SVM and RF Based Performance Enhancement in Organization: A Study on KGI, Odisha and its Organizational Growth.

ABSTRACT

Organization and organizational growth are two important aspects of a society and its relevant advancement. Now along with organization and its growth, the society advancement becomes most priority for the new age. Technologies that are becoming essential for these growths must have to be inculcated in new age society for complete advancement. Artificial intelligence, machine learning and deep learning are taking industry in a different horizon for complete globalization and adequate smarter than ever before. This paper dives into the organizational growth in particular having studied different aspects of making it even better and implementing different algorithms of AI/ML technologies to provide the best result for organizational growth. The Industry 4.0 has paved the way to build a strong organizational infrastructure for its sustainability in this competitive scenario. It is continuously leveraging different technologies and techniques to strengthen the growth. The next step is to adapt to the Industry 5.0 which works only with efficient robots and quantum computations. Researchers are searching and implementing every possible algorithm to its current infrastructure so as to produce effective results and methodologies that are best suited for fetching higher productivity. Artificial intelligence and Machine learning has produced immense growth in organizational success in recent times. The detailed study of Machine learning based algorithms in organizational growth is rapidly increasing in current years. Basically resource management, staff selection, training, monitoring and data analysis in an organization can be implemented with Machine learning algorithms for its complete growth. The challenge is to choose the proper algorithm from a specific learning technique and properly implementing it to the organization's different aspects. In this paper basically Support vector machine (SVM) and random forest (RF) algorithms are analyzed and implemented to the specific organization KGI for effective resource management. The result is compared to get best suitable organizational infrastructure that is suited for industry 4.0.

Keywords: ***Organizational growth,AI,ML,SVM,Random Forest Algorithm, Resource Management, Organizational growth, Industry 4.0.***

INTRODUCTION:

In the fast moving society organizational growth is most essential in order to compete with others. Particularly technological advancement in an organization gives them that extra edge over others [1].In propelling proper globalization along with technological advancement, artificial intelligence and machine learning has provided quite humongous revolutions.AI and ML are the next generations daily need that is essential for every field starting from small start ups to the global giant. Different enabling technologies in AI/ML have put the revolutions in industry4.0. It is now evident that during the COVID-19 pandemic, demographic, political, and socio-technical developments have all accelerated quickly. In these difficult times, modern firms have had to refine their adaptive skills to handle shifting market dynamics and customer behavior. Adaptive capabilities, which serve as the foundation for organizational change and digital transformation [1], enable rapid organization growth. However, in order to keep up with the exponential pace of modern technology, strategic guidelines are still lacking [2]. Modern technology is used by established companies to enhance and modify their operations. Among those technologies is artificial intelligence, sometimes referred to as the next wave of analytics[3,4,5]. The term "artificial intelligence" encompasses a broad spectrum of cutting-edge applications, logic-based techniques, and analytics. AI is having an increasing impact on a wide range of societal issues, including marketing, healthcare, and human rights. Allowing the development of AI applications to proceed without control may be damaging [6]. As a result, it is vital to support a trustworthy AI that follows legal criteria and adheres to moral norms (both technically and socially). Because AI should be considered as a dynamic computational frontier, regulation should extend beyond content to include analysis [7]. To address difficulties such as a lack of alignment between business users and analytics practitioners, governance processes for analytics must be in place alongside IT and data governance [8].In this paper we analyze the organizational structure of Koustuv group of institutions(KGI),odisha, a primary source which is used here also as the model for AI/ML algorithm implementations. Different algorithms like Support vector machine and random forest are applied to enhance the efficiency of the source model. This study explores how AI may be integrated with business and IT strategies to drive digital transformation. The study revealed that organizations often go through a digital transformation due to technological advancements and legal changes, and that integration is crucial.
Integrating AI with business and IT strategies is critical for enhancing corporate value and aligning digital transformation. The report emphasized the need of focusing on both creative and routine AI deployment, responsible AI governance, and using AI to enable adaptive transformation. The study's conclusions help firms optimize their usage of AI to achieve strategic flexibility and benefits.Artificial intelligence and Machine learning has come up with numerous solution to optimize the global problem in recent times. Specifically the technological advancement and reduction in problem complexity are totally managed by the ML algorithms. Now every organization is coming up with different frameworks to set up new model that gives proper growth to their organization. These frameworks are either ML inclusive or AI implemented [9].

LITERATURE SURVEY:

Borges and colleagues (2020) conducted a comprehensive analysis of the relationship between artificial intelligence (AI) and business strategy to generate business value. Their objective was to bridge the existing gap in knowledge by conducting an extensive literature review focused on the integration of AI with business strategy. They also aimed to combine current approaches and models in order to highlight the potential benefits, challenges, and opportunities associated with this integration. Additionally, the authors sought to identify areas for further research and discussion. To accomplish their goals, they curated a selection of articles from peer-reviewed journals and conference proceedings and developed a framework to identify research gaps.

Similarly, Caner and Bhatti (2020) conducted a systematic review of peer-reviewed scientific journal papers to propose a theoretical model for examining AI organizational strategy. Their focus was on papers published between 2015 and 2019. The researchers deduced that the crucial elements of artificial intelligence (AI) within organizations encompass the capabilities and limitations of AI, the financial aspect of AI, the integration of AI with organizational functions, the impact of AI on the workforce and industries, and the legal and ethical implications of AI in shaping corporate strategies.

Trunk et al. (2020) conducted a comprehensive analysis of the literature to explore the relationship between AI and decision-making in dynamic business environments. The authors reviewed peer-reviewed papers and employed content analysis to provide a synthesis of the existing research, elucidating the ways in which AI is correlated with decision-making in dynamic environments. The findings are presented within a theoretical framework that initially outlines how humans can embrace AI for decision-making in dynamic settings, and subsequently discusses the challenges, prerequisites, and consequences that need to be considered.

Raisch & Krakowski, (2021); Lebovitz et al., (2022) has drawn the comparative analysis of augmentation versus the automation of AI technology as a machine intelligence. It not only pacified the distinct analysis of ML and AI for next generation organizational growth but also mentioned the human intelligence and machine intelligence differences. The relationship between AI and the augmentation of human intelligence is dynamic and complex and needs to be investigated.

Zhou et al., 2021 defined augmented intelligence as “enhancing and elevating human ability, intelligence, and performance with the help of information technology”. Augmented intelligence informally means computers and humans working together, by design, to enhance one another such that the intelligence of the resulting system improves.
Now as the more studies goes into it the organizational growth and performance enhancement of any organization or industry relies on the new technologies like AI,ML,IOT and DL.
The vivid study provides a roadmap to fill up and huge research gap which needs to be minimized .So this study basically aims towards the performance enhancement and efficiency of any organization can exclusively increased by adopting different technologies and algorithms that best suited for them.

PROPOSED MODEL FOR PERFORMANCE ENHANCEMENT IN KGI:

S.Dey et al 2024 has proposed an AI and ML driven model for resource management in KGI, odisha. In this paper it has been designed to prepare a model based on different algorithms of ML like SVM,RFfor performance management as well as enhancement in organization. The basic performance enhancement factors and its respective inclusion with ML has been proposed here.

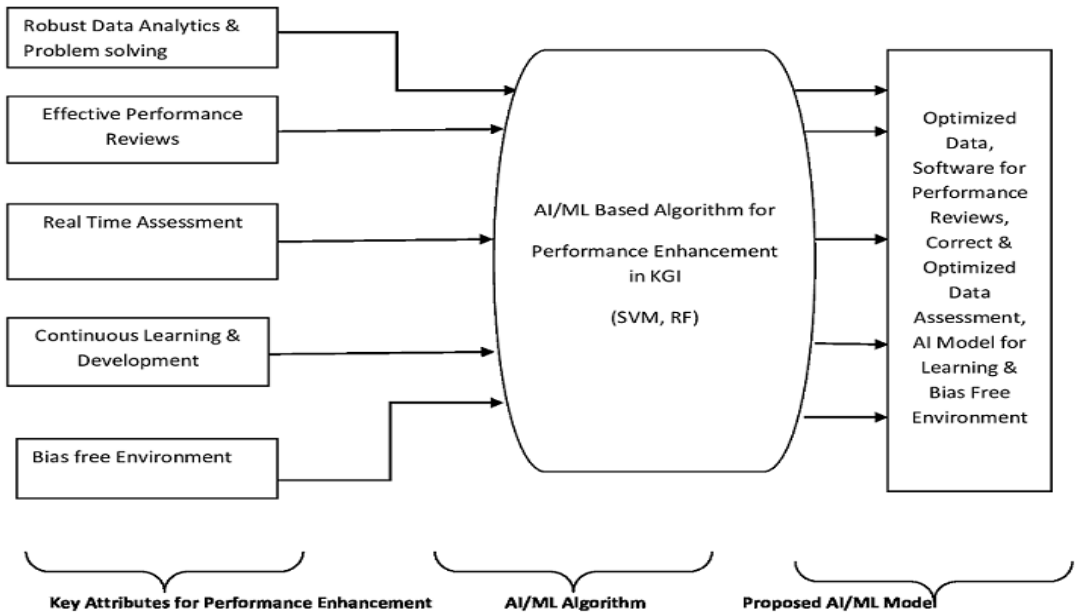

FIGURE 1: PROPOSED MODEL FOR PERFORMANCE ENHANCEMENT

Any organization's hope of achieving its set goal depends primarily on its human resources. Promotion and training can help prevent employees from leaving the organization, which can

improve employee performance and ensure job satisfaction. In any organization or business where employees are not given promotion and training opportunities, employee moral behavior can be poor. This can create errors or mistakes and lead to job dissatisfaction and the organization may not function properly, leading to even lower retention and turnover rates. Lack of promotion and training directly affects overall performance; this can lead to financial losses and experienced employees leaving the organization. The KNN, RFand SVM model were developed, trained, tested and evaluated using the same data using a grid search cross-validation test. A network search technique was used to select the best and optimal kernel and predict the support vector value for promotion and training. RFtests gave the best 79% and SVM 92%..

SUPPORT VECTOR MACHINES ALGORITHM

Support Vector Machine is a supervised learning model which can be used for both classification and regression challenges. However, it is mostly used in classification problems where the data is sparse (easy to classify). We perform classification by finding the hyper-plane that differentiates between the two classes very well.

RANDOM FOREST ALGORITHM

Random Forest is also one of the most used algorithms in machine learning. It can be used for both classification and regression tasks. The “forest” it builds, is an ensemble of decision trees, usually trained with the “bagging” method. The general idea of the bagging method is to create a combination of learning models which improves the overall result. Basically, Random forest uses multiple decision trees and merges them together to get an accurate and stable prediction.

RESULT ANALYSIS:

In the analysis part some survey is done based on some specific questionnaires. These are mentioned below:

- How would you rate the adequacy and transparency procedure in the organization?
- How would you rate the efficiency of the quality management and enhancement of efficiency processes?
- How would you adopt the new technologies?
- How employee prefers the bias free environment and adopts it subsequently?

Figure 2: employee feedback analysis report 1

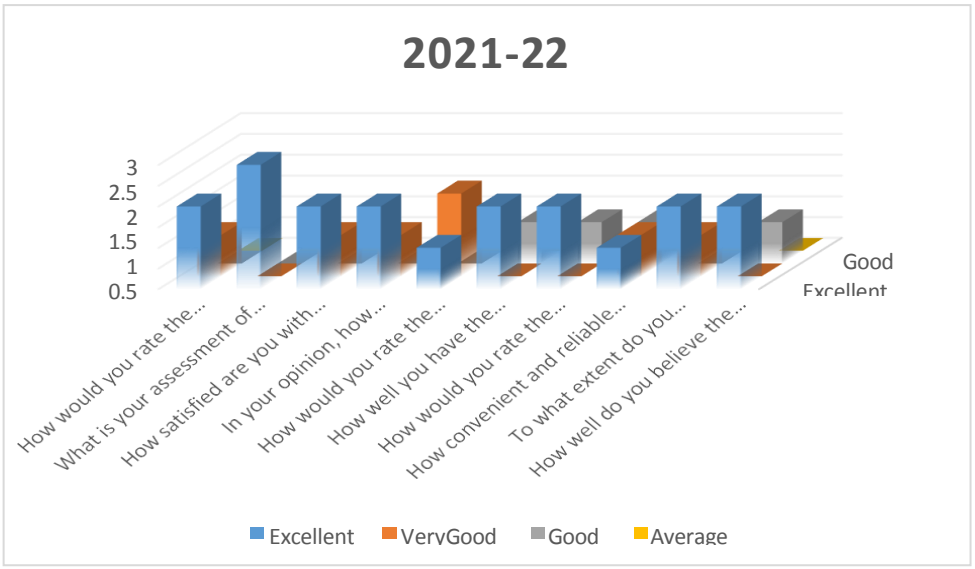

Figure 3: Employee feedback analysis report 2

Data set:

The basic survey is conducted and leads to a set of data source. This data set is constructed to the different attributes like model based training and model based testing. In the basic survey containing the questionnaires key attributes that are taken into considerations are gender, job category retained or new entrants, job satisfied or unsatisfied, target achiever or not etc. A total of 310 data set is created amongst which 70% is used for training model and 30% is used for testing model.

Training model data set = $\frac{70}{100}$× 310 =217.

Testing model data set =$\frac{30}{100}$× 310 = 93.

Table1: Development of data set for training and testing

	Gender	Retained in job	New Entrants	Training	Tested &Promoted	End Result
1	Female	Yes	Yes	No	Yes	Training
2	Male	No	No	Yes	Yes	=
3	Female	No	No	No	Yes	Training
4	Female	No	No	No	No	Train&Promote
5	Female	No	No	No	Yes	Training
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307	Female	No	No	Yes	No	Promotion
308	Female	Yes	Yes	No	Yes	Training
309	Female	No	No	No	Yes	Training
310	Female	No	No	No	Yes	Training

Design Algorithm: SVM (**Support vector machine**)

Step 1: Initiation
Step 2 :Find candidate_ SV with closest pair from classification(SV=>support vector)
Step 3 :If there are violating points:
Step 4 :Find violating_ points
Step 5:Computethecandidate_SV=candidate _SV+ violating _points)

Step 6:If there is any α_p< 0due to the addition of c to S that gives negative:
Step 7:Candidate_SV=candidate _SV
Step 8 :Repeat module to pr une all data points
Step 9 :end_ if
Step 10 end_ if

Performance Evaluation

The prediction accuracy, mean score and standard deviation and cross validations curve are employed to evaluate the performance of KNN and SVM classes.

The accuracy is the ratio of correctly classified data points to the total no. of points in the data set which ranges from 0-100%.

$$\text{Accuracy} = \frac{\text{Number of correct classifications}}{\text{Total number of classifications}} = \frac{TP+TN}{TP+TN+FP+FN} \quad (1)$$

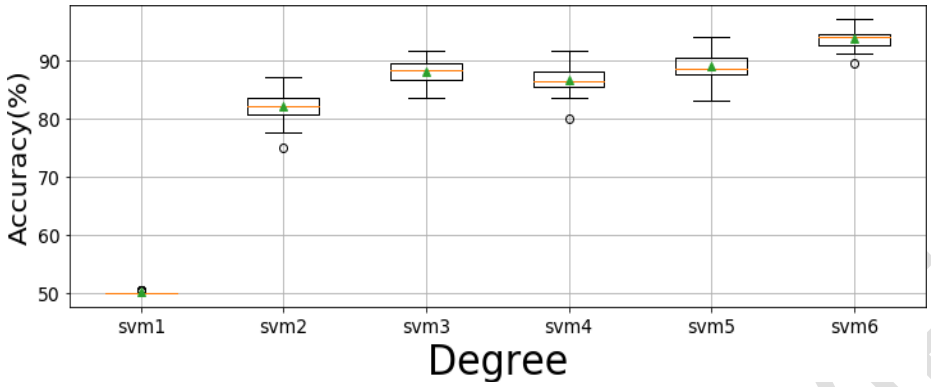

Figure4: Thesupportvectors

Table2:TheSVMmeanscoreandstandarddeviation

SVM	Meanscore	Standarddeviation
1	0.405	0.002
2	0.720	0.026
3	0.800	0.022
4	0.820	0.023
5	0.845	0.025
6	0.905	0.017

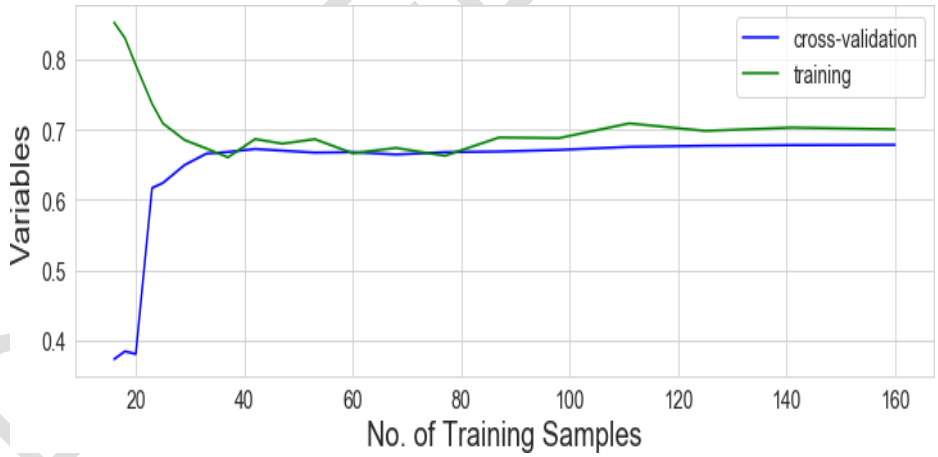

Figure5: TheSVM learning Curve

Table3:TheRFmeanscoreandstandarddeviationacross

RF value	Meanscore	Standarddeviation
1	0.753	0.030
2	0.778	0.038
3	0.795	0.03
4	0.797	0.035
5	0.799	0.033
6	0.800	0.034

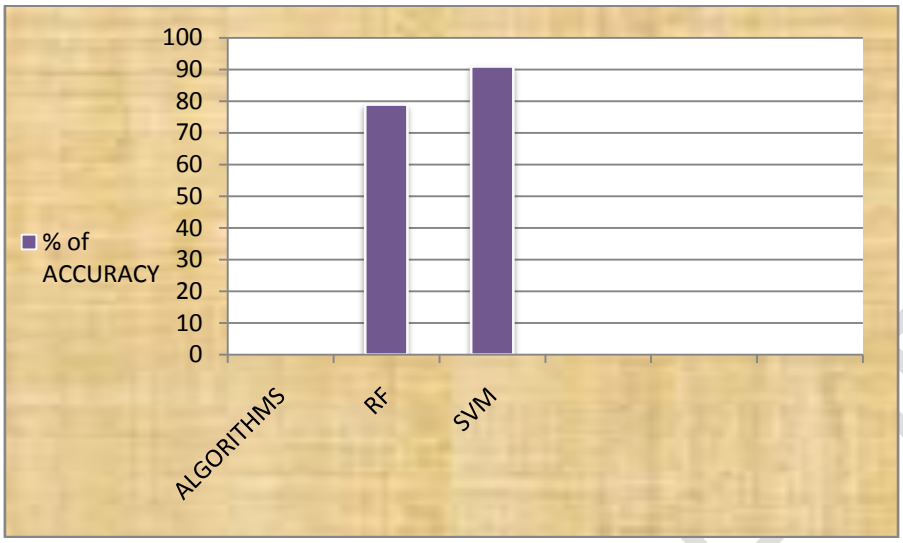

FIG 6.Bar Graph Showing Percentage of Accuracy

CONCLUSION

According to the analysis it has been found that the the SVM algorithm is getting more accuracy than the RF based analysis. In SVM the accuracy is approximately 91% whereas in RF algorithm the accuracy is just 79% to 80%.Thus for performance enhancement in KGI, the SVM algorithm may be included and take as best algorithm for its growth. In future analysis of different algorithm may be taken into consideration. Different algorithm may be included to study the future growth in results for ML implementations. As organizations are keen on providing better performances in Industry 4.0 ,the inclusion of algorithms like Decision tree, ANN, Naïve Bayes algorithm and KNN should be studied vividly on this regards.Also researcher may find interest in comparative study related to this.This paper studies basically two algorithms SVM and RF algorithm of machine learning that boosts up the general performance in a particular organization. The study also dives into the few constraints and future results that affects the performance of the organization.

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