Project Report: Employee Data Analysis for Strategic Workforce Insights

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1. Introduction

The workforce of a company plays an important role in its success. Understanding employee data helps to get insights in making informed decisions about salaries, diversity, and retention strategies. This project involves analysing employee records using Python to identify key workforce trends and provide strategic insights for better management.

Dataset Overview

The dataset contains employee records with details such as:

- Employee ID, Name, Job Title, and Department
- Salary and Bonus Information
- Gender and Ethnicity
- Hire and Exit Dates
- Geographic Data (Country, City)

Business Objective

This analysis supports **HR and workforce management** by identifying trends in compensation, diversity, retention, and departmental efficiency. Key objectives include:

- Understanding salary distribution and bonus structures.
- Evaluating gender and ethnic diversity across departments.
- Calculating employee tenure and turnover.
- Identifying high earners and compensation patterns.

2. Methodology

Data Preparation:

- **Handling Missing Values:**

    o Replaced missing Exit Date entries with "00/00/0000" (indicating active employees).
    o Forward-filled remaining missing values (e.g., Department, Job Title).

- **Data Cleaning:**

    o Removed duplicate records.
    o Converted Annual Salary (removed "$") and Bonus % (removed "%") to numeric formats.
    o Parsed Hire Date and Exit Date into datetime objects.

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Analytical Techniques Used

1. **Descriptive Analysis:**

- o **Sorting & Filtering:** Identified top earners using sorting method and IT department employees using filtering method.
- o **Grouping & Aggregation:** Found average salary per department.

2. **Demographic Insights:**
   - o Analysed gender and ethnicity distributions across the all the departments.
   - o Measured diversity metrics per department.

3. **Visualizations:**
   - o Used graphs to understand salary trends and workforce demographics.
   - o **Histogram:** Salary distribution across employees.
   - o **Bar Chart:** Employee count per department.
   - o **Boxplot:** Salary ranges by department.

4. **SQL Integration:**
   - o Stored data in an SQLite database for querying.
   - o Extracted tenure calculations (Exit Date vs. Hire Date).

Tools Used

- **Python** (Pandas, Matplotlib, Seaborn) for data analysis and visualization.
- **SQL Alchemy** for database management and querying.

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3. Key Findings

A. Salary and Compensation Trends

- **Top Earners:** Senior employees, such as Directors and Vice Presidents, earn over $200k.
- **Total Compensation:** Combines salary and bonuses to show the true cost of employees.
- **Average Salary by Department:** Accounting and Engineering departments have the highest salaries, while HR and Sales have lower salaries.
- **Bonuses:** The average bonus is around 8%, with Sales and Finance getting the highest performance-based incentives.
- **Total Bonus Expenditure:** The company spends around $15 million annually on bonuses.

B. Diversity and Inclusion

- **Gender Breakdown:**
  - o Engineering and IT departments have a male-dominated workforce (70%+).
  - o HR and Sales have a more balanced gender ratio.

- **Ethnicity Representation:**
    - Asian employees are high across the company which is ~44%.
    - Latino employees are second highest in the company.

C. Retention and Employee Tenure

- **High Retention:** Employees in Corporate roles stay for 8+ years.

- **High Turnover:** Manufacturing employees leave within 3 years, indicating job dissatisfaction.

D. Visual Insights

- **Salary Histogram:** Shows most employees earn below $110k.

- **Employee Distribution:** IT and Sales are the largest departments.

- **Salary Boxplot:** Highlights pay variation across departments.

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4. Conclusion and Recommendations

Summary of Results

The analysis revealed critical patterns in compensation, diversity, and retention:

- Compensation disparities exist between departments, with Engineering and IT leading.

- Gender imbalance persists in technical roles.

- Bonuses significantly impact total compensation but are unevenly distributed.

Strategic Recommendations

1. **Address Pay Gaps:**
    - Standardize salary bands across departments to ensure equity.
    - Review bonus structures to reward high performers in underrepresented roles.
2. **Improve Diversity:**
    - Launch targeted recruitment campaigns for female candidates in Engineering and IT.
    - Track diversity metrics quarterly to measure progress.
3. **Retention Strategies:**
    - Offer career development programs for long-tenured employees to reduce turnover.
    - Investigate causes of attrition in departments with high Exit Date rates.
4. **Optimize Bonuses:**
    - Align bonus percentages with performance metrics (e.g., sales targets, project outcomes).

Final Note:
This report provides insights to improve workforce efficiency, equity, and engagement. By addressing salary gaps, diversity issues, and retention risks, the company can build a strong and sustainable workforce.