

# Human Resource Information System with Machine Learning Integration

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**Abstract**—The human resource information system with machine learning integration was developed to aid in the management of employees' records, profiling, turnover, data analytics, and the generation of electronic personal data sheets used by the government service records. It was developed with the feature of predicting employee turnover using a supervised machine learning method. The system can also generate the following reports, namely, the government service record, years of service and loyalty awards, and available leave credits of the employees. To determine the quality of the developed system the researcher used the ISO 25010 Software Quality Model as a basis when evaluating the properties of a software product. The integration of machine learning in the human resource information system proves to be a very useful tool if integrated into a human resource information system to predict trends in the different aspects of human resource management. Based on the thorough evaluation of the experts and respondents, it was found that the human resource information system is highly usable, secured, efficient, and provides a fast and easy way to manage employees' records and predict employees over using a supervised machine learning that uses the linear regression method.

**Keywords**—Data Analytics, Employee's Turnover, Human Resource Information System, Machine Learning, Rapid Application Development

## I. INTRODUCTION

The evolution of modern technology like computers becomes an ally in business and organization that paves the way the improvements in human resource management [14]. It continues to evolve to bring remarkable changes to the country's educational system. [5] underscored that to successfully utilize technology in the organization there must be strong support for the integration of technology in any possible way even in the organizational systems. Like every other aspect of modern business operation, human resource management is no exception to how technology is transforming the way to operate, manage, and perform to interact in the digital world [1], [2], [3]. Different organizations consider human resource management practices as one of the key factors that contribute to the organization's success. The organizations are putting

increasing stress on the policies and practices of human resource management to gain a competitive advantage [11].

In the 21st century, technological innovation is essential as it can transform people's way of thinking, way of work, and way of life to attain success in every endeavor they make [12], [8]. The organization's perspective has transformed into a knowledge-based for the reason that technology becomes a powerful tool for improvement. Technological innovation in the organizational system inspired policy-makers in the organization especially in the human resource department to invest a great amount, especially in developing countries [17]. The role of technology in organizational systems is very vital as it compels the effective processes in human resources, especially in management [4], [1].

Technological advancement has become widespread in the area of human resource management to where certain organizations benefitted from it. [15] stressed in the so-called "digital age," it is necessary for the organization especially the human resource to become adept at the technical use of technology or the integration of machine learning into the different processes and systems of the organization. Machine learning is one technology that is presently making significant progress in simplifying and improving human resource management functions. Despite the fact that the technology itself is not new, human resource applications have only lately begun to gain popularity and are already having a big influence [6]. Furthermore, this human resource system can pave the way to increase the efficiency of human resource decision-making [10].

The given perspective provides an idea to develop a human resource information system with machine learning integration for the Technological University of the Philippines Visayas where the researcher affiliated with to assist and provide solutions to the human resource office on problems like managing the employee's records, employee profiling, predicting employee turnover, data analytics, and generations of reports that are needed.

## II. OBJECTIVES OF THE STUDY

Generally, the study aimed to develop a human resource information system with machine learning integration for the human resource office of the Technological University of the Philippines Visayas which is based in Talisay City, Negros Occidental. Specifically, its objectives are:

1. develop an electronic personal data sheet of employees and predict employee turnover using a supervised machine learning method;
2. generate the following reports, namely, the government service record, years of service and loyalty awards, and available leave credits;
3. determine the quality of the developed system based on the characteristics set in the ISO 25010 Software Quality Model;
4. determine the usability of the developed system in terms of usefulness, satisfaction, ease of use, and learning.

## III. MATERIALS AND METHODS

The study utilized software engineering and the descriptive method in evaluating the system, especially the Rapid Application Development (RAD) model as a software life cycle during the development of the system application as seen in Figure 1.

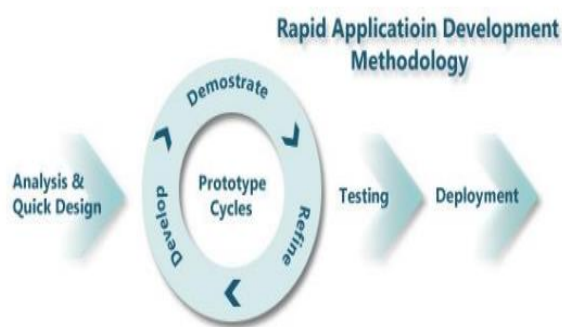


Figure 1. Rapid Application Development Methodology

Rapid application development (RAD) describes a method of software development that heavily emphasizes rapid prototyping and iterative delivery. The RAD model is, therefore, a sharp alternative to the typical waterfall development model, which often focuses mainly on planning and sequential design practices. By utilizing a rapid application development method, designers and developers can aggressively utilize the knowledge and discoveries gleaned during the development process to shape the design and/or alter the software direction entirely [16]. The technologies used in the development of the system are HTML (HyperText Markup Language), CSS (Cascading Style Sheets), jQuery, and JavaScript for the front-end development. In the backend development the researcher used PHP (PHP: Hypertext Preprocessor), and PHP-ML for Machine Learning Library for PHP, MySQL for the database.

### Data Gathering Procedure

The researcher conducts a personal interview, and survey among three employees assigned, at the human resource

office. The criteria that are being used in selecting the panel of IT experts, which is composed of seven IT practitioners. They should have at least a minimum of ten years of experience in Information Technology, particularly in software development. The researcher uses the purposive sampling method in gathering (10) respondents for the study which is composed of three employees in the human resource office, and seven members of IT experts.

## IV. RESULTS AND DISCUSSION

Before the development and implementation of the system the human resource office does not have any existing system to process the records of the employees, they simply rely on manual processing of employees' records which requires more time to process and was prone to inaccuracy of employee's information.

The developed human resource information system with machine learning integration paved the way in solving problems encountered by the employees assigned in the human resource office as well as the school administration in managing the employees' records in the university.

Table 1. In terms of Electronic Personal Data Sheet and Predicting Employees Turnover

	Mean	Verbal Interpretation
I can generate an electronic personal data sheet.	4.75	Very High
I can manage employees records.	4.68	Very High
I can view employees turnover reports.	4.92	Very High
<b>Total</b>	<b>4.78</b>	<b>Very High</b>

Table 1 shows the result of the users' feedback on the developed application in providing human resource staff use and access the system enables them. The application provides access to human resource staff to generate electronic personal data sheets, manage employees' records and view turnover reports, and had a mean rating of 4.78 which is interpreted as Very High.

Table 2. In terms of Report Generation

	Mean	Verbal Interpretation
I can print government service records.	4.94	Very High
I was able to print years of service and loyalty awards reports.	4.95	Very High
I can print employees' available leave credits.	4.87	Very High
<b>Total</b>	<b>4.92</b>	<b>Very High</b>

Table 2 shows the result of the users' feedback on the developed application in serving as a tool for managing

employees records, the printing of government service records such as Personal Data Sheet, report generation of years of service, loyalty awards reports, and leave credits of the employees' report; had a mean rating of 4.92 interpreted as Very High.

Table 3. In terms of the characteristics set in ISO 25010 Software Quality Model

Criteria	Mean	Verbal Interpretation
Functional Suitability	4.94	Very High
Performance Efficiency	4.75	Very High
Compatibility	4.76	Very High
Usability	4.89	Very High
Reliability	4.72	Very High
Security	4.90	Very High
Maintainability	4.71	Very High
Portability	4.95	Very High
<b>Total</b>	<b>4.83</b>	<b>Very High</b>

Table 3 shows the outcome of the IT Experts' feedback in determining the quality of the Human Resource Information System with Machine Learning Integration based on the characteristics defined in the ISO 25010 Software Quality Model. In terms of Performance Efficiency, Compatibility,

## V. CONCLUSION

In the light of the findings of the study, the researcher concludes that based on the thorough evaluation of the experts and respondents, the Human Resource Information System is highly usable, secured, efficient, and provides a fast and easy way to manage employees' records, creation of various employees reports like personal data sheet of employees' years of service, loyalty awards, available leave credits and predict employees' turnover using a supervised machine learning that uses linear regression method.

It serves as a reliable tool for the human resource office in terms of speedy onboarding of new employees. The use of this system can also help in storing employees' records more securely and accurately. The faster and timely access to employees' information can be used by the academic institutions to monitor the employee's training, work experiences, educational attainments, loyalty awards, years of service, and significantly the integration of machine learning can predict the turnover of employee which can be a tool to improve the retention of employees by providing employees' driven policies and programs which is essential to the school and its employee's in general. Machine learning proves to be a very useful tool if integrated into the Human Resource Information System to predict trends in the different aspects of human resource management.

The human resource staff of Technological University of the Philippines may consider implementing this system to manage the employees' records both by regular

and Maintainability, it was rated with a mean value of 4.74, which is interpreted as Very High. With regards to Usability and Portability, had a mean rating of 4.92, which is interpreted as Very High. Concerning Reliability, it was rated with a mean value of 4.72, which is interpreted as Very High. Security had a mean rating of 4.90, which is interpreted as Very High. About Functional Suitability had a mean rating of 4.94, which is interpreted as Very High.

Table 4. In terms of usefulness, satisfaction, ease of use, and learning

Criteria	Mean	Verbal Interpretation
Usefulness	4.81	Very High
Satisfaction	4.84	Very High
Ease of Use	4.65	Very High
Ease of Learning	4.73	Very High
<b>Total</b>	<b>4.76</b>	<b>Very High</b>

Table 4 shows the result of the users' feedback in determining the usability of the developed application based on usefulness, satisfaction, and ease of use and learning. In terms of Usefulness, had a mean rating of 4.81, which is interpreted as Very High. With regards to Satisfaction, it was rated had a mean rating of 4.84, which is interpreted as Very High. As to Ease of Use and Learning, it was rated had a mean rating of 4.69, which is interpreted as Very High.

and job order/contractual employees. This system can be effectively used as a personnel administration tool. It can help the human resource staff to work faster in the retrieval and processing of employee records. Interestingly, the reduction in duplication of efforts on the part of human resource employees leads to a reduction in cost.

The system also utilized various reports generated from available tools in the human resource information system with machine learning like exporting the reports in Microsoft Excel, Comma Separated Values, Portable Document Format (PDF), and printing on the web page, which is helpful in report generation. The system uses graphs generated by the system such as pie and bar charts from determining the educational qualifications and employee's employment status which can be used to create reports needed by government employees benchmarking and school employee records. Perhaps, the system uses the prediction feature to predict the turnover of employees, which is notable in the better analysis which can lead to more effective decision-making on the part of the human resource office in improving the retention of the employees. Further, it is recommended that the study may be replicated to further investigate the effectiveness of the developed Human Resource Information System with Machine Learning Integration to better improve the systems and processes in the human resource department.

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