



INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 4, Issue 2)

Available online at: www.ijariit.com

Performance Evaluation using Data Analytics

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ABSTRACT

In today's world large amount of data is generated in the organizations. Analyzing and proper utilization of this data is very essential. Financial data is the backbone of any educational institute or organization. It portrays a broader picture about the current status and the future prospectus of the organization. If an organization is financially stable only then it can withstand in the market for a longer period of time. In order to achieve the status of financially strong organization, predicting the financial trends for coming future is a necessity. In order to predict the financial trends it requires to carry out a process of examining financial data sets to draw the conclusions about the behavior of the information they contain increasingly with the aid of specialized systems and software's. All of this can be achieved by Data Analytics. Data Analytics predominantly refers to assortment of applications from basic intelligence, reporting and online analytical processing to various forms of analytics. In this paper we propose Data Analytics as a method for performance evaluation over educational organization's financial data.

Keywords: Data Analytics, Financial Data, Educational Institutes, Performance Evaluation.

1. INTRODUCTION

Managing the finances of educational institute till date is based on human interpretation of income to be generated and expenses to be carried out for the whole academic year [1]. These interpretations are traditionally based on the human experiences of historical happenings on day to day basis. But there are chances that educational institutes may land up into problems which will be difficult to sort out due to unpredicted financial requirements. If educational institutes are unable to handle these financial expenses, they may land into trouble affecting management of day to day activities, degradation of infrastructure and equipment quality and landing to run institute on bank loans. This will affect the overall performance of the educational institutes, if the performance evaluation of financial budget is not done before approval and grant of future expenses by management people. So to handle above problems, we have come up with a solution for performance evaluation of educational institutes.

The purpose of the system is to analyze the financial data of an educational institute and to predict future financial budgets or any faults which may arise with it. Sometimes they lose some of their data due to number of reasons, the main reason being an unauthorized personnel accessing the data without anyone noticing. So providing security to the system is essential. The annual hike of the employees must be decided such that the institution does not end up with more losses rather than any gains. For this, certain parameters are taken into consideration. These include the Basic Salary, Dearness Allowance, House Rent Allowance and the parameters like Repair and Maintenance, Electricity Charges and General Running Costs which come under expenditure of the institution. The proposed solution aims at providing a two-layered authentication for security purposes. At the same time automatic updation of institutional records will be added. For predicting annual hikes of employees, minimizing the costs incurred during the expenditure, data analytics can be used. Our solution aims at providing a feasible system which can solve problems faced by educational institutions managing their finances with the help of data analytics.

Data Analytics refers to qualitative and quantitative techniques and processes used to enhance productivity and business gain [2]. Data is extracted and categorized to identify and analyze behavioral data and patterns, and techniques which vary according to organizational requirements. Data analytics is also known as data analysis. Data analytics is primarily conducted in business-to-consumer (B2C) applications. Global organizations collect and analyze data associated with customers, business processes, market economics or practical experience. Data is categorized, stored and analyzed to study purchasing trends and patterns. Evolving data facilities thorough decision-making [3].

Data Analytics can also be separated into quantitative data analysis and qualitative data analysis. The former involves analysis of numerical data with quantifiable variables that can be compared or measured statistically. The qualitative approach is more interpretative, it focuses on understanding the content of non-numerical data like text, images, audio and video, including common phrases, themes and points of view.

2. LITERATURE REVIEW

Author Manil Wagle et al. discusses on bankruptcy, predicting the application and benefits of data mining techniques to construct prediction model in the field of corporate bankruptcy [4]. It analyses a data set of 120 companies using different data mining techniques. For various educational organizations managing day to day finances with increasing financial needs, uncertain growth in expenses, failures in predicted income, predicting changing financial requirements creates problems affecting quality outcome of the institute. Till date various organizations uses ways for predicting and managing their financial changes. Findings show that neural network is recommended as the best model to predict corporate bankruptcy. It also show that the proper selection and use of data mining techniques help to enhance the accuracy of prediction models.

Author discusses on salary prediction system using a profile of graduated students as a model [5]. In this paper a data mining technique is applied to generate a model to predict the salary for individual students who have similar attributes to the training data. In this work an experiment is made to compare various data mining techniques including decisions trees, naïve Bayes, K-nearest neighbor, support vector machine and neural networks to find a suitable technique for salary prediction.

Author proposes data mining technique as the process of extracting hidden, unknown, valid and actionable information from large databases and then using this acquired information to take critical business decisions [6]. Data mining can be applied in various financial sectors like credit analysis, fraudulent transactions, cash management and forecasting operations, loan applications of high risk and many such applications.

Author describes Data mining as a powerful tool for extracting important information from various data sources in the financial field with the help of big data [7]. This paper introduces the support services briefly for the financial industry provided from five different aspects using data mining techniques and tools. The five aspects discussed are:

- To construct data mining design of multidimensional data analysis and to construct data warehouse
- To analyze client status
- Enterprise risk management
- Forecast market trends
- Provide support for detection of economic crime.

Advanced types of data analytics include data mining, which involves sorting through large data sets to identify trends, patterns and relationships; predictive analytics, which seeks to predict customer behavior, equipment failures and other future events; Machine learning, an artificial intelligence technique that uses automated algorithms to churn through data sets more quickly than data scientist can do via conventional analytical modeling. Big data analytics applies data mining, predictive analytics and machine learning tools to sets of big data that often contain unstructured and semi-structured data. Text mining provides a means of analyzing documents, emails and other text-based content [8].

Data Analytics is considered to be the useful for analyzing large data sets. The present models in financial sector using data analytics do not serve the complete financial data of any organization. Most of the financial sector of any organization requires a complete model which involves automization and analysis of data. Combination of the above two methods will help in developing a complete financial model for overall financial data. The salary module requires automized salary incrementation and the financial prediction requires data analytics. The current systems in the market does not provide a solution for the above mentioned requirements thus giving following limitations in existing models.

- The present systems lack in providing the adequate security to the data.
- Automization and data analytics are not combined together for a complete overall solution.
- Data analytics still lacks in accuracy of results in some cases
- Optimization is required.

To overcome all above limitations we have come up with the performance evaluation system with the help of Data Analytics.

3. PROPOSED METHODOLOGY

We propose a system for analysis of the financial data of an educational institution and to predict future financial budgets or any faults which may arise with it. The annual hike of the employees must be decided such that the institution does not end up with more losses rather than any gains. Many institutions do not analyze their data and do not study where they are lacking. They fail in proper planning and management of their resources. Sometimes they lose some of their data due to a number of reasons, the main reason being an unauthorized personnel accessing the data without anyone noticing. The data in such cases is fabricated or even stolen. This directly affects the institution. Even though errors in data seem marginal the overall result turns out to be different than what it should have been. Security plays a major role in such operations in the institutions. In today's world security of systems should not be restricted to only passwords [9].

So to provide secure financial transactions, to stop loss of data, minimize errors, handle malicious access and activities and for proper implementation of current and future financial requirements, performance evaluation is necessary. Performance Evaluation for financial sector will be easy with the help of data analytic techniques. So we propose a method for financial performance evaluation of educational institutions with the help of data analytics. One time passwords (OTP) are very useful in such cases. Most of the transactions in bank make use of OTP for authentication and verification of customers. These are passwords which can be

generated any time while accessing the account. Each time a new OTP is generated which has to be entered by the user every time he logs in. This OTP is made available for only a certain amount of time after which it would not be valid for use next time. This can help reduce the problems arising in data security drastically.

The above solution can be implemented with the help of Data Analytics. Data analytics can be defined as the process of examining data sets in order to draw conclusions about the information they contain increasingly with the aid of specialized systems and software. As a term data analytics predominantly refers to an assortment of application from basic intelligence, reporting and online analytical processing to various forms of analytics.

4. SYSTEM DESIGN AND IMPLEMENTATION

For the system we consider number of data sets of average financial years. At the same time the details of employees which include the number of hours he has worked, his current achievements which are beneficial to the institute and any of his future plans. Based on the performance of the employee the rise in his salary can be decided. However the rise to be given is also based on the current financial status as well as it is checked that whether the expenditure has not exceeded the allotted budget for that year [10].

The admin logs in into the system with his password and then a two-step verification is done with the help of OTP. After the verification the admin has three options- financial details, salary details and upload required documents. In financial details the admin can predict faults and also determine the annual budget. In salary details the admin determines annual hikes of employees and keep the records updated. After completion of his work he can logout from the system.

The following Figure 1. Shows the detailed architecture of the proposed system.

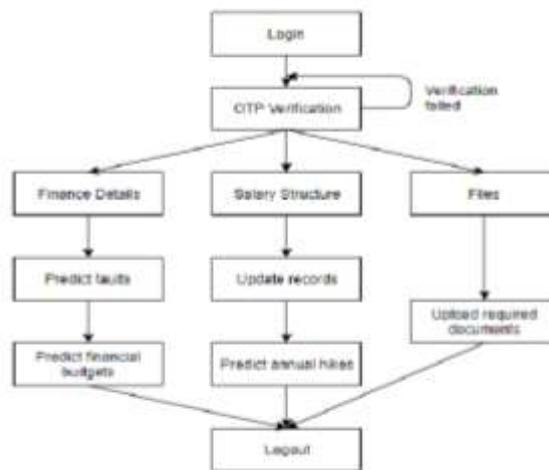


Fig 1. The overall Architecture of Performance Evaluation for Financial Organizations

The system is subdivided into tasks and modules as follows:

(1). Security: It is a crucial module for any financial data as unauthorized access can harm the integrity of data. So a two-layer authentication is implemented which consists of:

1. Password
2. OTP

(2). Salary structure: Automation of salary module is required. This module contains details of all employees as well as predicting annual hikes of every employee is included.

1. Employee details
 - a. Basic salary
 - b. Dearness Allowance (DA)
 - c. Home Resource Allowance (HRA)
 - d. Gross salary
 - e. Graduation update
2. Predict hike

(3). Financial Structure: This module contains all the annual expenditures of the Institute

1. Financial details
 - a. Expenditure
 - b. Maintenance cost
 - c. Student welfare cost
 - d. General running cost
2. Predict future budgets
3. Predict financial faults

5. RESULTS

The proposed financial system is a website based model. It is developed on php framework. As most of the financial and data entry work are carried out on computers it was feasible to develop a website for the proposed system.

The proposed system includes automation of salary structure as well as data analytics for predicting future financial trends. Thus it serves as a complete financial model system.

The following Table I show the details of finances of an educational institute with a budget of actual expenses, actual income and net profit & loss incurred by the institute in a particular academic year.

Table-1: Financial Details

Financial Year	Budget (Rs)	Expenditure (Rs)	Income (Rs)	Net Profit/Loss (Rs)
2014	80,00,000/-	75,00,000/-	95,00,000/-	+20,00,000/-
2015	85,00,000/-	87,00,000/-	98,00,000/-	+11,00,000/-
2016	88,00,000/-	84,00,000/-	98,00,000/-	+14,00,000/-

Table-2: Salary Details

Academic Year	Employee Id	Achievements	Attendance (%)	Regular Increment	Additional Increment (%)	Basic Salary (Rs)	The sudden hike in expenses
2014	10310	-	82	3%	5	7,00,000/-	NIL
2015	10310	PhD. awarded	62	3%	7	7,49,000/-	9%
2016	10310	-	72	3%	4	7,77,800/-	NIL

Table II shows details of the unexpected expenses incurred in one of the academic years which need to be managed suddenly by the institute.

From the above tables, it can be seen that the institute has a profit of Rs.20,00,000/- in the first year but later on next year as the budget increases, the expenditure increases by a large margin compared to previous year. So even though there is an increase in income the total profit gained is less compared to previous year. In the next year, however, there is a significant decrease in expenditure and a similar income that year. Although the profit that year is not as high as the first year it is significantly better than the second year. Similarly, the salary details of an employee are shown for three years. The employee gets an increment on the basis of his work and any achievements he has done. In the first year, he attended 82% of total working days and accordingly gets an increment of 5%. In the second year, he gets a PhD and attendance is 62%. Due to his achievement that year which was getting PhD he gets an increment of 7%. In the last year, the institute needs to increase profit and minimize the expenditures and the employee attends 72% that year without any achievements or records. So this year only 4% increment is given to him.

6. CONCLUSION

The performance evaluation of educational institute's finances has very simple principle and is easily modifiable. It can be used by a financial committee of any institute or an organization to manage their future finances by keeping track of historical incidences of profit and loss, a sudden increase in finances, increase in salary, government norms, hike or decrease in fees etc. All these sudden problem areas hamper the day to day execution of the educational institutes which can be avoided by this system giving better performance through Data Analytics. Hence due to simple architecture, the system can be modified and can be extended forward as per the individual user requirements.

7. FUTURE SCOPE

In this system, we are focusing on only the salary module and predicting financial trends of the college management system which requires automation of salary data. The system can also be made more generic as per every individual need.

We are further looking to extend this system to have a completed automated college financial management system with maintenance management, complete Budget Prediction, and Student Welfare Funds.

So with all these modules will be worked upon in detail to complete financial solution can be provided in future.

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