the concept of histogram and then matching the face with stored face of particular student. They are also training the system by giving multiple faces and then used on the classroom for detecting many faces from a single image. The problem of data storage of faces of all students occurs in this system, too. Training of system is also overhead for their system. But the main problem with this automatic system is the success rate is not as much as other systems.

A template based attendance system is developed [2] in which they are marking the attendance sheet by taking a scanned image of hard copy of attendance taken by a teacher in the classroom. They are also applying noise removal techniques to that scanned image. But they have not included the process of creating or generating an attendance sheet in their system. In our system we are also generating an attendance sheet so that when a scanned image is given to the system, rules of template for attendance sheet will be same for each different class. This gives benefit by reducing rules for template matching technique and with that also will improve the result in applying template matching technique.

III. PROPOSED SYSTEM

Our system works in two major parts. First part is for registration of students and generation of attendance according to our predefined template. Distance between pixels of each place is again predefined. We have tried to make the template as simple as possible so as to get more and more efficient result. The output of our first part is printed attendance sheet.

The second part is main part in which entry of attendance is recorded into the database. First of all using the technique of template matching, we are identifying the rectangle in which the circle for attendance is placed for each and every student in sequential manner. After this task is done, we are using the technique of histogram to identify whether the student is absent or present. Figure - 2 shows thesystem flow diagram of both part of the proposed system. Below given is a proposed template for our attendance sheet which is to be generated after completion of first part of our proposed system.

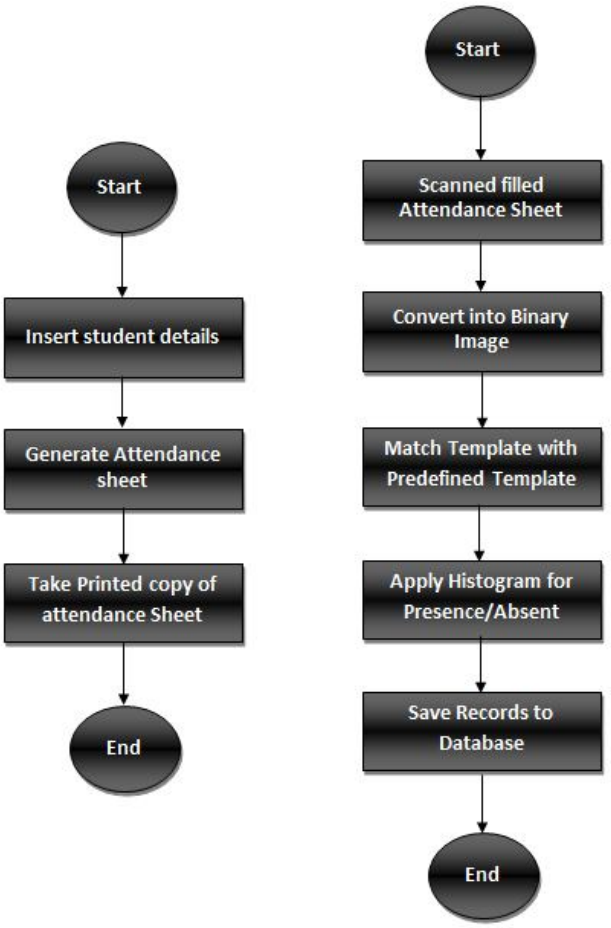

Figure - 2: System Flow Diagram

Enrollment No		Enrollment No		Enrollment No	
201204100110003	◯	201204100110051	◯	201204100110086	◯
201204100110012	◯	201204100110058	◯	201204100110089	◯
201204100110014	◯	201204100110064	◯	201204100110090	◯
201204100110022	◯	201204100110070	◯	201204100110091	◯
201204100110025	◯	201204100110071	◯	201204100110093	◯
201204100110026	◯	201204100110075	◯	201204100110094	◯
201204100110039	◯	201204100110076	◯	201204100110096	◯
201204100110042	◯	201204100110079	◯	201204100110101	◯
201204100110048	◯	201204100110083	◯	201204100110102	◯
201204100110049	◯	201204100110084	◯	201204100110104	◯

Figure - 3: Template of Attendance Sheet

Here, as shown in Figure - 3 the length and width of each and every rectangle is same and predefined. Also, the sequence in which enrolment number of students will occur is also predefined. Figure - 4 shows the template of attendance generated after applying template matching technique. Now, next task is to apply histogram technique on this to get the information about presence or absent of student.

Figure - 4: Template after applying Template Matching

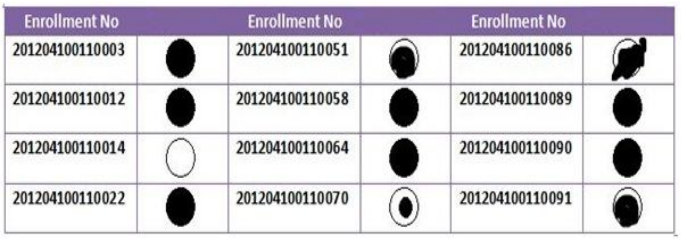

Figure - 5: Scanned Image of Attendance Sheet

The scanned copy of attendance sheet after taking presence of students will be similar to the Figure - 5. The rules for marking attendance is also predefined which is to be applied using histogram technique.

A. Present Caseif a particular scanned circle is not the same as the template saved, i.e. a circle is filled more than 75% (>75%), then that Enrollment number is considered to be present. The Enrollment numbers that are considered as present are saved immediately. The information is then passed on to a text file which keeps a record of the all the present students.

Present Case 1If a circle is filled in the allocated space as shown in the Figure - 6, Column No:2 then the algorithm will detect that particular roll number as present and mark it as present which is saved immediately into the text file.

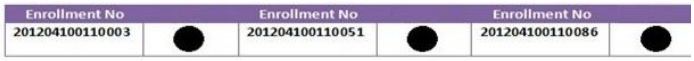

Figure - 6: Present Case 1

Present Case 2 If a circle is not filled completely in the allocated space as shown in the Figure - 7, Column No:2 and the filled area of space is greater than 75% (>75%) then the algorithm will detect that particular roll number as present and mark it as present which is saved immediately into the text file.

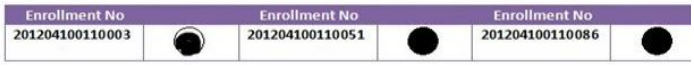

Figure - 7: Present Case 2

Present Case 3 If a circle is not filled completely in the allocated space as shown in the Figure - 8, Column No: 4, and the filled area of space is greater than 75% (>75%) or the filled area is beyond the circle then algorithm will detect that particular roll number as present and mark it as present which is saved immediately into the text file.

Figure - 8: Present Case 3

B. Absent Case:If a particular scanned circle is the exactly the same as the template saved, then that Enrollment number is considered to be absent as no mark of presence is present on the circle. In this case, the Enrollment numbers are saved and the information is then passed on to a text file.

Absent Case 1 If a circle is not filled completely in the allocated space as shown in the Figure - 9, column No:2, then the algorithm will detect that particular roll number as absent and mark it as absent which is saved immediately into the text file.

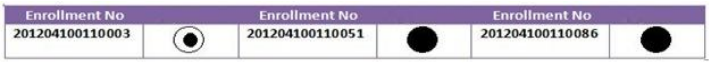

Figure - 9: Absent Case 1

IV. CONCLUSION AND FUTURE WORK

In this paper, we proposed an algorithm fortemplate matching based attendance entry and described its working and features. An efficient algorithm is introduced that stores and analyze the presence or absence of respective student from scanned attendance sheet. Different cases are illustrated in the paper. Here, we are expecting nearly 100% result for different cases. Once this algorithm is implemented successfully, this algorithm can be enhanced for making attendance entry by taking signature of a student and matching signature instead of filled circle. But the technique of histogram cannot be used for matching signature with the stored signature of each person. This enhanced algorithm will become more efficient.

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