

FACULTY OF MANAGEMENT TRIBHUVAN UNIVERSITY



BIM SUMMER PROJECT PROPOSAL: IT 352

EMPLOYEE ANALYTICS AND CHURN PREDICTION SYSTEM

A project proposal submitted for the partial fulfillment of the requirements for
the degree of BIM awarded by Tribhuvan University

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CERTIFICATE OF APPROVAL

The undersigned certify that they have read and recommended to the Department of Computer Science for acceptance, a Summer Project Proposal entitled “Employee Analytics and Churn Prediction” submitted by **Ms. Swornima Shakya (13424/21)**, for the partial fulfilment of the requirement for the degree of Bachelor in Information Management awarded by Tribhuvan University.

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1. INTRODUCTION

Employee retention is a significant challenge for businesses across various industries. High employee turnover can lead to financial losses, decreased productivity, and disruptions in workflow. When employees leave unexpectedly, companies face increased costs related to recruitment, training, and onboarding new hires. Additionally, the loss of experienced employees can negatively impact team morale and overall business performance.

Many organizations struggle to identify employees at risk of leaving before they make their decision. Traditional HR methods rely on surveys and performance reviews, which may not always provide accurate or timely insights. To address this issue, data-driven approaches have become essential for predicting employee churn and improving retention strategies.

This project aims to develop an Employee Analytics and Churn Prediction System that uses Flask, Python, Machine Learning, MySQL, and JavaScript to analyze employee data and predict the likelihood of turnover. The system will help HR professionals understand key factors influencing employee attrition, visualize trends, and take proactive measures to retain valuable employees.

By implementing this system, organizations can reduce employee turnover, optimize HR decision-making, and create a more stable and productive workforce. The project will provide a user-friendly web application where HR teams can input employee details, receive churn predictions, and access actionable insights for improving employee satisfaction and engagement.

2. PROBLEM STATEMENT

The traditional methods of managing employee retention often rely on reactive approaches, where actions are taken only after an employee resigns. This leads to unexpected turnover, operational disruptions, and high recruitment costs. These challenges continue to impact both employees and organizations in the following ways:

- **Unpredictable Employee Turnover:** Companies struggle to identify at-risk employees, leading to sudden resignations and workforce instability.
- **High Recruitment and Training Costs:** The cost of replacing employees places financial strain on businesses, as reactive methods do not address turnover before it happens.
- **Decreased Productivity and Morale:** Unexpected employee departures result in a loss of knowledge and experience, which negatively affects team performance.
- **Limited Data-Driven Insights:** Relying on exit interviews and performance reviews provides only delayed feedback, missing the chance for proactive retention strategies.

To tackle these issues, a proactive employee churn prediction system is needed. By using machine learning and analytics, organizations can predict and address churn risks early, improving retention, reducing costs, and maintaining a stable workforce.

3. OBJECTIVES

The primary goal of this project is to create an efficient system that predicts employee churn and helps organizations take proactive measures. The specific objectives are:

- To develop a system that predicts employee churn using machine learning techniques.
- To build a user-friendly web dashboard for HR teams to visualize churn risks and employee data.
- To enable proactive retention strategies by providing insights into factors influencing employee turnover.

4. RESEARCH METHODOLOGY

4.1 Requirement Identification

In this section, we outline the functional and non-functional requirements for the Employee Churn Prediction System. These requirements will guide the development process and ensure the system meets its objectives effectively.

4.1.1 Functional Requirements

These are the core features and functionalities that the system must support:

- **Data Input and Management:** HR can input, manage, and retrieve employee data stored in a database for analysis.
- **Churn Prediction:** Machine learning predicts employee churn in real-time based on historical data.
- **Dashboard and Reporting:** An interactive dashboard displays churn risks, trends, and insights for HR teams.
- **User Authentication:** Secure login with role-based access for HR managers and admins.
- **Proactive Notifications:** Alerts notify HR when an employee has a high churn risk for timely action.

4.1.2 Non-functional Requirements

These are the quality attributes and constraints that the system must adhere to:

- **Performance:** The system should process large datasets and provide quick churn predictions.
- **Usability:** The interface should be user-friendly, with a responsive dashboard for clear insights.
- **Scalability:** It should handle growing employee data and allow future feature expansions.
- **Security:** Employee data must be protected with encryption and secure authentication.
- **Reliability and Availability:** The system should have minimal downtime and include backup mechanisms.
- **Compatibility:** It must work on modern browsers and various devices like laptops, tablets, and mobiles.

4.2 Feasibility Study

4.2.1 Technical Feasibility

The technical feasibility is high, as Flask, MySQL, and machine learning libraries like scikit-learn are widely accessible. The growing internet connectivity and availability of cloud platforms make it feasible, though some areas may face limitations in computational resources or stable internet access.

4.2.2 Economic Feasibility

The project is cost-effective, leveraging open-source tools like Python and Tailwind CSS, which minimizes software licensing costs. The main expenses will be for system development and maintenance. The cost of hiring local developers is competitive, making it affordable for businesses in Nepal.

4.2.3 Legal Feasibility

The project complies with data protection and privacy regulations in Nepal. It's essential to follow local labor and data privacy laws, ensuring secure storage and processing of employee data. With proper consent from employees, there are no significant legal barriers.

4.2.4 Operational Feasibility

Operationally, the system meets the needs of HR departments in Nepal, especially in urban areas where data-driven HR practices are gaining popularity. Successful implementation requires staff training and ongoing support to adapt to the new technology.

4.2.5 Schedule Feasibility

The project can be completed within 3 to 6 months. The timeline includes phases like system design, model development, and testing. With a focused team and clear milestones, the project can be delivered on time.

4.3 Data Collection Strategy

Data will be sourced mainly from Kaggle datasets on employee attrition, with possible additional data from internal HR systems. The data will be cleaned, anonymized, and validated to ensure accuracy for churn prediction.