**HR Analytics Report: Understanding Employee Attrition**

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**1. Executive Summary**

This report presents a comprehensive analysis of employee attrition, with the goal of identifying key factors that influence an employee's decision to leave the company. Our analysis, based on a dataset from Kaggle, found a significant correlation between attrition and several factors, including working overtime, job satisfaction, and compensation. A predictive model was developed that can identify employees at high risk of attrition, enabling the HR team to implement proactive retention strategies.

**Key Findings:**

* Employees working overtime have a disproportionately higher attrition rate.
* Job satisfaction and environment satisfaction are strong indicators of an employee's loyalty.
* Certain departments and job roles, particularly in sales, experience higher turnover.
* Lower monthly income is correlated with a higher likelihood of attrition.

**Recommendations:**

* Review and manage overtime policies, especially in high-attrition departments.
* Implement targeted employee engagement and satisfaction surveys to address specific pain points.
* Develop a retention program focused on employees with lower compensation and those in high-risk roles.

**2. Introduction**

The objective of this analysis is to understand the factors behind employee attrition to support strategic planning and improve employee retention. The scope of this report includes an examination of demographic, job-related, and satisfaction-based factors from the provided dataset.

**3. Data Description**

The data for this report was sourced from Kaggle and is stored in two files: the raw HR Analytics.csv and a cleaned HR\_Analytics\_Clean.csv. The dataset includes variables such as Age, Department, MonthlyIncome, JobSatisfaction, OverTime, and the target variable Attrition. Data quality issues, such as missing values in columns like YearsInCurrentRole, were addressed by imputing with the mean. Outliers in continuous variables were capped using the IQR method.

**4. Methodology**

The analysis employed a combination of descriptive statistics, exploratory data analysis (EDA), and a machine learning model.

* **Tools:** Python (Pandas, Matplotlib, Plotly, Scikit-learn) and Streamlit for the interactive dashboard.
* **Analytical Techniques:**
  + **Descriptive Statistics:** Used to summarize key features and distributions.
  + **Data Visualization:** Plots and charts were created to visualize the relationships between variables and attrition.
  + **Predictive Modeling:** A Logistic Regression model was trained to predict the probability of attrition based on employee attributes.

**5. Analysis and Findings**

**Attrition Overview**

The overall attrition rate in the dataset is approximately 16%, with 237 employees having left the company.

**Key Factors Affecting Attrition**

* **Overtime:** Employees who work overtime are significantly more likely to leave. The attrition rate for employees working overtime is more than double that of those who do not. This indicates a potential burnout issue.
* **Job Satisfaction:** Employees with a "Low" or "Medium" job satisfaction score have a higher rate of attrition. This highlights the importance of fostering a positive work environment.
* **Compensation:** There is a clear inverse relationship between MonthlyIncome and attrition. Employees in lower income brackets are more prone to leaving.
* **Departmental Turnover:** The Sales department shows a higher attrition rate compared to Research & Development and Human Resources. This may be due to the demanding nature of sales roles.
* **Age and Tenure:** The analysis shows that younger employees and those with less tenure at the company are more likely to leave, suggesting a challenge in retaining new hires.

**6. Conclusion**

The analysis confirms that employee attrition is not a random event but is driven by identifiable factors. The most impactful drivers are overtime, low compensation, and low job satisfaction. By understanding these key insights, the company can move from a reactive to a proactive stance on employee retention.

**7. Recommendations**

Based on our findings, we recommend the following actionable steps:

1. **Workload Management:** Conduct a review of overtime policies in the Sales department and other high-turnover areas.
2. **Retention Campaigns:** Launch targeted retention programs for employees with lower monthly incomes, offering bonuses or career development opportunities.
3. **Satisfaction Audits:** Implement regular, confidential surveys to gauge job and environment satisfaction, allowing the HR team to address issues before they lead to attrition.
4. **Utilize the Predictive Model:** Use the interactive dashboard to identify employees at high risk of attrition and initiate conversations or interventions to understand their concerns.

**8. Appendices**

* **Code Snippets:** Detailed code for data preprocessing and modeling is available in the DA\_Project\_PRE.ipynb and app.py files.
* **Dashboard:** The interactive Streamlit dashboard is available for further exploration.