ABSTRACT

The accurate prediction of employee promotions is a critical aspect of effective human resource management (HRM), directly impacting organizational efficiency and employee satisfaction. Traditional promotion decision-making processes often rely on subjective judgments, which can lead to biases and inefficiencies. This study explores the application of machine learning (ML) techniques to predict employee promotions, aiming to enhance decision-making through data-driven insights.

We utilize a comprehensive dataset containing historical employee performance metrics, demographic information, and past promotion records. Various ML algorithms, including logistic regression, decision trees, random forests, and gradient boosting, are employed to develop predictive models. The data undergoes rigorous preprocessing, including handling missing values and transforming categorical variables, to ensure model accuracy and reliability.

The performance of each model is evaluated using metrics such as accuracy, precision, recall, and F1-score. Our findings indicate that ML models can significantly outperform traditional methods, providing a more objective and efficient approach to promotion predictions. Additionally, the study addresses the importance of data quality, ethical considerations, and change management in the implementation of ML-driven HR practices.

The results demonstrate the potential of machine learning to revolutionize HRM by offering precise, unbiased, and actionable insights into employee promotions. This advancement not only aligns individual career progression with organizational goals but also fosters a more transparent and equitable workplace environment

This abstract provides a concise overview of the project, highlighting the motivation, methodology, and potential impact of using machine learning to predict employee promotions in HRM.

INTRODUCTION

1.1. OVERVIEW

In the contemporary business environment, human resource management (HRM) plays a critical role in ensuring that organizations achieve their strategic objectives through effective management of their most valuable asset—people. A key aspect of HRM is making informed decisions about employee promotions. Promotions not only serve as a motivational tool but also ensure that the right people occupy the right positions to drive organizational success.

Traditionally, promotion decisions have been made based on a combination of performance reviews, manager recommendations, and subjective judgments. While these methods have their merits, they are often prone to biases and may not fully leverage the wealth of data available within modern organizations. This is where machine learning (ML) comes into play.

1.2. PURPOSE

The purpose of a Human Resource Management (HRM) project typically includes several key objectives:

1. Talent Acquisition and Retention: Developing strategies to attract, hire, and retain the best talent.

2. Training and Development: Creating programs for employee development to enhance skills and performance.

3. Performance Management: Implementing systems to evaluate and improve employee performance.

4. Compliance and Legal Issues: Ensuring adherence to labor laws and regulations.

5. Employee Relations: Fostering a positive work environment and managing employee relations.

6. Compensation and Benefits: Designing and managing competitive compensation and benefits packages.

7. Organizational Development Aligning HR strategies with business goals to improve overall organizational effectiveness.

8. HR Analytics: Using data to inform HR decisions and strategies.

These objectives aim to maximize employee productivity and contribute to the overall success of the organization.

2.LITERATURE SURVEY

2.1 EXISTING PROBLEM

Human Resource Management (HRM) faces several existing problems, including:

1. Talent Shortage: Difficulty in finding and retaining skilled employees.

2. Employee Engagement: Challenges in keeping employees motivated and engaged.

3. Workforce Diversity: Managing a diverse workforce and promoting inclusion.

4. Compliance Issues: Staying up-to-date with changing labor laws and regulations.

5. Performance Management: Ineffective performance appraisal systems.

6. Training and Development: Insufficient or outdated training programs.

7. Technological Changes: Keeping up with rapid advancements in HR technology.

8. Cost Management: Balancing the costs of HR initiatives with budget constraints.

9. Employee Turnove: High turnover rates affecting organizational stability and performance.

10. Remote Work: Managing remote or hybrid work arrangements effectively.

Addressing these problems is essential for HRM to support organizational goals and enhance employee satisfaction and productivity.

2.2 PROPOSED SOLUTION

To address the challenges in Human Resource Management (HRM), several solutions can be proposed:

1. Enhanced Recruitment Strategies:

Use of Technology: Implement AI-driven recruitment tools to streamline hiring processes and identify the best candidates.

-Employer Branding: Strengthen the organization's brand to attract top talent.

-Diverse Hiring: Focus on diversity in recruitment to build a more inclusive workforce.

2. Employee Engagement Programs:

- Regular Feedback: Implement continuous feedback systems to keep employees engaged and informed.

- Recognition Programs: Create programs to recognize and reward employee contributions.

- Work-Life Balance: Promote policies that support work-life balance, such as flexible working hours and remote work options.

3. Diversity and Inclusion Initiatives:

- Training Programs: Provide training on diversity and inclusion for all employees.
- Inclusive Policies: Develop policies that promote an inclusive work environment.
- Employee Resource Groups: Support the formation of groups that represent diverse employee interests.

4. Compliance and Legal Management:
- Regular Audits: Conduct regular compliance audits to ensure adherence to labor laws and regulations.
- Training: Provide ongoing training on legal requirements and best practices.

5. Effective Performance Management:
- Clear Objectives: Set clear, measurable performance objectives.
- Continuous Feedback: Move away from annual reviews to a system of continuous feedback.
- Performance Tools: Use performance management software to track and evaluate performance.

6. Advanced Training and Development:
- E-Learning Platforms: Implement e-learning platforms for flexible and accessible training.
- Career Development Plans: Develop personalized career development plans for employees.
- Mentorship Programs: Establish mentorship programs to support employee growth.

7. Adoption of HR Technology:
- HR Software: Use integrated HR software for efficient management of HR processes.
- Data Analytics: Employ HR analytics to make data-driven decisions.
- Automation: Automate repetitive HR tasks to save time and reduce errors.

8. Cost Management Strategies:
- Budget Planning: Develop detailed HR budgets and track spending closely.
- Outsourcing: Consider outsourcing non-core HR functions to save costs.
- Benefits Optimization: Regularly review and optimize employee benefits programs.

9. Employee Retention Strategies:
- Competitive Compensation: Ensure compensation packages are competitive within the industry.
- Career Growth: Provide opportunities for career advancement.
- Positive Work Environment: Foster a positive and supportive work environment.

10. Managing Remote Work:

- Clear Policies: Develop clear remote work policies and guidelines.

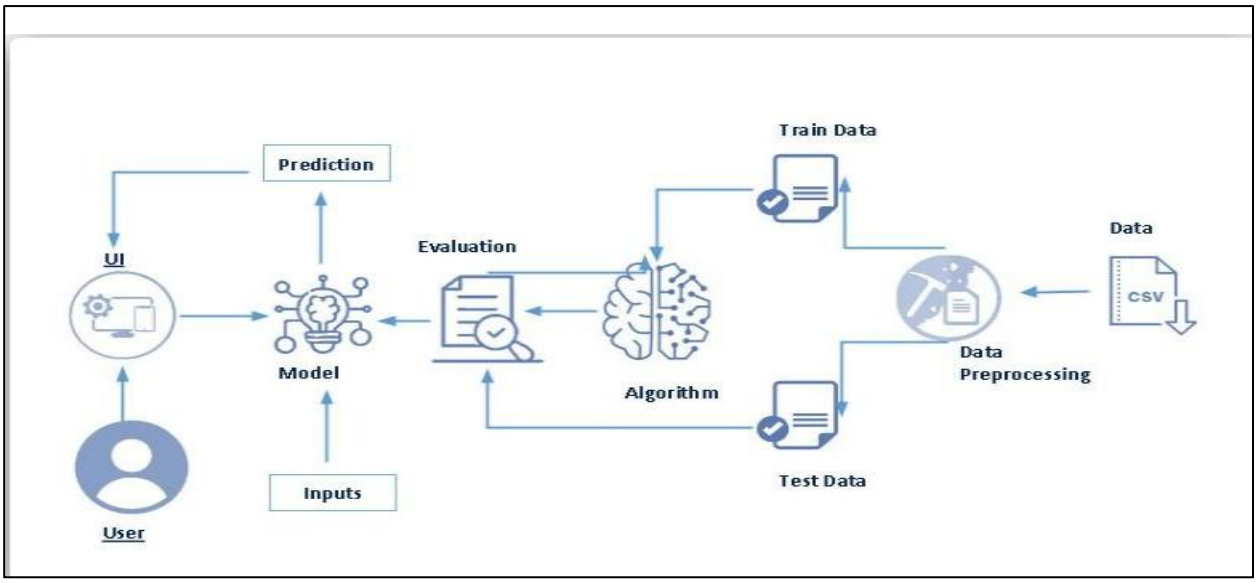
- Communication Tools: Use effective communication tools to keep remote teams connected.

- Support Systems: Provide support for remote employees, such as ergonomic home office setups and mental health resources.

Implementing these solutions can help HR departments address existing challenges and enhance overall organizational effectiveness.

3.THEORITICAL ANALYSIS

3.1.BLOCKDIAGRAM



3.2. SOFTWARE DESIGNING

The following is the Software required to complete this project:

Google Colab: Google Colab will serve as the development and execution environment for your predictive modeling, data preprocessing, and model training tasks. It provides a cloud-based Jupyter Notebook environment with access to Python libraries and hardware acceleration.

Dataset (CSV File): The dataset in CSV format is essential for training and testing your predictive model. It should include historical Human resource Management data, company information, employees levels, and other relevant features.

Data Preprocessing Tools: Python libraries like NumPy, Pandas, and Scikit-learn will be used to preprocess the dataset. This includes handling missing data, feature scaling, and data cleaning.

Feature Selection/Drop: Feature selection or dropping unnecessary features from the dataset can be done using Scikit-learn or custom Python code to enhance the model's efficiency.

Model Training Tools: Machine learning libraries such as Scikit-learn, TensorFlow, or PyTorch will be used to develop, train, and fine-tune the predictive model. Regression or classification models can be considered, depending on the nature of the AQI prediction task..

Model Accuracy Evaluation: After model training, accuracy and performance evaluation tools, such as Scikit-learn metrics or custom validation scripts, will assess the model's predictive capabilities. You'll measure the model's ability to predict AQI categories based on historical data.

UI Based on Flask Environment: Flask, a Python web framework, will be used to develop the user interface (UI) for the system. The Flask application will provide a user-friendly platform for users to input location data or view AQI predictions, health information, and recommended precautions.

Google Colab will be the central hub for model development and training, while Flask will facilitate user interaction and data presentation. The dataset, along with data preprocessing, will ensure the quality of the training data, and feature selection will optimize the model. Finally, model accuracy evaluation will confirm the system's predictive capabilities, allowing users to rely on the HRM predictions and associated Employee information.

4.EXPERIMENTAL INVESTIGATION

In this project ,we have use Human Resource Management Dataset. This data set is a csv file consisting of labelled data and having the following columns:-

1.Employee_id: This ID is used to distinguish between employees, track their records, and manage their employment information. It ensures that data associated with each employee, Typically, the Employee ID is an alphanumeric code or a number. It is essential for maintaining an organized and efficient HR system, as it links all relevant data points to the correct individual.

2.department:The department field specifies division or unit with in an organization where an employee works .this categorization helps in organizing employees according to their job functions,roles and responsibilities.

3.region: The "Region" field refers to the geographical area or location where an employee is based or operates. This categorization is important for various administrative, strategic, and operational purposes.

4.education: The "Education" field refers to the academic qualifications and educational background of employees. This information is crucial for various HR functions and decision-making processes.

5.gender: he "Gender ID" field represents the gender identity of employees. This field is important for ensuring diversity, equity, and inclusion within the organization, as well as for compliance with legal and reporting requirements. Typical values for the "Gender ID" field might include:

Male

Female

6.recruitment_channel: the "Recruitment Channel" field refers to the source or method through which candidates were attracted to apply for positions within the organization. This information is valuable for optimizing recruitment strategies and understanding the effectiveness of various channels.

7.no_of_trainings: the "Number of Trainings" field refers to the count of training sessions or programs that an employee has participated in. This field is important for monitoring employee development and ensuring that staff receive adequate training to enhance their skills and performance.

8.age: This information is valuable for various HR functions, including workforce planning, benefits administration, and compliance with labor laws. Including the "Age" field in an HRM dataset serves several purposes.

9.previous_year_rating: Absolute ratings are a measure of an employee's ability or potential to do a job. They are expressed as a rating on a scale from one to five, with one being the lowest and five being the highest. Absolute ratings are often used to determine an employee's starting salary or to place an employee in a particular job.

10.length_ of_ service: Length of Service is the number of years an employee has been working for an organisation. Some companies like to reward their employees for their length of service by increasing their Leave or Sickness Allowances.

11.KPIs_met>80%: Key performance indicators (KPIs) are defined as quantifiable or qualitative, specific measures of an organization's performance in critical areas of its business.

12.awards_won?: The human resources awards encompass various categories, including talent management, employee engagement, diversity and inclusion, learning and development, HR innovation, and the prestigious HR Person of the Year award.

13.avg_training_score: Training and development in Human Resource Management (HRM) refers to a system of educating employees within a company. It includes various tools, instructions, and activities designed to improve employee performance. It's an opportunity for employees to increase their knowledge and upgrade their skills.

14.is_promoted: when an employee is transferred to a new job role or position with more responsibilities as well as better pay.

5.FLOW CHART


Human Resource Planning
Processes Involved
Identification of Needs
1
2
Analysis of HR Capabilities
Identification of Gaps Between Demands and Capacity
3
4
Development of Strategies to Bridge the Gaps
Execution and Monitoring of the Plan
5
SelectHub

MODEL BUILDING:

1)Dataset

2)Google colab and VS code Application Building

1. HTML file (Index file, Predict file)

1. CSS file

2. Models in pickle format

6.SOURCE CODE

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
import warnings
warnings.filterwarnings('ignore')
from sklearn.preprocessing import LabelEncoder
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier,GradientBoostingClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import cross_val_score
import pickle
from sklearn.metrics import classification_report,confusion_matrix
plt.style.use('fivethirtyeight')
pd.set_option('display.max_rows',None)
```

```
import sklearn
print(sklearn.__version__)
```

```
df=pd.read_csv('/content/emp_promotion.csv')
print('shape of train data {}'.format(df.shape))
df
```

```
df.head(3)
```

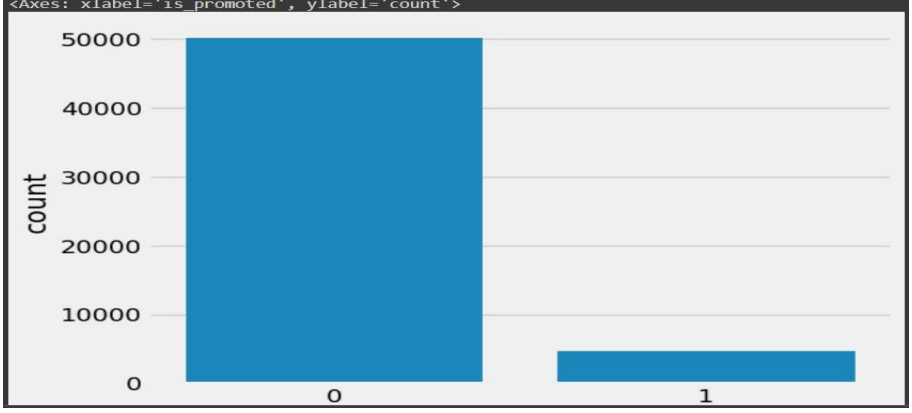
	employee_id	department	region	education	gender	recruitment_channel	no_of_trainings	age	previous_year_rating	length_of_service	KPIs_met >80%	awards
0	65438	Sales & Marketing	region_7	Master's & above	f	sourcing	1	35	5.0	8	1	
1	65141	Operations	region_22	Bachelor's	m	other	1	30	5.0	4	0	
2	7513	Sales & Marketing	region_19	Bachelor's	m	sourcing	1	34	3.0	7	0	

```
df.tail()
```

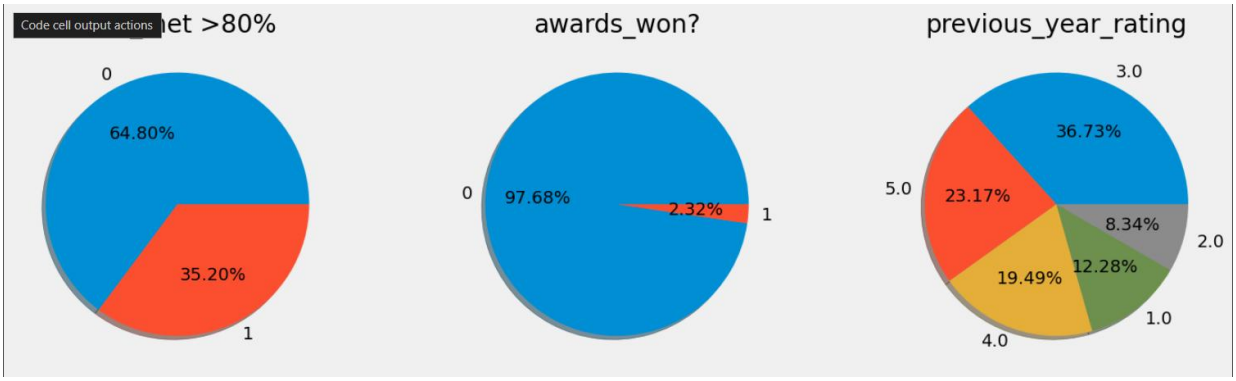
	employee_id	department	region	education	gender	recruitment_channel	no_of_trainings	age	previous_year_rating	length_of_service
54803	3030	Technology	region_14	Bachelor's	m	sourcing	1	48	3.0	17
54804	74592	Operations	region_27	Master's & above	f	other	1	37	2.0	6
54805	13918	Analytics	region_1	Bachelor's	m	other	1	27	5.0	3
54806	13614	Sales & Marketing	region_9	NaN	m	sourcing	1	29	1.0	2
54807	51526	HR	region_22	Bachelor's	m	other	1	27	1.0	5

```
sns.countplot(x='is_promoted',data=df)
```

```
<Axes: xlabel='is_promoted', ylabel='count'>
```

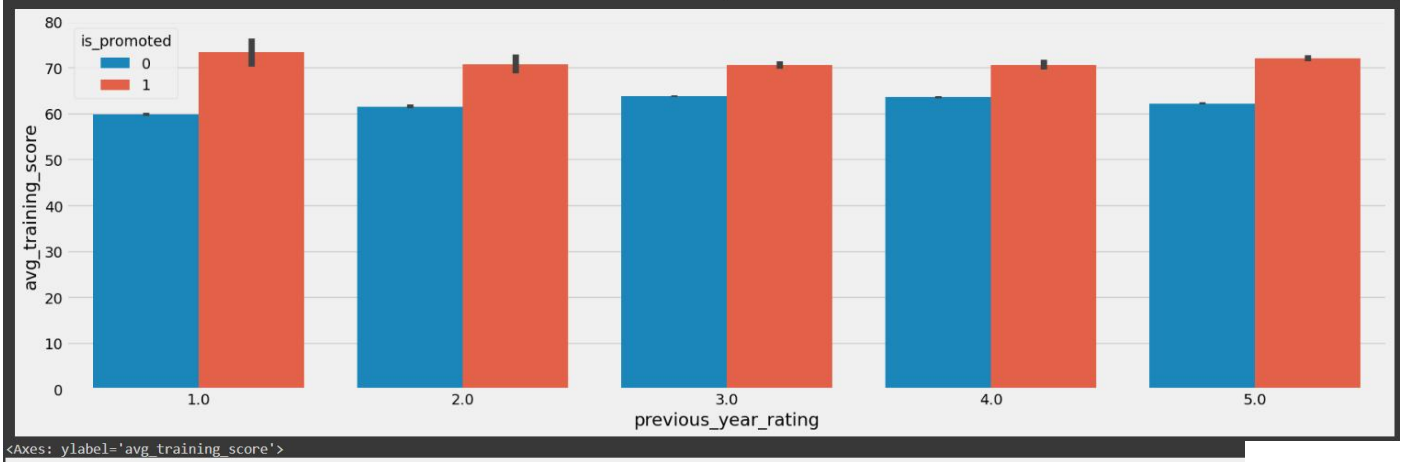



```
plt.figure(figsize=(16,10))
plt.subplot(231)
plt.axis('off')
plt.title('KPIs_met >80%')
df['KPIs_met >80%'].value_counts().plot(kind='pie',shadow=True,autopct = '%.2f%%')
plt.subplot(232)
plt.axis('off')
plt.title('awards_won?')
df['awards_won?'].value_counts().plot(kind='pie',shadow='True',autopct = '%.2f%%')
plt.subplot(233)
plt.axis('off')
plt.title('previous_year_rating')
df['previous_year_rating'].value_counts().plot(kind='pie',shadow='True',autopct = '%.2f%%')
plt.show()
```

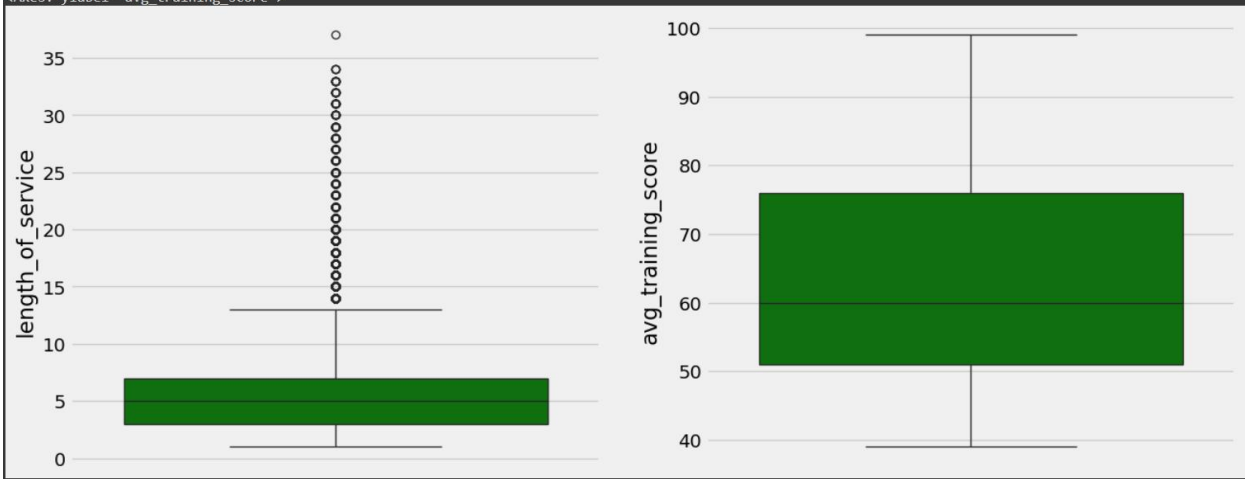



```
#length of services columns has outliers
plt.figure(figsize=(14,6))
plt.subplot(1,2,1)
sns.boxplot(df['length_of_service'],color='g')
plt.subplot(1,2,2)
sns.boxplot(df['avg_training_score'],color='g')
```

```
plt.figure(figsize=(20,6))
# Use 'x' and 'y' to specify the data for the bar plot
sns.barplot(x='previous_year_rating', y='avg_training_score', hue='is_promoted', data=df)
plt.show()
```




```
<Axes: ylabel='avg_training_score'>
```




```
df.describe(include='all')
```

	employee_id	department	region	education	gender	recruitment_channel	no_of_trainings	age	previous_year_rating	length_of_service	
count	54808.000000	54808	54808	52399	54808	54808	54808.000000	54808.000000	50684.000000	54808.000000	548
unique	NaN	9	34	3	2	3	NaN	NaN	NaN	NaN	
top	NaN	Sales & Marketing	region_2	Bachelor's	m	other	NaN	NaN	NaN	NaN	
freq	NaN	16840	12343	36669	38496	30446	NaN	NaN	NaN	NaN	
mean	39195.830627	NaN	NaN	NaN	NaN	NaN	1.253011	34.803915	3.329256	5.865512	
std	22586.581449	NaN	NaN	NaN	NaN	NaN	0.609264	7.660169	1.259993	4.265094	
min	1.000000	NaN	NaN	NaN	NaN	NaN	1.000000	20.000000	1.000000	1.000000	
25%	19669.750000	NaN	NaN	NaN	NaN	NaN	1.000000	29.000000	3.000000	3.000000	
50%	39225.500000	NaN	NaN	NaN	NaN	NaN	1.000000	33.000000	3.000000	5.000000	
75%	58730.500000	NaN	NaN	NaN	NaN	NaN	1.000000	39.000000	4.000000	7.000000	
max	78298.000000	NaN	NaN	NaN	NaN	NaN	10.000000	60.000000	5.000000	37.000000	

```
df=df.drop(['employee_id','region','recruitment_channel'],axis=1)
```

```
df.isnull().sum()
```

```
department                 0
education               2409
gender                     0
no_of_trainings            0
age                        0
previous_year_rating    4124
length_of_service          0
KPIs_met >80%              0
awards_won?                0
avg_training_score         0
is_promoted                0
dtype: int64
```

```
#replacing nan with mode
print(df['education'].value_counts())
df['education'] = df['education'].fillna(df['education'].mode()[0])
```

```
education
Bachelor's          36669
Master's & above    14925
Below Secondary       805
Name: count, dtype: int64
```

```
#replacing nan with mode
print(df['previous_year_rating'].value_counts())
df['previous_year_rating'] = df['previous_year_rating'].fillna(df['previous_year_rating'].mode()[0])
```

```
previous_year_rating
3.0    18618
5.0    11741
4.0     9877
1.0     6223
2.0     4225
Name: count, dtype: int64
```

```
negative=df[(df['KPIs_met >80%']==0)& (df['awards_won?']==0) & (df['previous_year_rating']==1.0) & (df['is_promoted']==1) & (df['avg_training_score']<60)]
negative
```

	department	education	gender	no_of_trainings	age	previous_year_rating	length_of_service	KPIs_met >80%	awards_won?	avg_training_score	is_promoted
31860	Sales & Marketing	Bachelor's	m	1	27	1.0	2	0	0	58	1
51374	Sales & Marketing	Bachelor's	m	1	31	1.0	5	0	0	58	1

```
#removing negative data
df.drop(index=[31860,51374],inplace=True)
```

```
#handling outliers
q1 = np.quantile(df['length_of_service'],0.25)
q3 = np.quantile(df['length_of_service'],0.75)
IQR = q3-q1
upperBound = (1.5*IQR)+q3
lowerbound = (1.5*IQR)-q1
print('q1 :',q1)
print('q3 :',q3)
print('IQR :',IQR)
print('upper Bound :',upperBound)
print('Lower Bound :',lowerbound)
print('skewed data :',len(df[df['length_of_service']>upperBound]))
```

```
q1 : 3.0
q3 : 7.0
IQR : 4.0
upper Bound : 13.0
Lower Bound : 3.0
skewed data : 3489
```

```
[48] pd.crosstab([df['length_of_service']>upperBound],df['is_promoted'])
```

is_promoted	0	1
length_of_service		
False	46885	4434
True	3255	234

```
#capping
df['length_of_service']=[upperBound if x>upperBound else x for x in df['length_of_service']]
```

```
# feature mapping is done on education column
df['education']=df['education'].replace(("Below Secondary","Bachelor's","Master's & above"),(1,2,3))
```

```
lb = LabelEncoder()
df['department']=lb.fit_transform(df['department'])
```

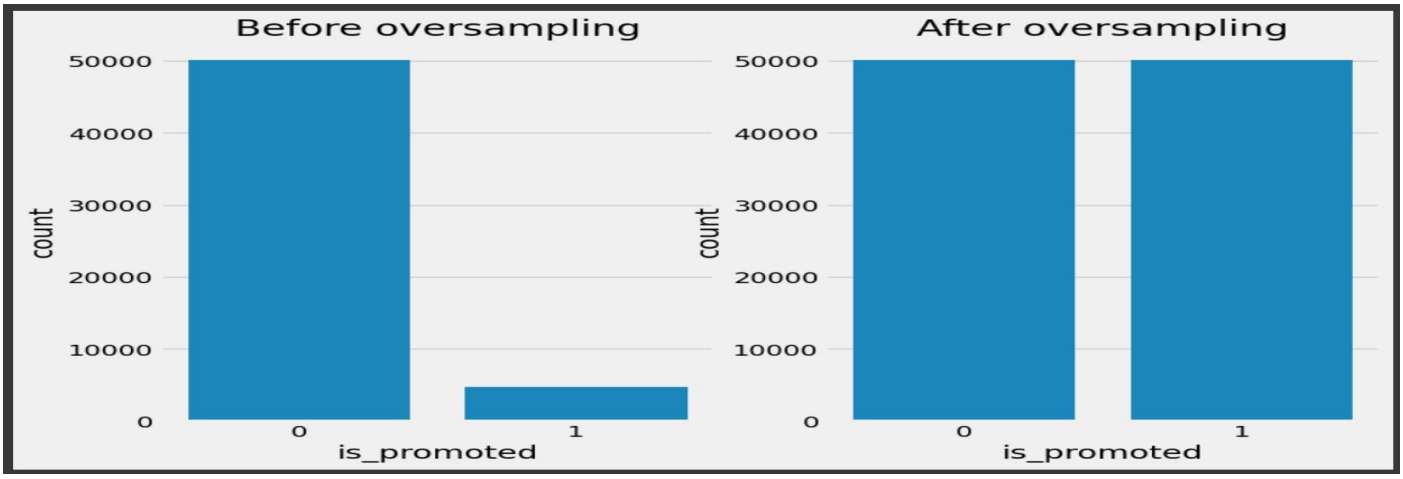
```
# splitting data and resampling it
x = df.drop('is_promoted',axis=1)
y = df['is_promoted']
print (x.shape)
print(y.shape)
```

```
(54808, 10)
(54808,)
```

```
[53] from imblearn.over_sampling import SMOTE
```

```
[54] x = df.drop('is_promoted',axis=1)
     x = pd.get_dummies(x)
     sm = SMOTE()
     x = x.fillna(x.mean())
     y = df['is_promoted']
     x_resample, y_resample = sm.fit_resample(x,y)
```

```
[55]
     plt.figure(figsize=(10,6))
     plt.subplot(1,2,1)
     sns.countplot(x=y) # Changed to y since x_resample is a DataFrame
     plt.title('Before oversampling')
     plt.subplot(1,2,2)
     sns.countplot(x=y_resample)
     plt.title('After oversampling')
     plt.show()
```




```
x_train,x_test,y_train,y_test = train_test_split(x_resample,y_resample,test_size=0.3,random_state=(10))
```

```
print('shape of x_train {}'.format(x_train.shape))
print('shape of y_train {}'.format(y_train.shape))
print('shape of x_test {}'.format(x_test.shape))
print('shape of y_test {}'.format(y_test.shape))
```

```
shape of x_train (70196, 11)
shape of y_train (70196,)
shape of x_test (30084, 11)
shape of y_test (30084,)
```

```
def decisionTree(x_train,x_test,y_train,y_test):
  dt=DecisionTreeClassifier()
  dt.fit(x_train,y_train)
  y_pred = dt.predict(x_test)
  print('***DecisionTreeClassifier***')
  print('confusion_matrix')
  print(confusion_matrix(y_test,y_pred))
  print('Classification report')
  print(classification_report(y_test,y_pred))
```

```python
def randomforest(x_train,x_test,y_train,y_test):
 rf = RandomForestClassifier()
 rf.fit(x_train,y_train)
 y_pred= rf.predict(x_test)
 print('***RandomForestClassifier***')
 print('Confusion matrix')
 print(confusion_matrix(y_test,y_pred))
 print('Classification report')
 print(classification_report(y_test,y_pred))
```

```python
def KNN(x_train,x_test,y_train,y_test):
  knn = KNeighborsClassifier()
  knn.fit(x_train,y_train)
  y_pred= knn.predict(x_test)
  print('***KNeighborsClassifier***')
  print('Confusion matrix')
  print(confusion_matrix(y_test,y_pred))
  print('Classification report')
  print(classification_report(y_test,y_pred))
```

```python
def xgboost(x_train,x_test,y_train,y_test):
  xg = GradientBoostingClassifier()
  xg.fit(x_train,y_train)
  y_pred= xg.predict(x_test)
  print('***GradientBoostingClassifier***')
  print('Confusion matrix')
  print(confusion_matrix(y_test,y_pred))
  print('Classification report')
  print(classification_report(y_test,y_pred))
```

```python
def compareModel(x_train,x_test,y_train,y_test):
    # Call your machine learning functions here, e.g.,
    decisionTree(x_train, x_test, y_train, y_test)
    randomforest(x_train, x_test, y_train, y_test)
    KNN(x_train, x_test, y_train, y_test)
    xgboost(x_train, x_test, y_train, y_test)
```

```python
compareModel(x_train,x_test,y_train,y_test)
```

```
***DecisionTreeClassifier***
confusion_matrix
[[13951  1124]
 [  836 14173]]
Classification report
              precision    recall  f1-score   support

           0       0.94      0.93      0.93     15075
           1       0.93      0.94      0.94     15009

    accuracy                           0.93     30084
   macro avg       0.93      0.93      0.93     30084
weighted avg       0.94      0.93      0.93     30084

***RandomForestClassifier***
Confusion matrix
[[14323   752]
 [  721 14288]]
Classification report
              precision    recall  f1-score   support

           0       0.95      0.95      0.95     15075
           1       0.95      0.95      0.95     15009

    accuracy                           0.95     30084
   macro avg       0.95      0.95      0.95     30084
weighted avg       0.95      0.95      0.95     30084

***KNeighborsClassifier***
Confusion matrix
[[12393  2682]
 [  340 14669]]
Classification report
              precision    recall  f1-score   support
```

```
                precision    recall  f1-score   support
Code cell output actions
              0       0.97      0.82      0.89     15075
              1       0.85      0.98      0.91     15009

    accuracy                           0.90     30084
   macro avg       0.91      0.90      0.90     30084
weighted avg       0.91      0.90      0.90     30084

***GradientBoostingClassifier***
Confusion matrix
[[13372  1703]
 [ 1818 13191]]
Classification report
              precision    recall  f1-score   support

           0       0.88      0.89      0.88     15075
           1       0.89      0.88      0.88     15009

    accuracy                           0.88     30084
   macro avg       0.88      0.88      0.88     30084
weighted avg       0.88      0.88      0.88     30084
```

```
#Random forest model is selected
rf = RandomForestClassifier()
rf.fit(x_train,y_train)
y_pred = rf.predict(x_test)
```

```
cv = cross_val_score(rf,x_resample,y_resample,cv=5)
np.mean(cv)
```

```
0.9511069006781014
```

```
pickle.dump(rf,open('model.pkl','wb'))
```

```
from google.colab import files
files.download('model.pkl')
```

#MODEL DEPLOYEMENT

#app.py

```
Import pickle
from flask import Flask, render_template, request
#import joblib
import numpy as np
import pandas as pd
import pickle
app=Flask(_name_)
#model=joblib.load('random_forest_model.pkl')
model=pickle.load(open('model.pkl','rb'))
app=Flask(_name_,template_folder='template')
@app.route('/')
def home():
   return render_template('index.html')
@app.route('/predict', methods=['POST'])
def predict():
  input_feature=[x for x in request.form.values()]
  input_feature=np.transpose(input_feature)
  input_feature=[np.array(input_feature)]
  print(input_feature)
  names=['department', 'education', 'no_of_trainings', 'age',
     'previous_year_rating', 'length_of_service', 'KPIs_met >80%',
     'awards_won?', 'avg_training_score']
  data=pd.DataFrame(input_feature,columns=names)
  prediction=model.predict(data)
  result=int(prediction[0])
  print(result)
  if result==1:
```

```
    result='promoted'
  else:
    result='Not promoted'
  return render_template('result.html', prediction_text='The employee is: {}'.format(result))
if _name=='main_':
  app.run(debug=True)
```

INDEX.HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Employee Promotion Prediction Using ML</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            background-color: #f0f0f0;
            margin: 0;
            padding: 0;
        }
        .header {
            background-color: #333;
            color: white;
            padding: 1em;
            text-align: center;
        }
        .nav {
            display: flex;
            justify-content: center;
            background-color: #444;
        }
        .nav a {
            color: white;
            padding: 1em;
            text-decoration: none;
            text-align: center;
        }
        .nav a:hover {
            background-color: #555;
        }
        .content {
            padding: 2em;
            background-color: white;
            margin: 2em;
```

```
            border-radius: 8px;
        }
        .predict-button {
            display: block;
            margin: 2em auto;
            padding: 1em 2em;
            background-color: #28a745;
            color: white;
            text-align: center;
            border-radius: 8px;
            text-decoration: none;
        }
        .predict-button:hover {
            background-color: #218838;
        }
    </style>
</head>
<body style="background-image: url('a.jpg'); background-repeat: no-repeat;
background-size: 100%;" >


        <h1>Employee Promotion Prediction Using ML</h1>


    <div class="nav">
        <a href="home.html">Home</a>
        <a href="about.html">About</a>
        <a href="predict.html">Predict</a>
    </div>


        <p>Promotion or career advancement is a process through which an employee
of a company is given a higher share of duties, a higher pay scale, or both.
Promotion is not just beneficial for employees but is also highly crucial for the
employer or business owners. It boosts the morale of promoted employees, increases
their productivity, and hence improves upon the overall profits earned by the
organization.</p>

        <a href="predict.html">To predict your promotion click on the predict
button on the top right side corner</a>


</body>
</html>
```

HOME PAGE.HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
```

```
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Employee Promotion Prediction Using ML</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            background-color: #f0f0f0;
            margin: 0;
            padding: 0;
        }
        .header {
            background-color: #333;
            color: white;
            padding: 1em;
            text-align: center;
        }
        .nav {
            display: flex;
            justify-content: center;
            background-color: #444;
        }
        .nav a {
            color: white;
            padding: 1em;
            text-decoration: none;
            text-align: center;
        }
        .nav a:hover {
            background-color: #555;
        }
        .content {
            padding: 2em;
            background-color: white;
            margin: 2em;
            border-radius: 8px;
        }
        .predict-button {
            display: block;
            margin: 2em auto;
            padding: 1em 2em;
            background-color: #28a745;
            color: white;
            text-align: center;
            border-radius: 8px;
            text-decoration: none;
        }
        .predict-button:hover {
            background-color: #218838;
        }
    </style>
</head>
```

```
<body style="background-image: url('a.jpg'); background-repeat: no-repeat;
background-size: 100%;" >


        <h1>Employee Promotion Prediction Using ML</h1>


    <div class="nav">
        <a href="home.html">Home</a>
        <a href="about.html">About</a>
        <a href="predict.html">Predict</a>
    </div>


        <p>Promotion or career advancement is a process through which an employee
of a company is given a higher share of duties, a higher pay scale, or both.
Promotion is not just beneficial for employees but is also highly crucial for the
employer or business owners. It boosts the morale of promoted employees, increases
their productivity, and hence improves upon the overall profits earned by the
organization.</p>

        <a href="predict.html">To predict your promotion click on the predict
button on the top right side corner</a>

</body>
</html>
```

PREDICT.HTML

```
<!DOCTYPE html>
<html>
<head>
    <title>Employee Promotion Prediction Using ML</title>
</head>
<body style="background-image: url('p1.jpg'); background-repeat: no-repeat;
background-size: 98%;">
    <h1>Employee Promotion Prediction Using ML</h1>
    <div class="nav">
        <a href="home.html">Home</a>
        <a href="about.html">About</a>
        <a href="predict.html">Predict</a><br><br>
    </div>
    <form action="submit.html" method="get">
        <label for="department">Department:</label>
        <input type="text" id="department" name="department"><br><br>

        <label for="education">Education:</label>
        <select id="education" name="education">
            <option value="below_secondary">Below Secondary</option>
```

```
            <option value="secondary">Secondary</option>
            <option value="bachelor">Bachelor</option>
            <option value="master">Master</option>
            <option value="phd">PhD</option>
        </select><br><br>

        <label for="trainings">No. of Trainings:</label>
        <input type="number" id="trainings" name="trainings"><br><br>

        <label for="age">Age:</label>
        <input type="number" id="age" name="age"><br><br>

        <label for="rating">Previous Year Rating:</label>
        <input type="number" id="rating" name="rating" step="0.1"><br><br>

        <label for="service">Length of Service:</label>
        <input type="number" id="service" name="service"><br><br>

        <label for="kpi">KPIs met >80%:</label>
        <select id="kpi" name="kpi">
            <option value="0">0</option>
            <option value="1">1</option>
        </select><br><br>

        <label for="awards">Awards won:</label>
        <select name="awards" id="awards">
            <option value="0">0</option>
            <option value="1">1</option>
        </select><br><br>

        <label for="avg_training_score">Average Training Score:</label>
        <input type="number" id="avg_training_score" name="avg_training_score"
step="0.1"><br><br>

        <input type="submit" value="Submit">
    </form>
</body>
</html>
```

SUBMIT.HTML

```
<!DOCTYPE html>
<html>
<head>
    <title>Employee Promotion Prediction</title>
</head>
<body style="background-image: url('s.jpg'); background-repeat: no-repeat;
background-size: 98%;">
    <h1>Employee Promotion Prediction Using ML</h1>
    <div class="nav">
```

```
        <a href="home.html">Home</a>
        <a href="about.html">About</a>
        <a href="predict.html">Predict</a>
    </div>
    <p>Eligibility status: {{predictionText}}</p>
</body>
</html>
```

7.RESULT


Employee Promotion Prediction Using ML
Home About Predict
Department:
Education: Below Secondary
No. of Trainings:
Age:
Previous Year Rating:
Length of Service:
KPIs met >80%: 0
Awards won: 0
Average Training Score:
Submit


Employee Promotion Prediction Using ML
Home About Predict
Eligibility status: {{predictionText}}

8. ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

- Recruitment and Retention: Effective HRM strategies help attract and retain talented employees, ensuring the organization has the right people in the right roles.
- Training and Development: HRM focuses on developing employees' skills and knowledge, leading to a more competent and competitive workforce.
- Employee Satisfaction and Motivation: By addressing employees' needs and fostering a positive work environment, HRM can increase job satisfaction and motivation, leading to higher productivity.
- Performance Management: HRM establishes performance standards and appraisal systems, helping to align employees' performance with organizational goals.
- Legal Compliance: HRM ensures that the organization complies with labor laws and regulations, reducing the risk of legal issues and penalties.
- Conflict Resolution: HRM provides mechanisms for resolving workplace conflicts, promoting a harmonious and collaborative work environment.
- Strategic Planning: HRM contributes to strategic planning by aligning human resources with the organization's long-term goals and objectives.
- Cost Management: Efficient HRM practices can help control labor costs through effective workforce planning, benefits management, and compensation strategies.
- Organizational Culture: HRM helps to shape and maintain a positive organizational culture, which can enhance employee engagement and organizational loyalty.
- Adaptability: HRM enables organizations to adapt to changes in the external environment, such as market conditions and technological advancements, by ensuring a flexible and skilled workforce.

DISADVANTAGES:

- Costly Implementation: Establishing and maintaining an HRM system can be expensive, especially for small and medium-sized enterprises (SMEs). Costs can include software, training, and specialized HR personnel.
- Time-Consuming: HRM processes such as recruitment, training, performance appraisals, and conflict resolution can be time-consuming, potentially diverting focus from core business activities.
- Complexity in Compliance: Ensuring compliance with labor laws and regulations can be complex and burdensome, requiring continuous monitoring and updating of policies.
- Resistance to Change: Employees and managers may resist HRM initiatives, particularly if they involve significant changes to existing processes or corporate culture.
- Confidentiality Issues: Handling sensitive employee information poses risks to privacy and data security. Breaches can lead to legal and reputational damage.

9.APPLICATIONS

Applications of Human Resource Management predicting Employee promotions using machine learning included:

1. Recruitment and Selection:
   Job analysis and design
   Advertising job vacancies
   Screening and interviewing candidates
   Onboarding and orientation

2. Training and Development:
   Identifying training needs
   Designing and delivering training programs
   Career development and planning
   Leadership development

3. Performance Management:
   Setting performance standards and goals
   Conducting performance appraisals
   Providing feedback and coaching
   Implementing performance improvement plans

4. Compensation and Benefits:
   Designing competitive compensation packages
   Managing employee benefits programs
   Conducting salary surveys and benchmarking
   Administering incentive and bonus programs

5. Employee Relations:
   Developing and enforcing workplace policies
   Addressing employee grievances and conflicts
   Promoting a positive organizational culture
   Ensuring compliance with labor laws and regulations

6. Workforce Planning:
   Forecasting future workforce needs
   Succession planning
   Managing talent pipelines
   Handling layoffs and workforce reductions

7. Health and Safety:
   Implementing workplace health and safety programs

Conducting risk assessments and safety audits
Providing health and wellness resources
Ensuring compliance with occupational health and safety regulations

8. Diversity and Inclusion:
Promoting diversity in hiring and promotions
Implementing inclusion training and initiatives
Monitoring diversity metrics and goals
Fostering an inclusive work environment

9. Employee Engagement and Retention:
Conducting employee satisfaction surveys
Implementing engagement initiatives
Recognizing and rewarding employee contributions
Addressing factors contributing to employee turnover

10. HR Information Systems (HRIS):
Managing employee data and records
Automating HR processes
Analyzing HR metrics and reporting
Enhancing data security and privacy

11. Strategic HRM:
Aligning HR strategies with organizational goals
Supporting organizational change and transformation
Contributing to business planning and development
Enhancing organizational agility and adaptability

11.BIBILOGRAPHY

Creating a bibliography for Human Resource Management (HRM) involves listing key texts, articles, and sources that provide comprehensive insights into the field. Here are some foundational and influential works in HRM:

1. Books:

- Armstrong, M. (2020). Armstrong's Handbook of Human Resource Management Practice (15th ed.). Kogan Page.

- Dessler, G. (2020). Human Resource Management (16th ed.). Pearson.

- Noe, R. A., Hollenbeck, J. R., Gerhart, B., & Wright, P. M. (2019). Human Resource Management: Gaining a Competitive Advantage (11th ed.). McGraw-Hill Education.

- Boxall, P., Purcell, J., & Wright, P. (2007). The Oxford Handbook of Human Resource Management. Oxford University Press.

- Ulrich, D. (1997). Human Resource Champions: The Next Agenda for Adding Value and Delivering Results. Harvard Business Review Press.

2. Journals:

- Human Resource Management Journal: This journal covers the latest research and developments in HRM.

- Academy of Management Journal: While broader in scope, it includes significant HRM research.

- Journal of Human Resources: Focuses on labor economics and human resources issues.

- Personnel Psychology: Covers both the theoretical and practical aspects of HRM.

3. Articles:

- Barney, J. (1991). "Firm Resources and Sustained Competitive Advantage." Journal of Management, 17(1), 99-120.

- Becker, B. E., & Huselid, M. A. (1998). "High Performance Work Systems and Firm Performance: A Synthesis of Research and Managerial Implications." Research in Personnel and Human Resources Management, 16, 53-101.

- Wright, P. M., & McMahan, G. C. (1992). "Theoretical Perspectives for Strategic Human Resource Management." Journal of Management, 18(2), 295-320.

4. Websites and Online Resources:

- Society for Human Resource Management (SHRM): www.shrm.org

- Chartered Institute of Personnel and Development (CIPD): www.cipd.co.uk

- HR Magazine: www.hrmagazine.co.uk

5. Government and Organizational Reports:

- U.S. Bureau of Labor Statistics: Reports and data on employment trends and HR practices.

- International Labour Organization (ILO): Publications on global HR standards and practices.

This bibliography includes a mix of textbooks, scholarly journals, influential articles, and online resources that provide a comprehensive foundation for studying HRM.