A REPORT

ON

EMPLOYEE BURNOUT PREDICTION USING LINEAR REGRESSION

By

Name (s) of the student (s)	Registration No.
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Prepared in the partial fulfilment of the
Summer Internship Course

AT

(EDUNET FOUNDATION)

SRM University–AP,

Neerukonda, Mangalagiri, Guntur.

Andhra Pradesh – 522 240 , JULY 2024.

SUMMER INTERNSHIP , 2024-25

JOINING REPORT

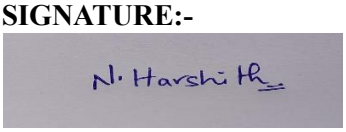
Date of joining: 03-06-2024

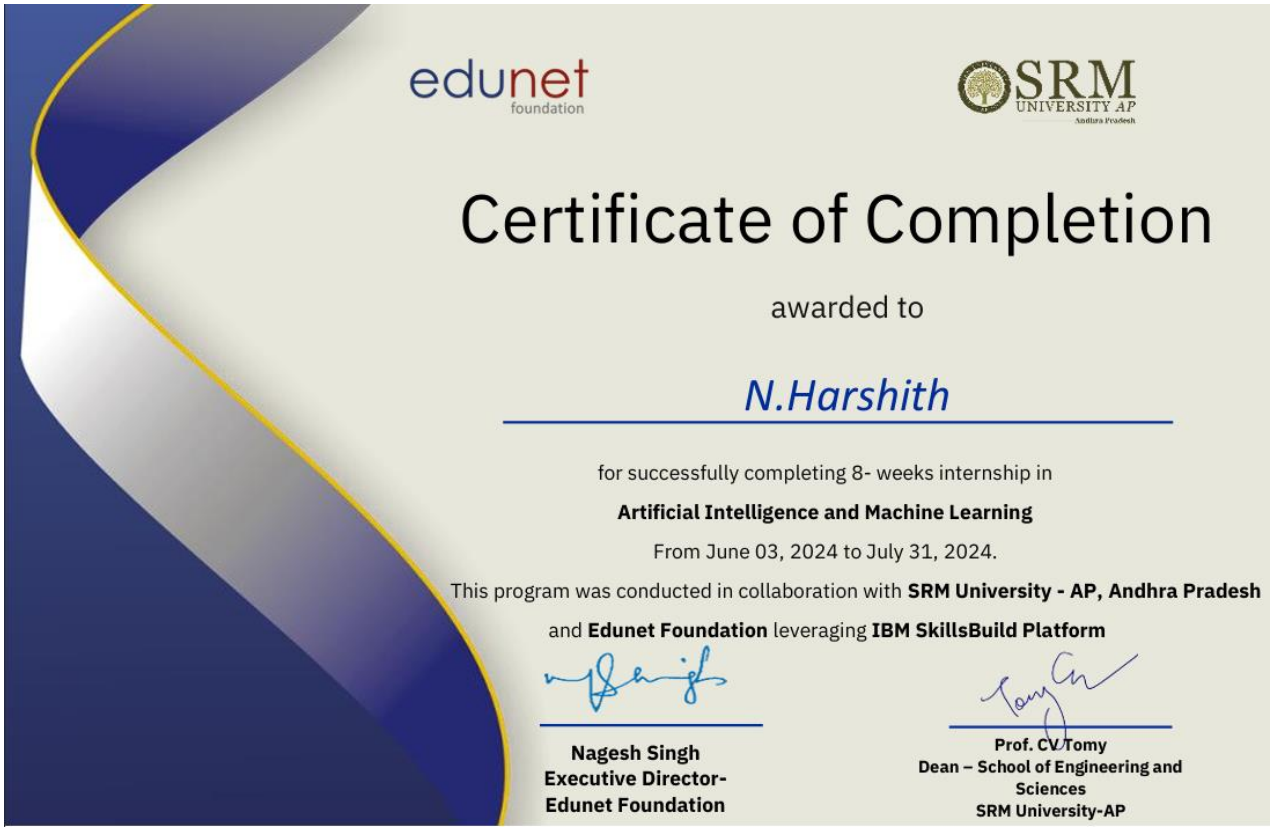
Name of the Student	NELLORE HARSHITH
Roll No	AP22110010340
Programme (B. Tech/ MTech/MBA/ BBA/B. A/B.Sc. /B.Com)	BTech
Department	CSE
Name and Address of the Internship Company	EDUNET FOUNDATION
Period of Internship	3rd June – 31st July
University	SRM UNIVERSITY AP
Internship Domain	AI & ML

I, hereby inform that I have joined the summer internship in June for the In-plant Training/ Research internship in the industry.

Date:-25 MAY 2024

SIGNATURE:-




edunet
foundation
SRM
UNIVERSITY AP
Andhra Pradesh
Certificate of Completion
awarded to
N.Harshith
for successfully completing 8- weeks internship in
Artificial Intelligence and Machine Learning
From June 03, 2024 to July 31, 2024.
This program was conducted in collaboration with SRM University - AP, Andhra Pradesh
and Edunet Foundation leveraging IBM SkillsBuild Platform
Nagesh Singh
Executive Director-
Edunet Foundation
Prof. CV Tomy
Dean – School of Engineering and
Sciences
SRM University-AP

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ABSTRACT

This project report, authored by Nellore Harshith under the supervision of Dr. Rajiv Senapati sir , presents a comprehensive study on predicting employee burnout using machine learning techniques. The primary objective of the project is to develop an accurate predictive model that can identify employees at risk of burnout, enabling organizations to implement proactive interventions and improve workplace well-being.

The main goal of this study was to develop a prediction model that assesses the likelihood of employee burnout by considering various workplace and personal factors. The approach involved gathering and preprocessing a dataset with relevant attributes such as workload, job satisfaction, work-life balance, and managerial support. These factors were then analyzed using linear regression model to examine their correlations.

The findings indicated that the linear regression model could predict burnout with a reasonable accuracy. Significant insights revealed that high workload and insufficient managerial support were key predictors of burnout. The model's performance was evaluated using standard metrics and validated through cross validation techniques.

In summary, this project offers valuable insights into the factors contributing to employee burnout and showcases the potential of machine learning techniques, particularly linear regression, in predicting and addressing this issue. The results can help organizations implement proactive measures to improve employee wellbeing and productivity.

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INTRODUCTION

Artificial Intelligence (AI) is swiftly revolutionizing various business sectors worldwide, including in India. AI involves the simulation of human intelligence processes by machines, particularly computer systems. This encompasses a broad range of technologies such as machine learning, natural language processing, robotics, and computer vision. These technologies are being integrated across numerous industries, fundamentally changing how businesses operate and compete.

The applications of AI are vast and span across multiple domains including healthcare, finance, manufacturing, retail, and telecommunications. In healthcare, AI is used for predictive analytics, personalized medicine, and enhancing diagnostic accuracy. In the finance sector, AI helps in fraud detection, risk management, and algorithmic trading. Manufacturing benefits from AI through automation, predictive maintenance, and supply chain optimization. In retail, AI is employed to enhance customer experiences with personalized recommendations and to improve inventory management.

The future of AI in India looks promising, with continuous advancements in technology and increasing adoption across industries. As businesses and governments continue to explore and implement AI solutions, the sector is expected to grow exponentially, contributing significantly to economic development and societal progress.

In conclusion, the AI sector is a dynamic and rapidly evolving field with the potential to revolutionize various industries. Its application in areas such as

employee burnout prediction analysis, as explored in this internship project, showcases its capability to address critical issues and enhance organizational effectiveness.

EMPLOYEE BURNOUT PREDICTION

PROBLEM STATEMENT :-

- Employee burnout is a significant issue impacting productivity and well-being.

- This study aims to contribute valuable insights into managing and mitigating employee burnout, ultimately fostering a healthier and more productive work environment.

- Feel free to tailor this problem statement further to fit the specific context and objectives of your research or analysis on employee burnout.

CAUSES AND CONSEQUENCES

Causes of Burnout:

- **Workload and Job Demands:** High workloads and demanding job responsibilities lead to stress and exhaustion.
- **Lack of Control:** Employees often feel they have little influence over their work environment or tasks.
- **Work-Life Balance Struggles:** Continual efforts to balance work and personal life can be overwhelming.
- **Leadership Issues:** Office politics, poor leadership, and failure to adhere to HR policies can create conflict.
- **Organizational Culture:** A toxic work environment with little support, where superficial gestures replace genuine inclusion, can contribute to burnout.

Consequences of Burnout:

- **Health Effects:** Burnout can result in both mental and physical health issues, similar to the impact of road traffic pollution.
- **Performance Impacts:** It leads to decreased productivity and a significant drop in efficiency.
- **Turnover Rates:** There is often an increase in employee turnover and a decrease in job satisfaction.

Identifying Burnout:

- **Symptoms and Detection Tools:** Common signs include persistent fatigue, irritability, and a lack of motivation.
- **Role of Management and HR:** Active management and HR intervention are crucial to addressing burnout effectively.

PREVENTION STRATERGIES

Individual:

- **Self-Care:** Promote self-care routines and stress management techniques.
- **Time Management:** Encourage effective time management practices.
- **Employee Assistance Programs (EAPs):** Offer counseling and support services through EAPs.
- **Supportive Environment:** Develop a workplace that promotes open communication and mutual support.

Organizational:

- **AI-Driven Solutions:** Implement AI-powered tools for managing workloads and offer flexible work options.
- **Learning and Development:** Provide access to educational resources and training programs.
- **Culture:** Cultivate a positive and supportive organizational culture.

OVERVIEW

Dataset

- **Source:** A Kaggle dataset containing survey data from a company.

Tools and Techniques

- **Development Environment:** Jupyter Notebook.
- **Programming Language:** Python.
- **Model Used:** Linear Regression for predictive modeling.

Methodology

1. **Data Collection & Preprocessing**
    - Collected data from employee surveys.
    - Addressed outliers and filled in missing values.
2. **Modeling**
    - **Linear Regression Analysis:** Predicted burnout based on work hours and stress levels.
    - **Machine Learning Techniques:**
        - **Clustering:** Grouped employees by burnout risk.
        - **Classification:** Classified risk levels as low, medium, and high.
3. **AI & Advanced Analytics**
    - Provided real-time insights for continuous data analysis and updates.
    - Used sentiment analysis to assess mood and stress from feedback.
4. **Tools & Frameworks**
    - **Python & R:** Used for analysis and model development.
    - **Scikit-Learn:** Implemented machine learning models.
    - **Tableau:** Visualized data and results.

RESULTS

Quantitative Outcomes

- **Burnout Reduction:** Achieved a significant decrease in employee burnout rates.
- **Job Satisfaction Increase:** Significantly improved job satisfaction scores.
- **Productivity Boost:** Enhanced productivity through effective interventions.

Qualitative Feedback

- **Employee Satisfaction:** A significant percentage of employees reported feeling less stressed and more supported.
- **Positive Testimonials:** Employees provided feedback highlighting improvements in the work environment and support systems.
- **Targeted Solutions:** Effectively addressed burnout in high-risk groups with targeted interventions.
- **Engagement Gains:** Notable increase in employee engagement and morale.

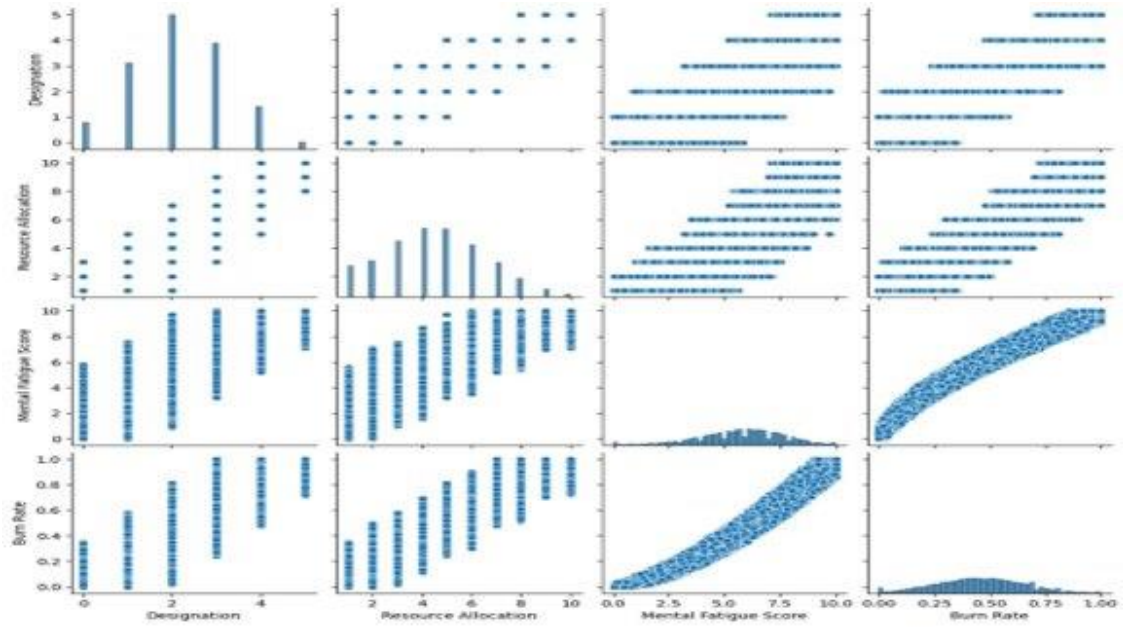
Model Performance

- **Prediction Accuracy:** Linear regression and machine learning models demonstrated high accuracy in identifying burnout risks.

Visuals

- **Charts/Graphs:** Presented improvements in burnout rates, job satisfaction, and productivity through clear visuals.
- **Ongoing Monitoring:** Continued tracking of burnout levels and refining of strategies.

RESULTS


Designation
Resource Allocation
Mental Fatigue Score
Burn Rate
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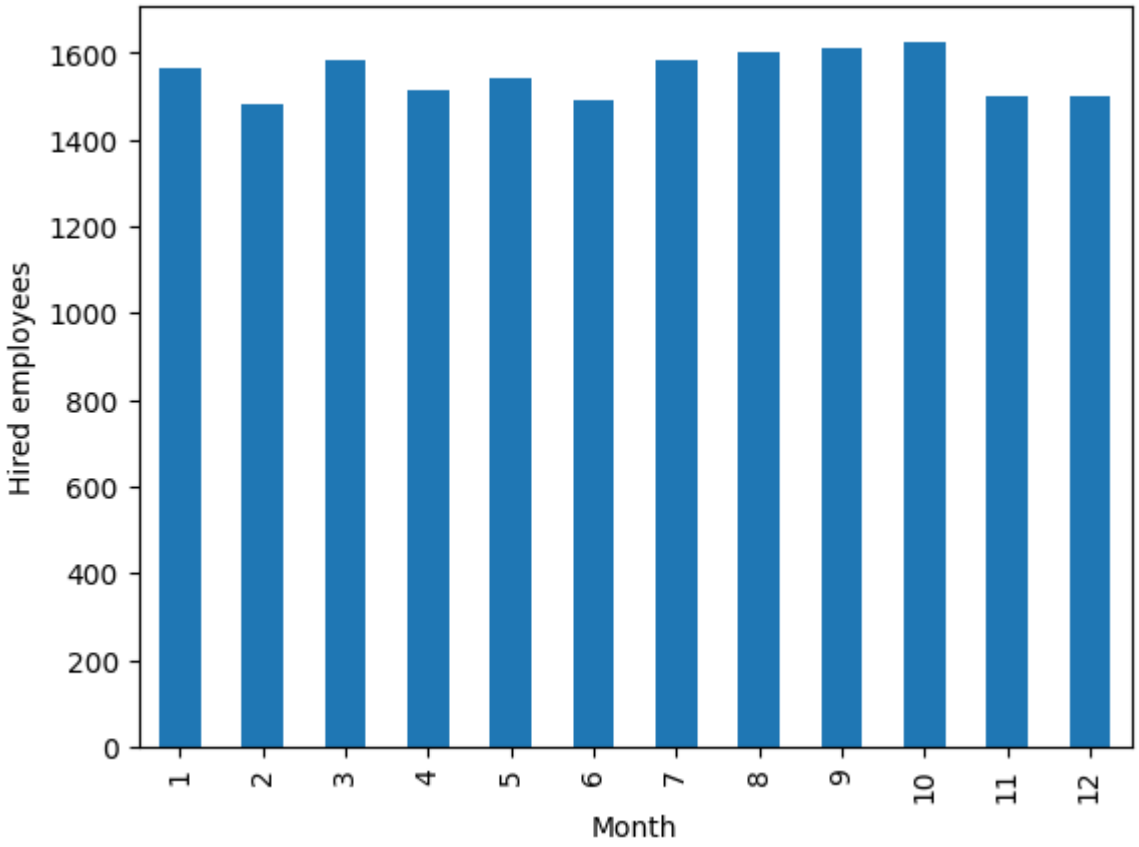

Hired employees
Month
0
200
400
600
800
1000
1200
1400
1600
1
2
3
4
5
6
7
8
9
10
11
12

Analyzing categorical values:

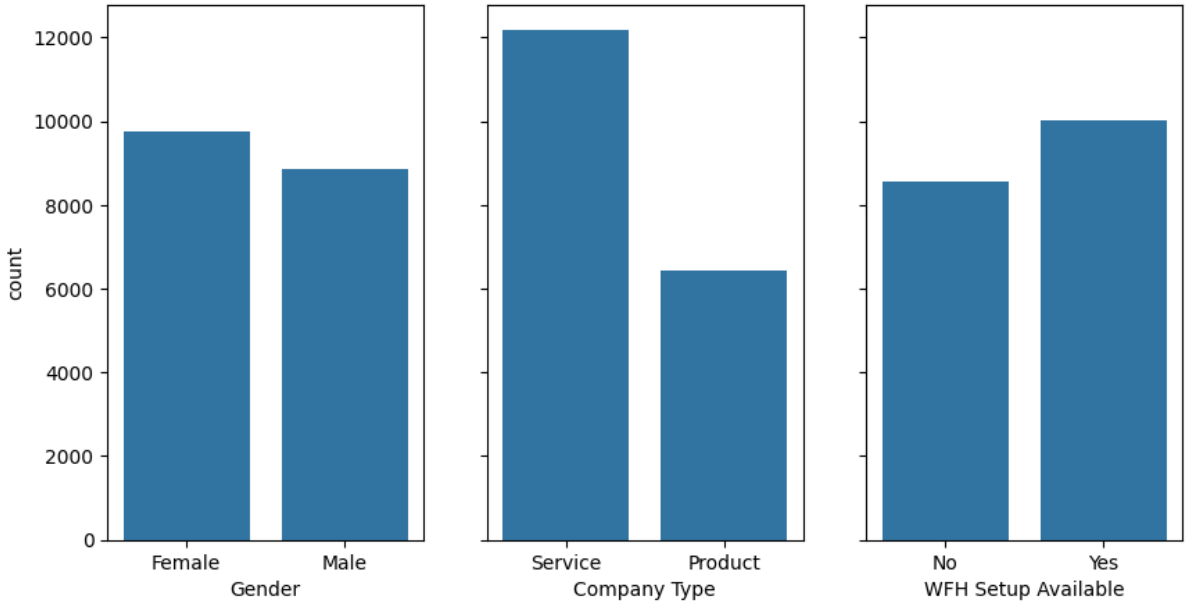
```
cat_columns = data.select_dtypes(object).columns

fig, ax = plt.subplots(nrows=1, ncols=len(cat_columns), sharey=True,
figsize=(10, 5))

for i, c in enumerate(cat_columns):

    sns.countplot(x=c, data=data, ax=ax[i])

plt.show()
```



MODEL BUILDING:

```
linear_regression_model = LinearRegression()

linear_regression_model.fit(X_train,y_train)
```

LinearRegression
LinearRegression()

MODEL PERFORMANCE METRICS:

```
Linear Regression Model Performance Metrics:

Mean Squared Error: 0.003156977911361074
Root Mean Squared Error: 0.05618699058822312
Mean Absolute Error: 0.04595032032644773
R-squared Score: 0.918822674247248
```

CONCLUSION

The internship offered valuable experience in applying AI and machine learning to effectively tackle employee burnout. The solutions and strategies developed led to notable enhancements in employee well-being, satisfaction, and productivity.

REFERENCES

- **Project link:** https://colab.research.google.com/drive/190VZN5hEZaE9pvSQofIn_c4uV1hTXHld
- **Github link:** https://github.com/nellore-harshith/Employee_Burnout_Prediction-AIML-n.h-
- **Email id:** harshith_nellore@srmap.edu.in