Employee Performance Prediction System

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Abstract – An Employee is an asset to any organization of any level. Knowing the worth of employee which could be helpful in maintaining the level of knowledge and employee's performance are very crucial. Level of knowledge here means the improvement in certain area / how to upgrade the existing performance. Each of the employee would get analyzed as per his previous knowledge ratings and this tool could give predictions based on the analysis in order to upgrade the level of knowledge/ any improvement areas. It is a good approach to know their performance in each area so that one can know better about their lacking or improvement areas by no delay. With the help of that they can focus on improving the qualities needed in employee which then in return improves employee's knowledge stack.

Index Terms – Ratings Analysis, Performance Prediction, Classifier model for Need to improve/Stable/Good areas.

I. INTRODUCTION

In order to establish a reliable standardized performance measurement and evaluation system, various businesses utilize key performance indicators for periodic performance evaluation. Traditionally, conventional performance evaluation practices primarily rely on discrete numerical data excluding any information that relates to the historical performance of the business.

Since knowledge is reported to be the main resource for firms to develop innovation is linked to incremental and radical innovation, which would help in managing the performance, technical, interpersonal skill sets etc.

The theoretical importance of knowledge for organizations has naturally laid the ground for the key role of Knowledge Matrics practices over the past two decades . Knowledge we can find in different forms, and the main difference is between good and bad areas of knowledge. The latter concerns the personal skills of employees and is therefore more problematic to codify and imitate.

Thus, knowledge is something that lies with a firm's employees.

1. Getting employees knowledge information
2. Finding out the exploitations and explorations
3. Rating the skillset
4. Analysing the employee's performance
5. Predicting the results based on analysis done(Future performance)
6. Show predieted values to improve skill set.
7. Visualize the details predicted by software

II. LITERATURE SURVAY

Performance measurement and evaluation methods are well studied in the literature. Owing to their multicriteria nature, various multicriteria decision-making (MCDM) approaches have been applied to several industries [1]. For instance,

The history of the world can be categorized into four distinct Industrial Revolutions. The first, second, and third Industrial Revolutions were to the benefit of humankind and moved society forward. These three revolutions saw the introduction of mechanization, lectricity, and information technology into the workplace. The first Industrial Revolution was characterized by mechanization and steam power. The second Industrial Revolution was characterized by the mass production of goods and the introduction of assembly lines that were all powered by electrical energy. Automation, computers, and electronics characterized the third Industrial Revolution. Industry 4.0, or the fourth Industrial Revolution, was then introduced. Li [2] is of the opinion that the fourth Industrial Revolution is all about integration. This integration takes place across the entire value chain of the life cycle of a product or service.

This section provides an overview of each Industrial Revolution,focusing on the aspects that initialized the specific revolution.

A. First Industrial Revolution

Prior to the first Industrial Revolution, labor was done manually by artisans and their apprentices, and no mechanization existed. The advent of the first Industrial Revolution turned this around. The introduction of water- and steam-powered mechanical manufacturing facilities made mechanization possible [3]. migrated from rural to urban

areas. This revolution started in about 1784 and lasted for 86 years.

B. Second Industrial Revolution

The second Industrial Revolution started due to inventions in energy, materials, chemicals, and medicine. This

phase in the human history was extremely fruitful in innovations, which were built upon knowledge and science and the interaction between them. During this period, the living standards of ordinary people increased as innovations and technologies became part of their daily lives [4].

An example is electricity in households. The purchasing power of ordinary people also increased as more people were employed in factories to assist with the mass production of goods [10]. This period also saw the involvement of governments as a major role player because the new large technological systems required a great deal of coordination.

C. Third Industrial Revolution

Almost a century passed between the advent of the second Industrial Revolution and the third. Atkeson and Kehoe explain that this took so long because it took quite some time for people to learn how best to use the new technologies. They had to learn how technology works as well as how to work these new technologies optimally.

Technologies were also industry as well as organization specific, which made it close to impossible to transfer knowledge and skills. The advent of the third Industrial Revolution came through the introduction of computer technology, information technology, and widespread digitalization.

D. Fourth Industrial Revolution

The fourth Industrial Revolution, or Industry 4.0, started in 2011 among German companies. Industry 4.0 focuses on integrating various technologies that enable ecosystems to function in an intelligent and autonomous way, decentralizing factories, and integrating product–services. Industry 4.0 came about as a direct result of the significant technological developments in information and communications technology (ICT), cyber-physical systems, and the IoT [5]-[6].

Industry 4.0 provides information everywhere and any time and to achieve this, "all involved resources have to be integrated as dynamic, self-organized, real-time, and autonomously optimized value-adding systems".

Industry 4.0 has an impact on various systems and management domains, but for the purpose of this paper, its impact on the organization, i.e., flexible work organizations and competence management, is relevant. Following table 2.1[7]-[8] shows the example of performance criteria's to be considered:

	Veterans	Baby Boomers	Generation X	Generation Y	iGeneration
Workplace Traits	Strong work ethic Respect authority	Team oriented Optimistic Relationships Sacrifice Loyal Hard working	Practical Pessimistic Work-life balance Technically independent Adaptable	Ambitious Self-esteem Narcissism Technically independent Multitasking	Take advantage of advanced technologies Acceptance of new ideas Different conception of freedom
Leadership Style	Military chain of command	Influencing High expectations Mentoring	Practical Goal-oriented	Flexible Adaptable Lack of social grace Ambitious	Unknown at this point
Motivation	Value of experience Value of loyalty Value of perseverance	Demonstration of their ability Bonus and other incentives Value of their contribution	Work-life balance Non-hierarchical structure Time off as incentive Loyalty	Higher position Monetary gains Lower need for social approval Innovation	Feeling of fulfilment and excitement that helps move the world forward Involved in their community and their futures
Learning Style	Classroom On-the-job training	Classroom Instructor focused	Technology focus Mentors	Creative thinking Visual	Intrapersonal and independent learning Learning to be practical and hands-on Engage with and apply the

Table 2.1 Generation Summary

In addition to using the Naïve Bayes classification technique as another classifier, where three experiments were conducted based on real data collected from several organizations for detecting the most effective factors on the employees' performance. Moreover, the results of experiments showed that the job title was the effective factor on the employees' performance [9].

H. Jantan, Norazmah Mat Y. and Mohamad Rozuan N. (2014) applied SVM technique in the Classification process of Employee Achievement. The accuracy was considered satisfactory by the SVM technique but needs some enhancement to get the higher [10].

Hamidah Ja., Abdul Razak Ha., and Zulaiha (2010a) presented an important study about the problems that may face the talents management that can be solved by using various DM techniques. In this study, they attempted to settle one of the talents management tasks as identifying potential talents by predicting their performance based on previous experience knowledge and introducing the suitable DM Technique for this issue. [11].

Hamidah Ja., Abdul Razak Ha., and Zulaiha (2009) also discussed the potential classification techniques for talents' forecasting. In this study, they used various classification techniques such as DT, NN, and KNN. They focused on the techniques' accuracy to detect the most suitable one for HR data. The results showed that the DT technique was the potential one for talents' forecasting in HRM, where it had the highest accuracy. The used dataset was collected from a higher education

institution for academic staff [12].

III. PROPOSED SOLUTION

3.1 Architecture:

System Includes architecture based on web development which follows the workflow as given in the above introduction part which gives general idea about the system. Provides a system, method and computer program product for tracking the performance of an employee. Various details relating to each activity undertaken by the employee are captured. The analysed and observed details may be used to monitor the activities currently being performed by the employee, generating reports detailing the time spent by the employee on various activities, availability of the employee. The block diagram is shown in Figure 3.1.

3.2 Methodology:

In managing employees, it is desirable to track how the employees spend their time. Such tracking is useful for determining employee performance. As used herein, the term "performance" includes, for example, one or more of the following parameters: tasks, including projects and processes being performed, time spent on a particular task, efficiency, productivity, output, downtime, and the like. Such information can be used by managers, for example, to evaluate labor costs, schedule employees to meet labor demands (i.e., provide appropriate staffing), evaluate individual and group productivity, etc. Collection and analysis of such information, however, is tedious and time consuming.

We can also think of the skillset rating given to employee, where he would be able to give the ratings as per his own knowledge-based skill set and along with that respective supervisor can also give their rating based

on which the further employee performances can be predicted.

We can make use of one template information as shown in Table 2.1, All these parameters are the area's where employee exploitations ie the already having skills and explorations that are skills set that employee wishes to learn. Algorithm analysis are shown in below fields

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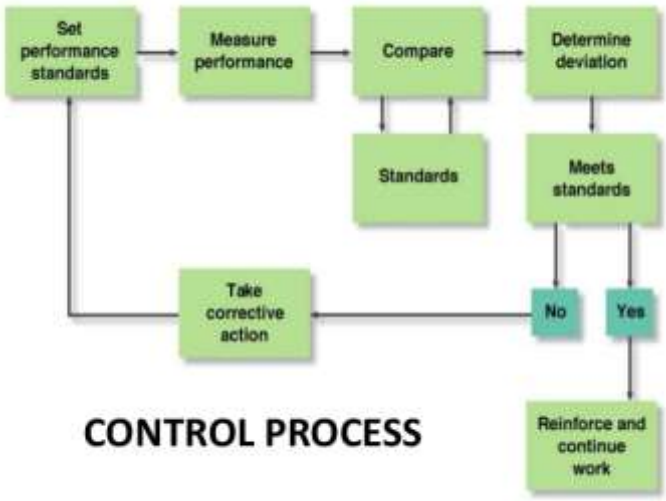

Figure 3.1 Block diagram of proposed solution.

3.3 Algorithm:

3.3.1 Data Mining:

Data mining techniques such as association, clustering, classification, quantity prediction are used by organization's in order to set performance matrics and predict the future outcomes. Figure 3.2 shows algoritm analysis considered for performance prediction system.

Collecting data and converting it into meaningful manner would lead us to variety of solutions for regular problems.

Data mining helps us to use data in a way that we can make suitable solution on the problems. In my case, if the regular cultural data which has been followed by decades could be useful in predicting performances using which employees would know their better areas and improvements on which they need to work on.

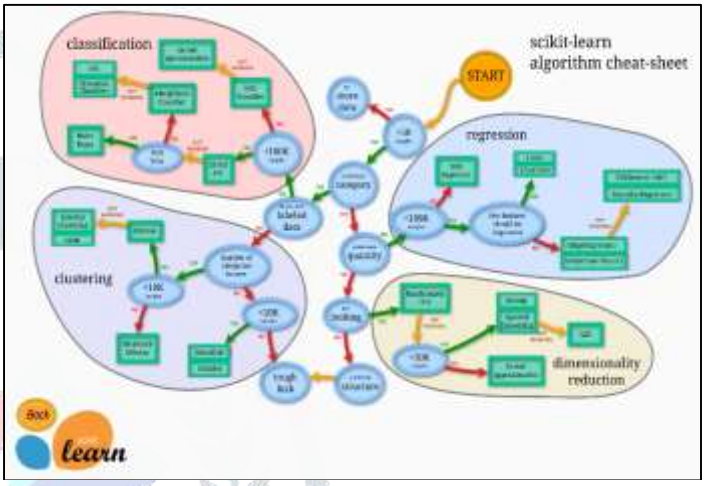

Figure: 3.2 Algorithm analysis

3.3.2 Regression: -

The method of Support Vector classification can be extended to solve regression problems. This method is called Support Vector Regression.

The model produced by support vector classification (as described above) depends only on a subset of the training data, because the cost function for building the model does not care about training points that lie beyond the margin. Analogously, the model produced by Support Vector Regression depends only on a subset of the training data, because the cost function for building the model ignores any training data close to the model prediction.There are three different implementations of Support Vector Regression: SVR, NuSVR and Linear.

LinearSVR provides a faster implementation than SVR but only considers linear kernels, while NuSVR implements a slightly different formulation than SVR and LinearSVR. Currently I found that SVR regression supports the quantitative prediction at a good precision by taking reference of below Figure 3.2 in my research.

3.3.3 SVR –

Since I wanted to predict quantity outcomes, ie the performance of skill set category for upcoming months, SVR helps here.

It works with training data with minimal samples and trains algorithm. For large datasets consider using sklearn.

svm.LinearSVR or sklearn. linear_model. SGDRe gressor instead, possibly after a sklearn. Kernel_approximation.

Nystroem transformer.

Figure 3.3 Shows the algorithm analysis.

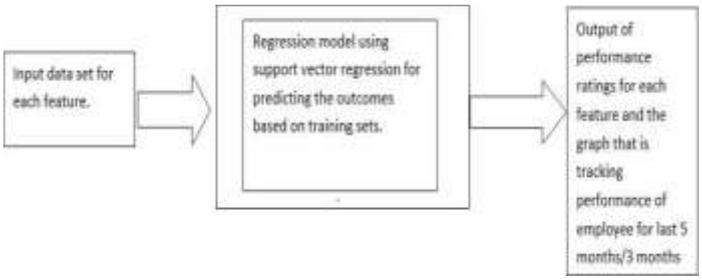

Figure: 3.3 Algorithm analysis block diagram

IV. CONCLUSION

In this paper, Employee performance prediction system is proposed. The future work includes integration of this system with Web interfaces and Databases.

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