PROJECT REPORT

Task Management System: Data Analysis and Machine Learning-Based Priority Prediction

1. Title of the Project

Task Management System Using Data Analysis and Machine Learning for Priority Prediction and Workload Optimization

2. Abstract

This project presents a data-driven Task Management System designed to analyze tasks, understand workload distribution, and predict task priority using machine learning algorithms. The project includes exploratory data analysis (EDA), text preprocessing of task descriptions, visualization, and training of multiple ML models such as Naive Bayes, SVM, Random Forest, and XGBoost. Additionally, workload balancing among employees is performed based on task allocation patterns. The system provides insights into task distribution, predicts priority levels, and suggests workload rebalancing to improve efficiency.

3. Introduction

Managing tasks effectively is essential for organizational productivity. With an increase in work volume, identifying workload imbalance, classifying tasks, and predicting priority becomes challenging. This project aims to automate insights and support smart decision-making using data analysis and machine learning.

4. Dataset Description

The dataset contains 300 records with details of Task ID, Description, Assigned Employee, Status, Deadline Days, and Priority.

5. Methodology

- Week 1: EDA including Priority Distribution, Status Distribution, and WordCloud.

- Text preprocessing using lowercase conversion, punctuation removal, stopwords removal, and stemming.

- Week 2: Status prediction using Naive Bayes, SVM, Random Forest, and XGBoost.

- Week 3: Priority prediction using structured data with Random Forest and XGBoost.

- Workload balancing by identifying overloaded and underloaded employees.

6. Results and Findings

- SVM, Random Forest, and XGBoost achieved the highest accuracy (~0.37).

- WordCloud revealed frequent task-related keywords.

- Workload balancing suggested transferring tasks from overloaded to underloaded employees.

7. Conclusion

This project demonstrates how machine learning and EDA improve task management efficiency. Future improvements include deep learning models and skill-based task assignments.

8. Future Enhancements

- Add employee skill data

- Use BERT-based NLP models

- Deploy a real-time dashboard

9. References

Python libraries and machine learning frameworks used in development.