AUTOMATED ATTENDANCE SYSTEM FOR EFFICIENT EMPLOYEE MANAGEMENT: A BIOMETRY BASED APPROACH

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ABSTRACT

Process of maintaining attendance of employees has significant impact on the Payroll Management System of an organization. Employee payroll is a considerable share of the profit earned by an organization. Attendance system plays a crucial role to ensure adequate staffing and kindles positive employee morale resulting in delivery of expected productivity standards throughout the organization. The system attempts to embrace the accountability of employees to adhere to their workplace schedule. Several prominent organizations maintain manual attendance systems as a part of their Human Resource Management System (HRMS) which is tedious and error prone. It leads to major discrepancies in maintaining the professional attendance record of the employees which in turn adversely affects the revenue of the organization. This is because of the role of analytics in attendance system which is responsible to sanction the payroll. Most of the organizations have almost 1/4th portion of its revenue sanctioned for payroll of employees. Additionally, the stipend of interns and trainees holds 1/10th of the total cost. Hence, there is a need to develop an automated attendance management system for proficient execution of the task. Integration of biometry in an HRMS based attendance systems can help in achieving this goal of automation. The automated system of attendance thus becomes enabled to analyze large amount of employee data per month by using automated tools and techniques. It is useful for analysing the working pattern and extracting the data of the associates almost immediately. This paper has analysed the contribution of automated biometric based attendance system for efficient management of the employee attendance. It has proposed incorporation of biometry in HRMS to reduce human error which in turn has a positive impact on the revenue of the organization.

Keywords: Biometry, Automated Attendance, Analytics, Efficient Employee Management, Workplace Schedule

INTRODUCTION

"Attendance Process and Payroll System" has a decisive role in supervision and maintenance of documentation for employee accounts in terms of their availability and attendance in the organization which is useful preparing the payroll. But the process has complex overhead which makes it significantly time consuming. The various components to be calculated carefully including social security benefits of an employee along with the regular parameters like on job time, incentives, advances and so on. Correctness in calculating these components is directly proportional to trust building among employees (Torres & Kline, 2006).

This work has considered the schedule and turnout of employees in a hotel industry by segmenting it to assorted departments. Each department has a supervisor, or a manager oversee the attendance of the employees in the corresponding department. Every other department may maintain their own flexible schedule for which the managers need to be restricted only to their corresponding departments to avoid conflicts in administration. However, the General Manager may have the privilege to administer the attendance irrespective of departments to ensure discipline and smooth workflow. The entire report of attendance is further scrutinized by an accountant to provide it as input to the payroll software. A common trend in hotel industry is to offer extra allowances to married employees whose spouse is not employed with some organization (Maroudas, Kyriakidou & Vacharis, 2008). The facility of extra allowance helps in saving the tax for the financial year.

Monthly calculation of pay period involves examination of permanent employee hours to be considered as overtime. Usually the overtime is adjusted with the remaining working hours for that month. In case of contractual employees, the time is calculated by observing the punches of time card. In both the cases HR must enter and calculate the hours manually. In case of contractual employees, the process is even more

cumbersome. The time cards are to be collected from department head and are to be entered instantly. Finally, the gross wages are calculated based on the payment type, namely, hourly basis or monthly pay. Thus, there is a requirement to streamline these different processes of providing the input for calculation of wages. Proper calculation of salary is difficult with the existing kind of system having maximum manual intervention at each of the stages.

LITERATURE REVIEW

Biometric system is used extensively in the hotel industry. A study is made by considering the insights of guests in a hotel regarding the use of biometric system (Morosan, 2012a). Use of biometric system is popular to ensure security in travel and tourism industry of which the hotels are a significant part (Morosan, 2012b; Kang, Brewer & Bai, 2007) Incredible extent of implementing biometric system in chain hotels has changed the way of managing attendance system (Bilgihan *et al.*, 2013). Introducing biometry in attendance has made way to research with fair practices in maintaining attendance (Li, Wu & Wu, 2012).

Biometry is well studied as fingerprint recognition in the domain of content-based image classification. Various techniques are proposed by the researchers to enhance the accuracy of the process (Geradts & Bijhold, 2002; Ratha *et al.*, 1996; Zhang & Yan, 2004; Gragnaniello *et al.*, 2013). Ridged frequency and gabor filters are used to enhance image enhancements of fingerprints (Gottschlich, 2012). Discrete wavelet transform has also been used to extract feature from the fingerprints used for biometrics (Tarare, Anjikar & Turkar, 2015).

Hence, use of biometrics is an active research area and the hotel industry is applying it to automate the manual processes for suitable management of administrative affairs (Kim & Bernhard, 2014). It is considered as a foremost technique to guarantee identification in highly networked organizational system of current times (Jackson, 2009). It is one of the keys for survival of the technologies used in hotel industry (Lattin, 1990). A recent work has reviewed the different scopes and obstacles faced using biometric system (Morosan, 2016). Recent inclinations and purposes of using biometric techniques in hotels is researched in (Bilgihan *et al.*, 2013).

This work has applied a biometric based system to automate the attendance process in hotel industry by selecting certain attributes from the existing manual system. The proposition has improved the management capacity and has contributed towards efficient handling of attendance data.

RESEARCH METHODOLOGY

Attendance for all employees maintained dually– through attendance registers maintained in each Departments/Sub-department. Attendance records are called in by the 15th of each calendar month towards processing and tallied against the leave records. Attendance of all contracted out staff are maintained at by the contractor's representatives on site. The same is rectified by the representative department heads at the end of each month. Once all the records are tallied, calculation of total working hours, over time etc. is done. The working hours are the cross checked with the standards, which is 8 hours per day and 6 days a week. If associate is found to have worked for less number working days, then he/she is entitled to for a Loss of Pay (LOP). Uninformed absence from work or absconding from work, for a period of 8 days at a stretch, may call for termination of services. This process is quite tedious in nature. Hence, we have come up with the proposal of installing biometric devices for tracking attendance. Before making the organization run on a full-fledged attendance tracking mechanism using biometric devices, we figured out the department having the maximum number of employees with the most fluctuating work shift, i.e., the Housekeeping department.

RESULT

We have considered the employee dataset of Taj, Yeshwantpur, Bangaluru (Kumar *et al.*, 2014). The figure 1 has shown the number of employees in each department.

Figure 1: Department-Wise Distribution of Fixed Employees
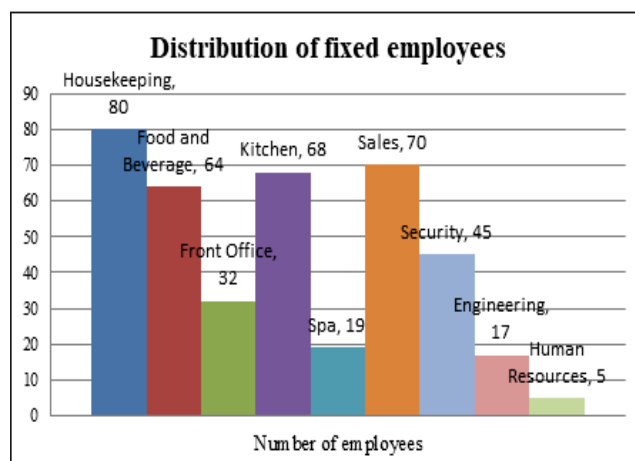
Leave Record is again a manual record, kept and monitored by the Human Resource Department. All employees are requested to file in their planned leave (PL) details and get it sanctioned prior to a month. In case of contingency leave (CL), the employee must file in as soon as it joins the organization. Date-wise entry has to be made in the Leave Record book, which is then manually counted and recorded as per different heads. The table 1 below has shown the data for the month of April of a certain year.

Table 1: Attendance for Housekeeping Department for the month of March-2018

Id	Name	Dept	Present	Absent	Holiday	Weekly of	Leave
196001949	Ramesh Choudhury	Housekeeping	26	0	0	5	0
196002265	Kundan Kishore	Housekeeping	24	0	0	7	0
196002302	M D Jasim	Housekeeping	25	0	0	6	0
196003434	Willbert A	Housekeeping	25	0	0	6	0
196010583	Bhabani Dash	Housekeeping	25	0	0	6	0
196011971	BalaMurugan.G	Housekeeping	17	0	1	4	9
196013828	Piyali Sarkar	Housekeeping	25	0	0	6	0
196014230	Abhay Singh	Housekeeping	25	0	0	6	0
196015324	Chokhoni	Housekeeping	23	1	0	4	3
196100722	ArakshitaTripathy	Housekeeping	19	0	0	6	7

Next, Attendance Register is taken and for each employee, the number of days marked present, absent, weekly-off, holiday is counted. It is then cross-checked with the numbers obtained from the Leave Record. The whole process requires minute observation and patience, slight mistakes leads to discrepancies in sanctioning the salary of the employee. The recommended biometric system can select attributes from the HRIS database and can also help to extract the leave details of an employee from the database. The data is extracted in the form of excel sheet, which is again helpful in auditing the payment process. Few attributes which we can be added to the database for retrieval of relevant data while extracting information, are:

Company ID (Cid), Company Name (Cname), Employee ID (id), Employee Name (name), Department (Dept), Sub-Department (Sub_Dept), Designation (desig), In date of the particular month (InDate), Shift ID of the valid shift of the department (ShiftId), Shift description (ShiftDesc), In time of the day (InTime), In status shows whether the employee is still inside the organization and marks true if found positive (InStatus), Out date of the particular employee (OutDate), Out time of the employee (OutTime), Out status holds true if the employee is not present in the organization (OutStatus), Total hours worked in a single shift (Total), Status gives the leave details of the employee (Status), Start time of the shift (BaseHr), Few

departments require to be in a continuous move hence the employee need to shuffle in and out of the organization generating multiple out time : (OT1, OT2, OT3, OT4) OT, The final calculation after various out time (DayTotalMultiple) etc. The table 2 below helps to get a clear picture of careful selection of the attributes:

**Table 2: Attributes and Its Values**

Attribute	Value
Cid	**6
Cname	Taj Yeshwantpur, Bangalore
id	196***949
name	Ramesh Choudhury
Dept	Housekeeping
Sub_Dept	Rooms
Desig	Housekeeper
InDate	03-01-2018
ShiftId	
ShiftDesc	
InTime	07:09:09
InStatus	IN
OutDate	03-01-2018
OutTime	20:52:15
OutStatus	OUT

Total	13:43:06
Status	Present
BaseHr	08:00
OT1	05:43:06
OT2	
OT3	
OT4	
OT	05:43:06
Day Total Multiple	13:43:06

The device is then linked to an employee portal, which makes it more user-friendly and attractive to use. The employee may apply for leave through this portal, hence no need of manual checking of Leave Records and Attendance Registers.

The employee may login to its account using thumb impression, and mark the daily attendance capturing the time-stamp. The Work-Flow-Diagram in figure 2 gives the idea behind the working of the suggested automated biometry-based system.

Figure 2: Work Flow Diagram of the Biometric Device, Capturing the Authenticated Attendance
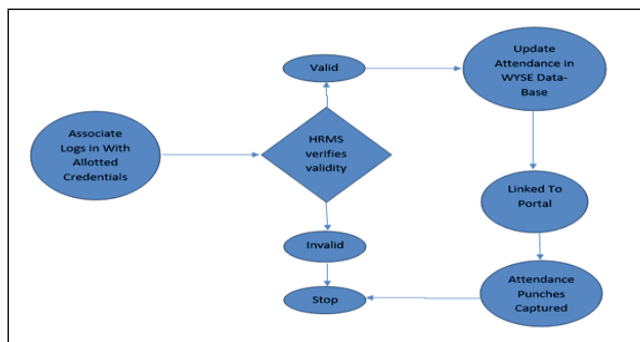
The analysis done in this section has clearly revealed the benefits of using biometry over the existing manual system. It has analytically shown the efficiency of the automated system towards proficient employee attendance management.

DISCUSSION

With the advancement of machine learning, Human Resource Management System is now able to eliminate repetitive tasks, reduce employee attrition and improve employee engagement. By using various algorithms, we can simulate the behavior of human and to re-imagine the experience of the employees (Maroudas, Kyriakidou & Vacharis, 2008). Artificial Intelligence helps in drawing out the insights and inferences, which

might remain unrecognized with general manpower. It has brought this good news for Human Resources and has given it a chance to catch up with the digital transformation. All put together, we were able to come up with a computer application which would automatically identify a person from its palm and wrist vein images. And then use this technique to create an automated attendance management system, which implicitly detects the employee when he/she enters the office gate and marks their attendance (Li, Wu & Wu, 2012).

CONCLUSION

Biometric authentication covers a vast area including exclusive physiological traits like fingerprints identification, iris recognition etc. In this work we have carried out a detailed study of the manual attendance and payroll management system in the hotel industries. The process is observed to be highly error prone due to human involvement to pursue repetitive tasks. Moreover, wrong repeated salary calculation may affect employee retention and can end up in huge employee dissatisfaction.

Hence, we have suggested a finger print based automation system which can be beneficial for the hotel to streamline the existing manual procedures. It will automate the repetitive tasks and will enhance accuracy in salary calculation. This will reduce the burden of human errors and will ensure enhanced employee satisfaction adding up to the brand name of the organization.

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