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Research Article

New Recruitment Approach Based on Logistic Regression Model

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Abstract

Artificial intelligence (AI) is a pivotal technological advancement developed by humans with the aim of enhancing the quality of human existence. It signifies the capacity of a computerized machine resembling a robot to execute tasks typically performed by humans and replicate human behavior. Machine learning (ML), a subfield of AI, involves the construction of systems that acquire the ability to make predictions about new output values by leveraging existing data, without the need for human interaction. Currently, ML has been incorporated into various fields, including but not limited to medical diagnosis, image processing, prediction, classification, learning association, commerce, finance, and natural language processing. This project aims to employ ML techniques within the human resource (HR) department. The implemented model will enable the human resources department to effectively identify the most appropriate candidates for a job opening throughout the recruitment process, utilizing a comprehensive dataset and considering many criteria, all without the need for manual intervention. The construction of the model involves the utilization of an authentic dataset comprising recruitment tasks. Initially, the dataset undergoes a process of selecting the most pertinent elements from both pre-existing and extracted factors. These selected factors include educational level, age, and past experience. Furthermore, taking into consideration these aforementioned factors, a decision system is constructed utilizing the Binary classification approach. The logistic regression classifier is utilized in this investigation. Subsequently, the dataset is partitioned into two distinct subsets, namely the training subset and the testing subset. The effectiveness of the model is demonstrated by the utilization of various evaluation metrics, including the confusion matrix, recall, precision, accuracy, and F-measure values.

1. INTRODUCTION

In Arab nations, a significant number of organizations encounter substantial challenges related to the lack of digitization in their data management systems, which hinders their capacity to effectively scale their operations. Due to this rationale, numerous firms are using novel technological tools and transitioning towards digital transformation in order to enhance their business processes. The decision-making process is an essential component for companies to address and resolve issues by selecting suitable courses of action. Nevertheless, the level of commitment in this particular field within these nations remains insufficient. The implementation of advanced technology administration based on machine learning techniques has the potential to bring about substantial changes in the management of organizations, particularly in the realm of decision-making challenges [1].

The selection of an appropriate applicant procedure is crucial during the various stages of recruiting. Nevertheless, the process of candidate selection is quite intricate owing to the substantial volume of individuals vying for a certain employment opportunity. Therefore, if the methodology employed in the selection procedure is inappropriate, the outcome has the potential to be muddled and inconsequential. Therefore, it is imperative to have a well-defined job description accessible. Additionally, it is imperative that the criteria utilized for the purpose of selecting the most suitable applicant are characterized by their convenience [2].

The human resources department within an organization may solicit new personnel for a variety of purposes, some of which are outlined below [3]:

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One or more individuals employed by the organization have tendered their resignations. Consequently, comprehensive job descriptions are disseminated via several media, including the official corporate website, LinkedIn, Instagram, among others. Furthermore, the requisite abilities are advertised in order to recruit suitable people.

The organization has lately implemented the addition of additional divisions or positions. Therefore, comprehensive descriptions of these positions are established in order to compile a comprehensive list of requisite abilities for suitable individuals.

The utilization of a precise and comprehensive job description will enhance the effectiveness of an intelligent system in the process of selecting the most suitable employee. Due to the potentially vast number of candidates, the implementation of an automated decision system offers significant advantages in terms of efficiency and time management. Furthermore, this system has the potential to exhibit high performance when evaluated against certain criteria, independent of any bias or human emotions [4].

Machine learning (ML) is a subfield of artificial intelligence (AI) that enables an intelligent system to acquire knowledge and improve performance via experience, without the need for explicit programming. ML enables systems to acquire knowledge from historical data, discern patterns, and autonomously make decisions, thereby reducing the need for extensive human involvement. ML employs several techniques, such as decision trees, regression, support vector machines, and ensemble methods [5].

Furthermore, ML is extensively employed in the corporate sector due to its ability to facilitate the comprehension of customer and staff behavioral patterns, as well as the analysis of company processes. Furthermore, it facilitates the determination of the viability of developing new items. As a result, ML has emerged as a formidable contender for numerous enterprises [6].

This article aims to explore the application of machine learning techniques in supporting the recruitment process inside the human resource department. This paper consists of six primary sections. Section 2 introduces the human resource department. The concept of machine learning is expounded upon in Section 3. The methodology under consideration is expounded upon in Section 4. The findings are presented and analyzed in Section 5. Finally, a comprehensive conclusion is illustrated in Section 6.

2. HUMAN RESOURCES

The HR department comprises persons who constitute the workforce of a company or business sector. Its purpose is to underscore the significance of employees as a vital component of the business, emphasizing the need to manage them proficiently in order to attain success. The word comprises all individuals employed within the business, including both managerial and non-managerial personnel, who have been recruited based on predetermined criteria. The individual is responsible for formulating plans, rules, and procedures that effectively structure the workflow in order to accomplish the organization's objectives, while also guaranteeing its long-term prosperity through the execution of its strategic initiatives [7].

Researchers in the field of management have directed their attention towards the human factor [8]. Their focus has been on investigating ways to enhance human well-being by optimizing the utilization of human resources across different time periods.

When an organization acquires human resources with the necessary skills and knowledge, it may be stated that the organization holds a reservoir of human resources. Consequently, the organization must uphold the following principles [9]:

- The existence of persons who are willing to cultivate talents in a suitable manner facilitates the enhancement of their competences.
- Individuals are able to attain their personal goals and self-actualization by effectively contributing to the aims of the institution through the acquisition and use of skills.

Hence, the primary objective of the HR department is to attain optimal efficiency in the performance of the organization's workforce, achieved through effective management practices and the implementation of procedures aimed at enhancing employee productivity, commitment, and fostering healthy competition, ultimately leading to the attainment of the most favorable outcomes. Furthermore, HR personnel strive to attract and recruit individuals with exceptional competencies, while also endeavoring to motivate employees based on their performance and accomplishments through various forms of awards. This approach plays a significant role in enhancing productivity levels and overall performance [10].

2.1 Human resources primary responsibilities

There is variation in human resources activities among different institutions. The human resources function is intricately connected to the institution. The department engages in many tasks alone or in collaboration with other departments within the institution. These activities include conducting individual interviews, designing development programs, strategizing, evaluating performance, and making decisions. These functions pertain to the activities carried out within an organization in collaboration with the human resources department, impacting several domains. The core duties of the HR department can be succinctly outlined as depicted in Figure 1 [11]:

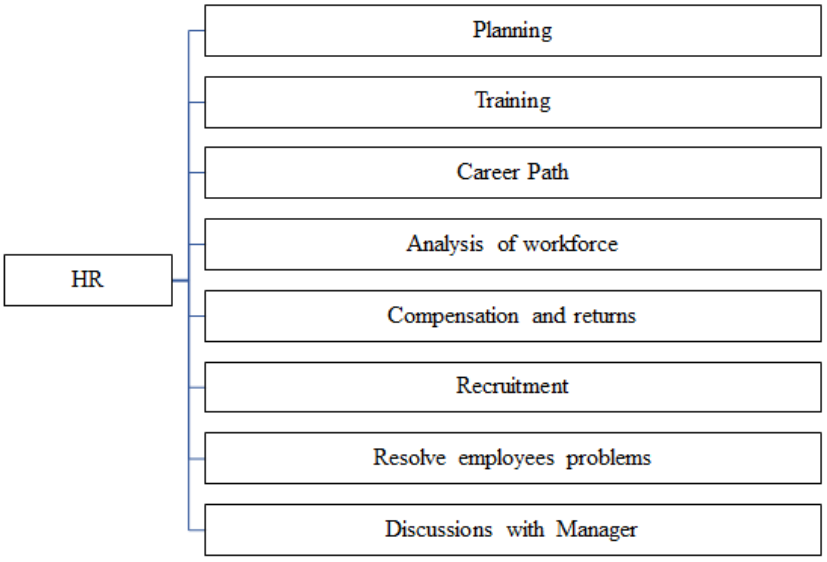


Fig. 1. HR primary responsibilities adapted in most organizations

- Planning is an essential and pivotal activity within the HR department. The procedure under consideration is designed to convert the objectives and strategic plans of the organization into measurable requirements pertaining to the human component. This necessitates the anticipation and estimation of the magnitude of human resources.
- The analysis of the present workforce entails the creation of comprehensive inventories outlining the many tasks within each department of an organization. These inventories provide information on the current number of employees, the sorts of jobs they have, and the interconnections between these positions. This procedure might potentially enhance the understanding of the prevailing workforce in terms of quantity, categorization, and expertise, so aiding the administration in gaining clarity on the availability of conditions associated with each job. According to the study conducted by [12].
- According to [13], the provision of training is crucial in enhancing employees' skill levels, which in turn has a favorable impact on their working behavior.
    - Career Trajectory: Over the course of one's professional journey, an individual has the potential to attain a series of advancements and relocations, both in a hierarchical and lateral manner. This phenomenon is commonly referred to as a career trajectory. It signifies the congruence between an individual's competencies and the requirements of an institution. The objective of strategically mapping out career trajectories is to enhance operational effectiveness inside the organization. The aforementioned phenomenon persists within thriving organizations, whereby it serves to differentiate employees based on their suitability and enhance their skills, or conversely, identify inadequacies and implement suitable interventions. Consequently, this has a significant impact on the process of making informed decisions [14].
- Compensation and returns encompass any remuneration received by those employed in the field of human resources. The purpose of compensation is to establish a motivational factor for individuals and to encourage an improvement in productivity. There is a positive correlation between the quality of incentives and an individual's level of attraction and employment in service of an institution's aims [13].

- Recruitment is a crucial function of the HR department, aimed at identifying individuals with the necessary qualities to enhance organizational performance. By sourcing and selecting the most eligible candidates, the HR department strives to ensure that the business is staffed with highly competent individuals.
- The Human Resources department is now engaged in the process of product development, with a focus on enhancing both the quality and quantity of production.
- The primary objective of the HR department is to facilitate the enhancement of employee performance and productivity by offering various tools, resources, and training programs. Additionally, the HR department is responsible for administering compensation, including wages and incentives, which are designed to further motivate employees and foster their success in the workplace.
- The HR department facilitates interactions with senior management by coordinating and organizing communication among administrative units and assigning specific assignments to staff.
- The HR department plays a crucial role in identifying the primary issues faced by employees that have a detrimental impact on organizational productivity. This tool offers essential support to managers in the implementation of policies and aids in the resolution of employee-related difficulties or issues.

2.2 Recruitment Process

An explanation of the three fundamental stages involved in the recruitment process is provided and depicted in Figure 2 [15].

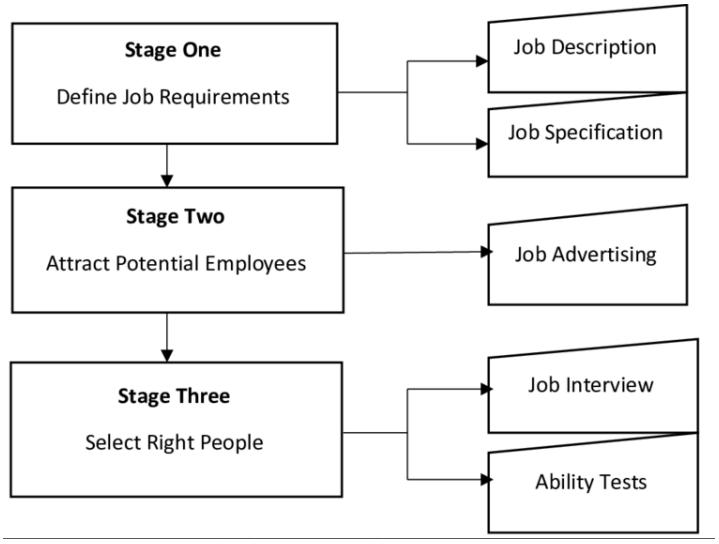


Fig. 2. The three stages of the recruitment process

Stage One: The initial phase involves the establishment of job requirements. The process involves the delineation of the job prerequisites. The current stage can be divided into two primary components: The two tasks involved in this process are composing the job description and revising the primary specifications, which encompass the necessary abilities of the employees.
Stage two: How to Attract Prospective Employees. The execution of this stage can be accomplished through the utilization of job advertising methods employing various media platforms and social media tools.
Stage three: Choosing the Appropriate Individuals. The selection process involves the assessment and distinction of persons who are seeking employment for a certain position based on their respective skill sets [16].
The responsibility of overseeing this process is delegated to them by executive management, regardless of whether it is a small or large firm. The final selection stage involves the participation of multiple parties in the decision-making process [17]. Based on the criteria and specifications given in the job requirements, a job analysis is conducted to achieve optimal levels of performance, contingent upon a predetermined set of parameters that prospective job candidates must fulfill [18]:

- Education level encompasses several aspects such as academic qualifications, areas of concentration, degrees earned, and the authority responsible for conferring graduation status.

- Experience is widely regarded as a significant determinant of an individual's potential for success in their professional endeavors. The utilization of previous experience is prevalent across many firms due to its facilitation of job seekers' ease in doing their tasks.
- Personal characteristics encompass several factors such as marital status, age, gender, and so forth.

The process of recruitment involves a critical stage known as candidate selection, which holds significant importance. The process can be broken down into two distinct stages:

- A job interview serves as a means of distinguishing among candidates for available positions by evaluating the authenticity of the information provided, receiving the approval of the General Administration for the chosen candidates, and making the final decision regarding their appointment.
- The administration of an ability test is a compulsory requirement subsequent to the verification of the accuracy of the submitted information and the conduct of multiple interviews. A roster of suitable applicants is compiled for the purpose of appointment, based on the outcomes of the ability test. Consequently, the aforementioned documents are submitted to the upper echelons of management in order to facilitate the issuance of appointment determinations. The ultimate selection of candidates for a position typically hinges upon their successful completion of a medical examination, which serves to assess their overall well-being and capacity to fulfill job responsibilities.

2.3 Modern Recruitment approach in Personal selection

Based on a number of empirical investigations [19], it has been shown that personal information pertaining to candidates can be acquired through their social media profiles. The creation of a distinctive profile for the applicant is feasible; nevertheless, it deviates significantly from the information provided in the questionnaire and obtained during the interview. Subsequently, upon careful investigation, his candidacy may be promptly dismissed. Therefore, the organization is able to achieve substantial cost savings by implementing a process that involves the early evaluation and elimination of candidates. In order to establish a formalized and comprehensive technique, it is necessary to devise a framework for evaluating the psychological attributes of applicants. This framework should concentrate on specific aspects that can be used to ascertain personality traits. This can be achieved by analyzing the provided material:

- Honesty: Ensuring accuracy in providing one's birth date and place, educational background and institution, details regarding foreign language proficiency, profile photo, and contact number.
- Introduction: The public view profile encompasses various elements that provide insights into a candidate's personality, including quotes displayed on the front page, the number of friends, the quantity of profile images, and the presence of a listed phone number.
- Evidence of restraint is observed through the use of communication in the comments and occasional instances of smiling during interactions.
- Etiquette: Assessing the degree to which individuals are formally addressed by unfamiliar individuals on social media platforms, evaluating candidates' understanding of ethical practices while sharing and transmitting non-conventional movies, and examining their tendencies to engage in unethical and impolite behavior by posting and sharing inappropriate posts, images, and videos.
- Tolerance: The concept of religious tolerance pertains to the absence of explicit declarations, visual representations, or audiovisual content that advocate for the denigration of one's own religious beliefs or the humiliation of another religious faith.
- Interests: Engaging in thematic communities, actively participating in discussions, and sharing findings and accomplishments.
- Profile material: Ensuring the currency of profile material, including text, photos, videos, etc., is of utmost importance, and may be achieved by verifying the posted dates. The information associated with older dates is deemed irrelevant.

During the process of development, it is imperative to not only complete the staffing table but also establish guidelines that ensure the chosen candidate is well-suited for the team and can contribute to the organization's efficiency. The determination of an individual's characteristics necessitates an objective evaluation of their psychological aspect, as

well as an assessment of their level and qualifications. The primary determinant of success lies on the efficacy of personnel service, encompassing cost-effective and efficient people selecting methodologies.

3. MACHINE LEARNING

The rapid advancement of information technology has necessitated the creation of novel technologies for the purpose of effectively managing and analyzing the extensive volume of information that is currently accessible [20]. ML is a rapidly evolving field of computing algorithms designed to simulate human intelligence through the process of learning from available data and the surrounding environment. Machine learning techniques have demonstrated their efficacy in a wide range of applications, including but not limited to pattern recognition, computer vision, aerospace engineering, finance, entertainment, and computational biology, particularly in the field of biomedical and medical applications. Consequently, there is now a significant scholarly interest in the advancement and refinement of machine learning methodologies. The majority of these individuals are comprised of researchers specializing in machine learning and professionals working in the commercial sector. Many professionals strive to develop progressive machine learning approaches in order to enhance the workflow of their respective organizations [21].

3.1 Machine Learning Process steps

The achievement of the objective of machine learning necessitates the execution of a sequence of seven distinct phases. The sequential execution of these processes (refer to Figure 3) is recommended [22].

Data collection	The process of gathering and storing information from different sources in order to be used later for developping practical machine learning solutions.
Data Preparation	The process of modifying raw data that should be run through machine learning algorithms to uncover insights or make predictions.
Choosing a model	The process of selecting one machine learning model from a set of candidate models for a specific problem.
Training	The process of using training set to train the choosing model.
Evaluation	The process of using different evaluation technique in order to understand the performance of ML model, its robustness and limitations.
Parameter tuning	The process of choosing a set of optimal parameters for a ML model.
Prediction	The output of a ML model after training with dataset and applying to new data

Fig. 3. The use of machine learning techniques involves a series of seven sequential steps

3.2 Machine Learning in HR department

The process of employee recruiting is a fundamental responsibility for every organization. The primary objective of the Human Resources department is to identify suitable candidates who can effectively fulfill the requirements of an organization, while also offering favorable employment prospects to these individuals. The process of selecting a new worker or stakeholder might pose challenges for the Human Resources department. The determination of this decision may be contingent upon numerous factors, including prior experience, certification, educational attainment, age, and potentially even gender [23].

In contemporary times, there is a growing utilization of advanced tools and technologies, such as artificial intelligence and machine learning, within the realm of business. These tools have the potential to assist employees in various capacities, including but not limited to recruitment, promotion, and decision-making processes. Hence, the substantial volume of

contemporary company data can be effectively processed and controlled by the utilization of artificial intelligence (AI) or machine learning (ML) techniques, thereby facilitating enhanced decision-making capabilities.

In [24], the utilization of machine learning techniques was employed to address the interactions and connections between customers and suppliers. Consequently, personal decisions will not result in the disregard of any connection. Furthermore, the utilization of machine learning in the selection process enables the identification of optimal business partners based on the analysis of company profiles and existing transactional associations.

In [25], a sophisticated business model was employed to forecast product pricing. A multistage decision model was constructed utilizing machine learning algorithms, specifically random forests and multiclass logistic regression. The model has been developed as a functional prototype, offering consumers an interface via which they may engage and offer predictions regarding products, so enhancing decision-making techniques.

In [26], the researchers have devised an ML approach that aids in identifying the key factors that impact an employee's choice to depart from an organization. The present method possesses the capability to predict the likelihood of an employee's departure from the organization. The primary objective of this study was to examine the impact of objective factors on employee attrition. The proposed methodology was evaluated using a legitimate dataset consisting of 1500 samples, which was sourced from IBM Analytics. The outputs of the experiment are shown using conventional metrics, and it was observed that the Gaussian Naive Bayes classifier technique yielded the most favorable results for the supplied dataset, gven its ability to accurately detect all positive instances and a false negative rate of only 4.5% over the whole dataset, this classifier demonstrates the highest recall rate, which is measured at 0.54.

In [27], the authors employed machine learning approaches in order to forecast worker productivity. Additionally, in [28], the authors employed machine learning methodologies to analyze employee data with the objective of assessing the appropriateness of an individual's position within the organization. HR executives now have unprecedented access to personal information on payroll and work performance, encompassing revenue rates, staff qualities, and service history, unlike any previous time. In this study, the researchers employed the random forest classification algorithm to facilitate the categorization of employees based on their monthly salary and the informal utilization of data analytics. In order to conduct a more comprehensive evaluation of employee performance, a clustering methodology was employed, utilizing the similarity of performance criteria as the basis for analysis.

Sisodia et al. [29] developed a predictive model for employee attrition rate using data obtained from the KAGGLE website. To assess the link between attributes, the heat map and correlation matrix are generated. A histogram was produced in order to establish a correlation between factors including pay, department, and satisfaction level. A total of five unique machine learning algorithms were employed in this study, namely the linear support vector machine, the C 5.0 Decision Tree classifier, Random Forest, k-nearest neighbor, and Naive Bayes classifier, with the aim of making predictions [33].

This study presents a potential machine learning-based system. The primary function of this system is to aid the HR department in the process of selecting the most suitable employee. The aforementioned system is characterized by its simplicity and efficiency, and it has the potential to encompass a multitude of functions. The subsequent section will provide a description of the proposed approach.

4. PROPOSED APPROACH

The primary objective of this project is to develop a machine learning system that aids the human resources department in the identification and selection of individuals who are best suited for a given employment opportunity. The approach under consideration can be partitioned into five primary tasks, as depicted in Figure 4. The research approach in this study involves the implementation of a binary classification algorithm with the objective of categorizing candidates into two distinct groups: qualified and non-qualified. This classifier operates by utilizing probability calculations to determine if a given individual is qualified (represented by a value of zero) or ineligible (represented by a value of one). Hence, the values of 0 and 1 are indicative of the categorization of candidates as either qualified or unqualified.

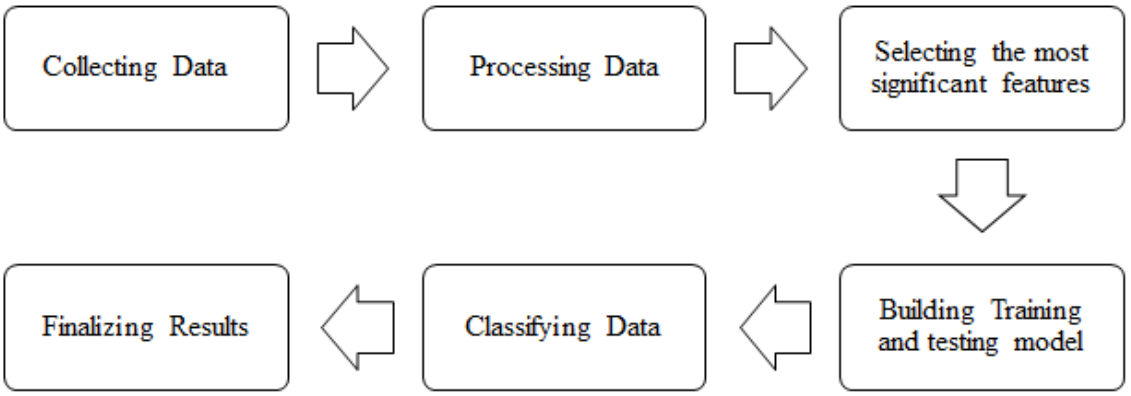


Fig. 4. The steps of the proposed method

The primary objective of engaging in the study of probability is to facilitate the process of making predictions. The forecast will provide the probabilities associated with each variable that can be used to classify candidates as either qualified or not qualified. The dependent variable categorizes the dataset into two groups: Qualified and Not-Qualified. Therefore, if the likelihood value above 0.5, the individual is deemed eligible for employment. Nevertheless, if the probability value falls below 0.5, it is deemed that the candidate does not meet the qualifications for the job. The methodology facilitates the selection of candidates through the consideration of factors such as time allocation, level of effort exerted, and the degree of transparency exhibited. The algorithm impartially selects all eligible applicants without exhibiting bias towards any one candidate. Consequently, it offers an improved assortment with a reduced number of interviews. The following list provides a more comprehensive exploration of the steps depicted in Figure 4 [30, 31]:

- The process of data collection involves acquiring and labeling data from pre-existing data or models.
- The process of data processing involves the transformation of data from its original format into a format that is more practical and relevant, hence enhancing its informational value.
- Choose the most salient feature from the given set of features. This phase aids in reducing the dataset size utilized in the machine learning model. Therefore, it is possible to decrease the prediction time.
- When constructing a model, it is necessary to develop a classifier model. Furthermore, it is important to partition the existing dataset into two primary segments. The initial segment should be employed for the purpose of training the model. The second phase of the study involves assessing the correctness or efficiency of the suggested model, commonly referred to as the evaluation process.
- Once the model has been constructed, the recommended methodology is employed to categorize novel data.
- The outcome is presented in the format of determining the compatibility or incompatibility with the existing job vacancies.

4.1 Evaluation metrics

Various metrics are employed to calculate and assess the effectiveness and efficiency of a machine learning technique [32]. The metrics utilized in this study are as follows:

- A confusion matrix (CM) is a visualization of the performance measurement for machine learning algorithms. This matrix classifies outputs into two or more classes (see Table 1), and described as follows:

TABLE I. –CONFUSION MATRIX FOR CLASSIFICATION: ACTUAL VS. PREDICTED

		Actual Class	
		Positive (1)	Negative (0)
Predicted Class	Positive (1)	TP	FP
	Negative (0)	FN	TN

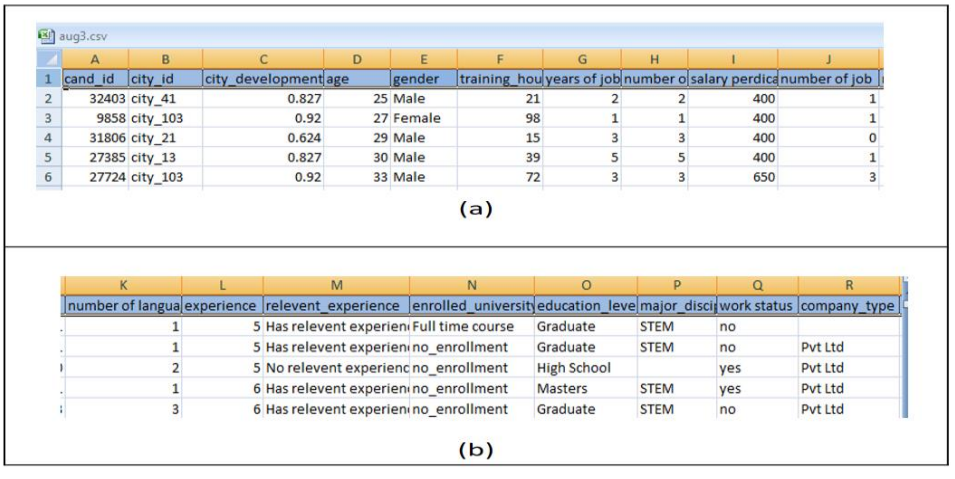
- The term "actual class" refers to the true classification of an element, whether it is a relevant candidate or not.

- The predicted class refers to the class that is obtained as the output of a machine learning model.
- The value of "positive" (1) indicates the candidate's relevance.
- The value of zero (0) indicates that a contender is not considered relevant.
- The term "True Positive" (TP) is used to denote the count of components that are correctly predicted as relevant by the machine learning (ML) model.
- The term "TN" refers to the number of records that are predicted by the machine learning model to be not relevant and are indeed not relevant.
- The first type of error, known as a False Positive (FP), refers to the amount of data that are incorrectly projected to be relevant by the machine learning (ML) model, despite not actually being relevant.
- The false negative (FN) is a classification error that occurs when elements that are actually relevant are incorrectly forecasted as not relevant.
- The accuracy metric quantifies the proportion of positive class predictions that correctly belong to the positive class. The calculation of precision is determined using the confusion matrix in the following manner:
  $$Precision = \frac{TP}{TP+FP} \quad (1)$$
- The recall metric measures the proportion of correctly predicted positive class instances in relation to the total number of positive examples present in the dataset. The calculation of the recall metric is determined using the confusion matrix in the following manner:
  $$Recall = \frac{TP}{TP+FN} \quad (2)$$
- The f-measure is a metric that quantifies the trade-off between precision and recall by providing a single numerical score. The F-score is calculated using the confusion matrix in the following manner:
  $$F - measure = 2 \times \frac{Recall \times Precision}{Recall+Precision} \quad (3)$$
- The accuracy metric is defined as the proportion of accurate predictions to the overall number of input samples. The calculation of accuracy is determined using the confusion matrix in the following manner:
  $$Accuracy = \frac{TP+TN}{TP+TN+FP+FN} \quad (4)$$

5. RESULTS

5.1 Dataset description

During the recruitment phase, the Human Resources department of a business gathers a substantial volume of data pertaining to all prospective candidates. The data can be categorized based on the eligibility of a candidate for a specific job description. This study will examine a genuine dataset that was collected and curated by [37].
Figure 5 illustrates the primary characteristics of the dataset under consideration. The dataset comprises 1000 rows and 18 columns. The features are represented by the columns, while their corresponding values are represented by the rows. Consequently, a multitude of variables are gathered, including age, gender, quantity of training hours, language proficiency, and level of schooling. The classifier employs these qualities in order to make predictions on the most suitable individuals for the given employment positions.


aug3.csv

	A	B	C	D	E	F	G	H	I	J
1	cand_id	city_id	city_development	age	gender	training_hou	years of job	number o	salary perdica	number of job
2	32403	city_41	0.827	25	Male	21	2	2	400	1
3	9858	city_103	0.92	27	Female	98	1	1	400	1
4	31806	city_21	0.624	29	Male	15	3	3	400	0
5	27385	city_13	0.827	30	Male	39	5	5	400	1
6	27724	city_103	0.92	33	Male	72	3	3	650	3

(a)

	K	L	M	N	O	P	Q	R
	number of langua	experience	relevent_experience	enrolled_university	education_leve	major_disci	work status	company_type
	1	5	Has relevent experien	Full time course	Graduate	STEM	no	
	1	5	Has relevent experien	no_enrollment	Graduate	STEM	no	Pvt Ltd
	2	5	No relevent experienc	no_enrollment	High School		yes	Pvt Ltd
	1	6	Has relevent experien	no_enrollment	Masters	STEM	yes	Pvt Ltd
	3	6	Has relevent experien	no_enrollment	Graduate	STEM	no	Pvt Ltd

(b)

Fig. 5. A sample of the dataset

5.2 significant features

In this section, the generalized linear model will be employed to identify the most significant features through the utilization of the P value test. As depicted in Figure 6, it can be observed that just three factors, namely pay forecast, number of job, and experience, exhibit statistical significance. The aforementioned features are employed in the training process of the machine learning model.

```
Call:
glm(formula = train$relevent_experience ~ train$city_development_index +
    train$age + train$training_hours + train$years.of.job + train$salary.perdication +
    train$number.of.job + train$number.of.language + train$experience,
    family = binomial)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.2589  -0.7865  -0.6164  -0.2750   2.2929

Coefficients:
                              Estimate Std. Error z value Pr(>|z|)
(Intercept)                  0.0074892  1.2030757   0.006   0.9950
train$city_development_index -1.1447128  1.0045991  -1.139   0.2545
train$age                    0.0641427  0.0470536   1.363   0.1728
train$training_hours        -0.0030721  0.0025286  -1.215   0.2244
train$years.of.job           0.0953470  0.0787906   1.210   0.2262
train$salary.perdication     0.0012230  0.0006715   1.821   0.0686 .
train$number.of.job         -0.3040236  0.1419626  -2.142   0.0322 *
train$number.of.language     0.1545557  0.1658309   0.932   0.3513
train$experience            -0.4468135  0.2120235  -2.107   0.0351 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 348.65  on 315  degrees of freedom
Residual deviance: 329.86  on 307  degrees of freedom
  (484 observations deleted due to missingness)
AIC: 347.86

Number of Fisher Scoring iterations: 4
```

Fig. 6. Generalized linear model

5.3 Logistic regression result

The dataset is divided into training and testing set (70% training set, 30% testing set). The training set is used to train the Logistic regression model. The testing set is used to test the performance of the ML model. Table 2 shows the confusion matrix of the proposed model.

TABLE II. CONFUSION MATRIX

Rep2	Has relevant experience	Has no relevant experience
Has	**150**	**44**
No	**4**	**2**

TABLE III. –EVALUATION METRICS FOR THE PROPOSED APPROACH

Metric	Recall	Precision	F-measure	Accuracy
Value (%)	97	77	85	76

Table 3 presents the assessment criteria utilized to evaluate the performance of the machine learning model. The recall value solely pertains to the classification of affirmative candidates. Based on the findings presented in Table 5.5, the

proposed methodology demonstrates a 97% success rate in identifying eligible candidates. This outcome is indicative of a favorable outcome, as it indicates that the HR department did not overlook any qualified candidates.
Precision refers to the degree of accuracy exhibited by a model's optimistic prediction. According to the proposed model, the precision is determined to be 77%, indicating that the optimistic forecast accuracy stands at 77%. The machine learning technique exhibits an adequate value.
The f-measure quantifies the balanced connection between precision and recall by assigning equal weight to both metrics. The evaluation of the model is facilitated by considering both precision and recall metrics, which are combined into a single number. The f-measure is a valuable metric for evaluating and comparing the performance of models. The f-measure value of the model provided in this study is 85%. The value in question exhibits positive attributes, and the performance of our model can be deemed satisfactory.
The accuracy metric quantifies the overall performance of the model over all potential solutions. The accuracy is defined as the proportion of accurate forecasts to the overall number of predictions made. In this particular approach, the accuracy rate is measured at 76%. This indicates that the proposed method achieves a success rate of 76% in determining the suitability of the applicant.
The evaluation of a machine learning model's performance and usefulness is aided by the concepts of accuracy and precision. Accuracy measures the degree of proximity between a prediction and a known or recognized value, while precision assesses the consistency of predictions, regardless of their deviation from the approved value. In the suggested methodology, the precision and accuracy numbers exhibit a close proximity.

6. CONCLUSION

Machine learning (ML), which is a component of artificial intelligence, enables programs to acquire knowledge from accessible data and make predictions without explicit programming. Machine learning algorithms commonly utilize previous data as input in order to make predictions about fresh output values. Currently, ML approaches are extensively employed in various domains, including healthcare, navigation systems, commercial sectors, and power systems. This chapter introduces the utilization of machine learning tools inside the Human Resources department. Numerous organizations in emerging nations have significant challenges due to the substantial volume of non-digitalized data, which poses difficulties in effectively managing the company's scalability. Hence, the incorporation of emerging technological tools such as ML and artificial intelligence becomes imperative.
The human resource (HR) department serves as the major administrative unit inside an organization. The role encompasses several duties, including workforce analysis, resolution of employee issues, and recruitment. Recruitment is widely recognized as a highly significant procedure within the human resources department. The process involves the selection of the most suitable candidate for a given post. Nevertheless, the process of candidate selection is inherently intricate owing to the substantial volume of individuals vying for a particular employment opportunity. Therefore, if the methodology employed in the selection procedure is inappropriate, the outcome could potentially be muddled and lacking in relevance. Therefore, the utilization of machine learning techniques in this procedure is of utmost importance.
This article presents recent research on the utilization of machine learning techniques throughout the recruitment process. Furthermore, a machine learning (ML) model utilizing binary classification has been proposed for the purpose of handling recruitment data and identifying appropriate candidates based on many parameters. Prior to the implementation of the machine learning model, a preliminary stage of selection was conducted. In this stage, the selection of the most significant features is determined through the utilization of a generalized linear model. The system under consideration was evaluated using an authentic dataset. The findings demonstrate the efficacy of employing a machine learning classifier in this particular application. The evaluation of the outcome was conducted by employing a confusion matrix, recall value, precision, f-measure, and accuracy. In subsequent endeavors, it is recommended to employ machine learning techniques in various different applications within the human resources department. Furthermore, it is imperative to conduct research on the efficacy of alternative machine learning algorithms in the context of recruitment tasks.

Conflicts of Interest
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