

Transition: Impact on Workforce from Primitive Digital Tools to GEN AI Tools

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Abstract

The transformative world from neurons to bits is possible due to Artificial Intelligence which makes life easier. The transition from mundane to quantum work. One of the examples is virtual assistant bots help to manage the workforce and automate the process at your workplace. The tools to improve the task, automation level, employee engagement, remote work, digital literacy affects the different workplace outcomes to predict Role definition, Job satisfaction and Work Agility. The methodology used multi-algorithmic models like Linear Regression model is used to predict the job satisfaction as a continuous variable, XGboost ensemble algorithm is used for calculating workflow agility and clustering is used for Role Definition three different models have been used as per the data type of target variable following algorithms has used. Moreover, Role definition in workplace can be implemented using Clustering, just to compare the performance using accuracy and CH- Index value and the experimental results proves that which is the better approach, K-Fold Cross validation technique will be implemented for better evaluation. The Experimental results will be proven using evaluation parameters like Accuracy, Precision, Recall, F1-Score and Calinski-Harabasz Index. Henceforth results will conclude the transition is effective that will be further validated though the complete study.

Keywords: XGboost, Calinski-Harabasz Index, Multiple Linear Regression

Introduction

Digital Tools was the highest leading innovative way that changed the system, streamlined the process, improving work culture either in education, Healthcare, Finance and many more verticals. These tools have wider zone of learning and now in AI, era tools are primarily inclined towards AI tools to improve automation, robustness, more streamlined process. The novel reason of transformation is bridging the digital gap related to work force is that it is often diagnosed which greatly maximizes the job satisfaction, workflow agility and Role Redefinition using AI Tools. AI tools are the most commonly used tools that are develops to mitigate and

improves result for the organization. The current practice gap is the system itself is not capable to change the text or adapt the changes as per the context of user. Pedagogical strategies of traditional tools adhere rule-based logic but when integrate with AI the learning practices are reformed. For Example, AI powered Quiz generator tool understand the context of user, generate the content as per information itself understand the level of difficulty on the other hand, Digital tool likewise Google Form also does the same thing but user has to give the clear and concise text you have to type the questions, answers at their own, provide rating as well and level of questions are decided by user itself is a challenging task

Work Related to Research

There was remarkable advancement in collecting & creating digital content using AI tools. The development of tools for generating the digital content makes life so easier across each sector. The author [1]J. Yunus Basha Artificial Intelligence based tools had simplified the employee's tasks, improves efficiency and accessibility in mundane task. Despite, this AI revolution comes with a set of challenges specifically concerning to study the impact of AI in students' academic and real life. This study indicated that excessive use of AI base tools leaves a negative impact on critical thinking, generating business logic and in decision making in students' life. To address these issues researcher proposed some solutions to come out from this problem. According to author a balance usage of AI tools and promoting that digital usage must be for wellbeing but not for the dependency. AI is necessary across sectors due to their positive aspects like predictive analysis, real -time decision making, and optimality. [5] Researcher Devarajan.S et.al has discussed digital transformation in different fields like Metrology AI-enables machines to predictive weather events, to prevent life. In Business AI helps in recommendation of product, improves operational efficiency through PDP loop which enhanced the marketing, CRM and CXM. The main aim of researcher Krishnat H. Chougale .

Methodology

The data set is collected from Govt and Non- Government employees approximately 1000 employees are the target audience to measure their impact with specifically focusing on Job Satisfaction, Work Flow Agility and Role Redefinition. Impact of professionals have been evaluated using multi modal analytical approach. Job satisfaction is assessed using Linear Regression, offering insights into the influence of various independent factors. Workflow agility is examined using Ensemble algorithm XGBoost due to its nature to capture high and complex data. Role Redefinition parameter is computed using Clustering despite the availability of predefined label. This was carried out to find the hidden patterns, focus on schema and to verify whether the data exhibits biased and validate the integrity of the clustering results. The Ch Index is used to support the study by identifying the optimal numbers of users and to determine which is the dominant category - digital or Generative AI-based learning environments.

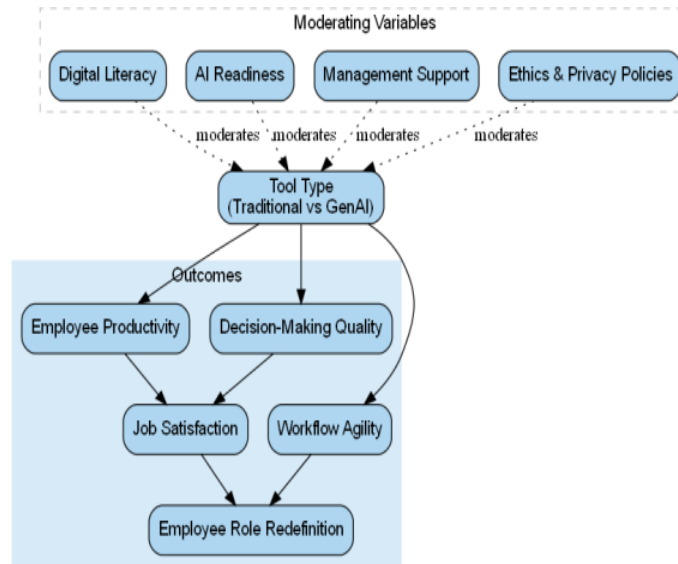


Figure1: The moderating variables influences the transition to AI tools
(Source: Created by Author) The interpretation is higher CHI better the clusters).

Proposed methodology:

The proposed Research methodology adopts multi model approach in this architecture that incorporate a feature map of influential variables aligned with intended outcome. For illustration of this workflow various stages are outlined. Additionally, model is equipped with following equation to proven the study.

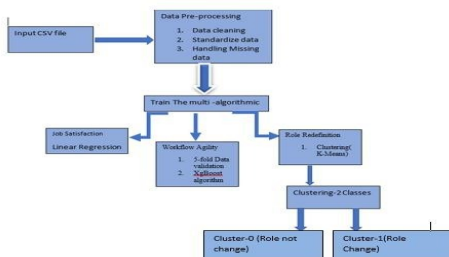


Figure:2 Workflow of Multi-Algorithmic Pipeline

The following equations are used to compute the target variables

$$Y1 = (wt1 * x1 + wt2 * x2 + wt3 * x3 + wt4 * x4) + \text{noise} \quad (1)$$

$$Y2 = (Y1 + x2) > \text{thres} \quad (2)$$

The above proposed equation wt1, wt2, wt3, wt4 are the weights or the relative importance of predictors (0-1) depends on their relative importance weights are assigned Y1 is the output variable in terms of Job_ satisfaction and Y2 is the Role Redefinition x1, x2, x3, & x4 are the modelling variables Digital Literacy, AI_Readiness, Management Support and Ethics & Privacies Policies noise, is some random variable with 0 mean ,5 as standard deviation and no_of _samples. It is added for mitigating the overfitting problem and to maintain the non-linearity.

Thres, is variable is for threshold computed using Job satisfactions(Y1) average likely between some range a-b and AI_Readiness(x2) range is like c-d. The expression for computing threshold value is expressed as:

$$thres = avg [(add (min (a - b, c - d))) + (max (a - b, c - d)))] \quad (3)$$

here,

a - b, range lies in the interval of [60-100] c - d, range lies in the interval of [40-95]

These values come from because the job _satisfaction is counted in Likert scale with range of (1-5) and when we compute the percentage the following range comes the formula

Implementation & Training and challenges/Future Scope:

Implementations and Training

The study was implemented and trained using Python and machine learning and ensemble techniques. The first outcome is Job satisfaction using Linear Regression. To prevent overfitting problem noise is added in eq (1) with 0 mean and 5 as standard deviation along with the no of samples. Second outcome is Workflow Agility Grid is trained with ensemble technique XGBOOST and for results improvement GridSearch CV is added to tune the hyperparameter boost the accuracy and the learning rate is set to [0.1,0.05,0.001], and other hyperparameter for tuning are max_depth is [3,5,7], no estimators are [100,200,300] and gamma is [0,1,5] have been used to evaluate the best score. The results were calculated on fold used as test set, and the final result was obtained by averaging the metrics across the five trials. Third outcome Role Redefinition is computed using job satisfaction and the variable AI Readiness here threshold is set as 140 by using the formula mention in expression (3). are no_samples are 300, optimization algorithm used quasi-newton 'lbfg' solver suitable for small to medium size dataset and for handling multi class classification the 'multinomial' option is used. In this study clusters are evaluated within the range from 2 to 7 and the best score is determined based on CH Index. The following figure illustrates that higher CH Index occurs at cluster 2.

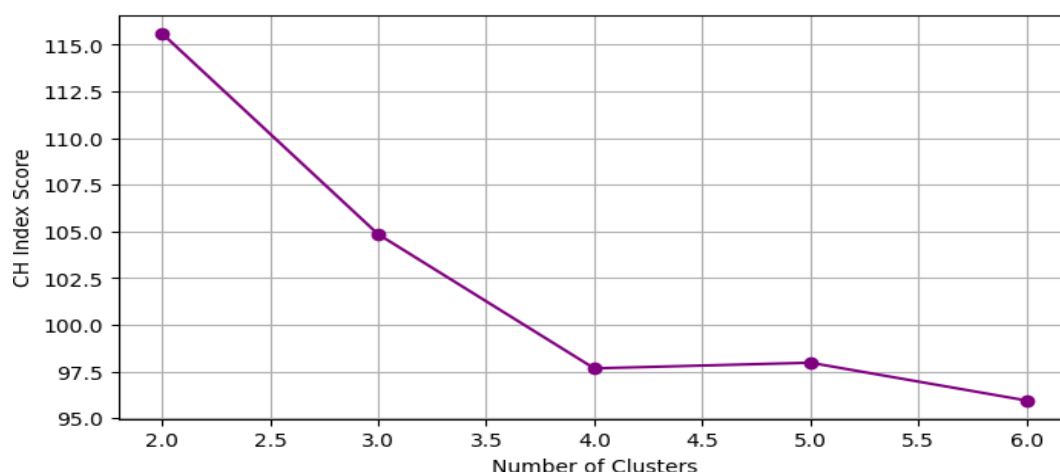


Figure3: Calinski-Harabasz Index for KMeans Clustering

Interpretations

Table1: Performance Metrics of Models Across Target Variables

S.No	Target_Variable	Algorithm	Metric	Output
1	Job_Satisfaction	Multiple Linear Regression	MSE R^2	21.4276 0.7418
2.	Work Agility	XGboost Regressor with GridSearchCV	MSE R^2	32.28 0.4567
3.	Role - Redefinition	K-means	Calinski-helnski-Index	K=2, CHI is 115.0
4.	Role-Redefinition	Logistics Regression	Accuracy Precision Recall F1-score	84.44% 80% 69% 74%

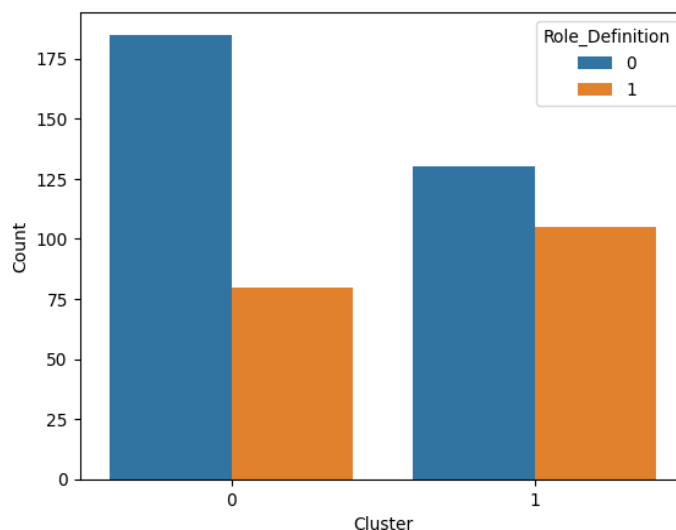


Figure4: Role Redefinition Distribution by Cluster

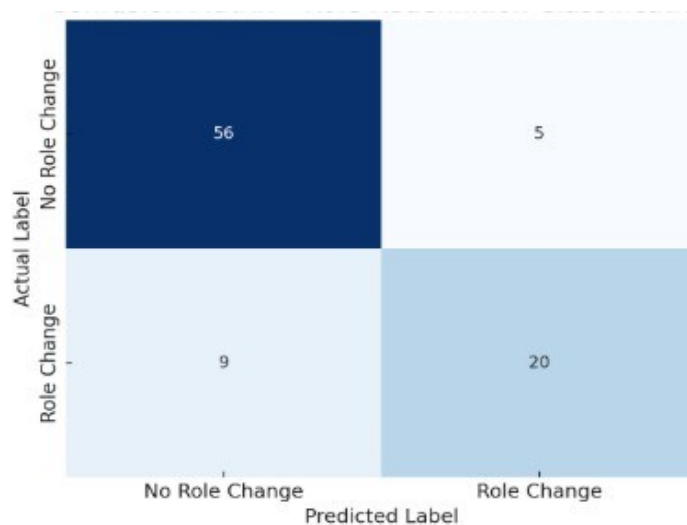


Figure5: Confusion matrix: Role Redefinition Classification

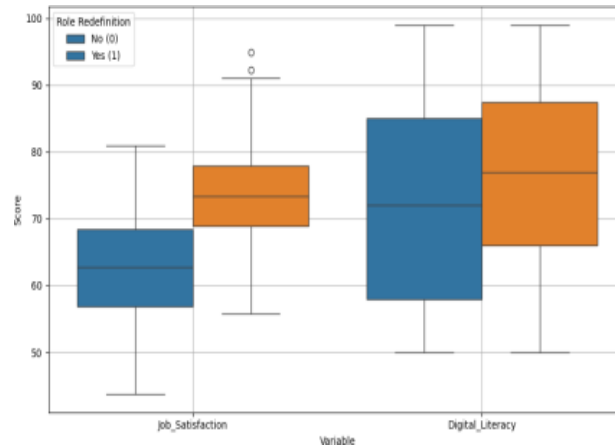


Figure6: Box Plot of Job satisfaction and Digital Literacy by Role Redefinition

The result based on Role Redefinition on the basis of Job satisfaction and AI_Readiness the study analyzed that number of employees in each cluster. The chart depicts that cluster 0 maximum number of users did not want to undergo Role change. These findings emphasize the need for inclusive change management strategies that support all employees in adapting to AI-enhanced environments. CHI index is computed using the expression (6). Role Redefinition outcome is Binary Class classification task where we classify employees into two categories SubType- 0 and SubType-1. SubType-0 class means employees are neither ready to adapt nor willing for role change. SubType-1 class means employees are ready to adapt and willing for role change. The accuracy of algorithm is 84.44% with precision of 80%. is computed from expression. The Box plot graph illustrates the comparison study of two key metrics for data distribution are Job satisfaction and Digital Literacy across the Role Redefinition category

Conclusion

Through this study we have used the machine learning and advance machine learning algorithms to categorized AI user and Non-AI users with a specific focus on influential variable of Role Redefinition. The use of AI-tools can serve as a new feather for future endeavours in different verticals. The results demonstrated that our study outperformed previous state-of-the-art models when comparing in digital tool and AI tools users [1-17].

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